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INTRODUCTION TO MECHANISM

An understanding of the principals of typewriter construction and function of its mechanism will aid the student and the mechanic in understanding adjustment requirements. It is the intent of this Foreword to present the theory of typewriter mechanism so that the reader may become acquainted with the operation of the machine prior to study of the individual subjects contained in this Manual for each make of machine.

Viewing the typewriter from the rear, as in the following drawing, in regular typing the Carriage would move to your right under tension of the Main Spring which is located under the Carriage to your right. When the end of the typing line is reached the operator will return the Carriage to your left. In explaining the mechanism of the drawing reference is made to Left and right from your position viewing the machine from the rear.

I. THE CARRIAGE MECHANISM:

a. THE CARRIAGE:

The Carriage is positioned on or between Carriage Rails, riding upon roller or ball bearings fitted into pinions or ball and roller retainers. These pinions or ball retainers are geared to racks or anti-creep racks, which function to retain the retainers within the carriage rails. Such bearings operate at a speed of one-half the movement of the carriage. In typing, the Carriage moves in the direction of the Main Spring Drum [to your right] because of tension applied by the Main Spring through the connecting Drawband which is attached to the Drawband Anchor Stud beneath the Carriage casting to your left.

b. THE CARRIAGE RACK:

To control movement of the Carriage for step-by-step or letter-by-letter spacing, the Carriage is equipped with a Carriage Rack. The teeth of this Rack are formed to face in the direction of the Main Spring [to your right]. The condition of these teeth is important, for if worn or broken they will not mesh properly with the teeth of the Pinion Wheel resulting in skipping when typing. The Carriage Release Levers form a part of the Rack Bail or assembly and when depressed [except on the Remington No. 17 and the L. C. Smith] the Rack is lifted from contact with the Pinion permitting unrestricted carriage movement. The Rack Bail is adjustable to permit proper meshing of the Rack into the Pinion Teeth. If the Rack Bail is adjusted too deeply, movement of the Carriage with the Line Space Lever will produce a rasping sound. If adjusted too shallow, improper mesh will result and skipping may occur.

c. THE PINION WHEEL:

The teeth of the Carriage Rack are positioned to mesh in the Pinion Wheel Teeth. The teeth of the Pinion are formed to face opposite to the Rack teeth so that they will fit into each other properly with sufficient purchase to prevent the Main Spring tension on the Carriage from causing the Rack to slip out of engagement with the Pinion.

d. THE PINION PAWL:

In regular typing [letter spacing] the Pinion Pawl, attached to the Starwheel, engages the teeth of the Pinion holding the Pinion in fixed
movement with the Starwheel [except on the Remington No. 17 and the L. C. Smith typewriters where the Pinion is affixed rigidly to the Starwheel]. When the Carriage is returned [to your left] for typing a new line the Rack is also carried with it and its engagement in the Pinion causes the Pinion to rotate backwards with it, this freedom being allowed by the Pinion Pawl which does not transmit this motion to the Starwheel. During the Carriage return, the Starwheel and the Escapement Rocker remain stationary.

**e. THE STARWHEEL:**

Traced, as outlined above, movement of the Carriage and Rack, Pinion and Pinion Pawl in typing is controlled by the movement of the Starwheel. The Starwheel is held by the Loose [Active or Holding] Dog of the Escapement Rocker and may rotate in regular typing only by movement of the Loose Dog off the Starwheel tooth.

**f. THE ESCAPEMENT ROCKER:**

The Escapement Rocker [Dogs assembled] pivots at right angle with the Starwheel Shaft. Viewed from your position in the rear of machine, the top of the Escapement Rocker may rock outwards [towards you] or in [towards the front of machine] depending upon the make of machine you are facing. The Escapement Rocker pivots on the Rocker Pivot as indicated in the drawing. As the Rocker moves out [or in] it disengages the Loose Dog from the Starwheel tooth by moving the Loose Dog off the tooth, permitting the Starwheel to rotate. Rotation of the Starwheel is limited to one tooth, however, because as the Loose Dog moves off the Starwheel tooth the Stationary Dog moves in between the teeth of the Starwheel. Rocking of the Escapement Rocker is controlled by the Keylever Typebar-Universal Bar mechanism described in Section II.

**II. ROCKER TRIP [ESCAPEMENT TRIP]:**

The method of tripping the Escapement Rocker [moving the Loose Dog off the Starwheel tooth] is accomplished differently on the various makes of typewriters, all of which are explained in the "Escapement" Section of this Manual. For the purpose of explaining the Principle and mechanism only one version is utilized here.

The mechanism pictured in the drawing provides that the U-Bar, as it is drawn forward by depression of a Keylever, will contact and move forward the lower extremity of the Escapement Rocker. The upper part of the Rocker will move rearward and in this movement the Loose Dog will be disengaged from the Starwheel.

**III. KEYLEVER-TYPEBAR MECHANISM:**

Depression of a Keylever will move the type head of the Typebar upwards towards the
platen and the Universal Bar forward toward the lower extremity of the Escapement Rocker. By slowly depressing a Keylever it will be discovered that just prior to the type head reaching the Platen the Escapement will trip and the Carriage will move the distance allowed between the face of the Loose Dog and the contacted face of the Roll [Stationary Dog]. To move a typebar to the platen with the fingers will give the same result and would indicate that there is a half-step or broken-step escapement. In actual typing [not while holding a typebar to the platen with the fingers or slowly depressing a Keylever] there is no step-by-step or half-spacing movement of the Carriage on any typewriter. At the instant the type prints the Carriage is immobile while the Escapement Rocker has released the Starwheel. After the printing of the type character the Carriage moves a full space and the Rocker returns to position the Loose Dog for contact with the next Starwheel tooth.

If a typewriter is available it is suggested that this test be made at this time. The test should be made in the following manner: Move a typebar to the Platen slowly with the fingers and when it reaches the paper press the head in firmly to make an impression. Release the typebar and back space once. This time hit the same Keylever sharply as in regular typing. Compare the impressions. It will be noted that the last impression is forward of the first impression verifying the fact that the Carriage did not move prior to the actual printing of the type.

IV. SEQUENCE OF MECHANICAL ACTIONS:

Depression of a Keylever, in regular typing, motivates the parts in the following sequence:

1. Ribbon raises to cover the type [Ribbon Cover].
2. Type prints.
3. Escapement Rocker trips, permitting.....
4. Carriage to move one full space.
5. Ribbon moves to a new position [Ribbon feed].

V. A STUDY OF THE TYPEWRITER:

Viewing the mechanism through the 42 duplicated Keylevers, Sublevers, Links and Typebars, one would say that it is a complicated mechanism. For the purpose of study of the mechanism it is recommended that all cover plates, 41 of the duplicated Keylevers, Sublevers, Links and Typebars and the Platen, Feed Rolls and Deflector be removed, leaving only one center keylever mechanism remaining. In this manner the student will have an unobstructed view of the mechanism and will be able to trace actions and movements of parts in their proper sequence and relationship to each other. The drawings in this Manual have been laid out to present such an unobstructed view.

VI. GENERAL:

Although a typewriter is a somewhat complicated piece of mechanical equipment, it can be said that rarely does the machine "wear out". Generally speaking these machines become so badly maladjusted that they cannot continue to produce satisfactory work until the adjustments are returned to factory standards. The average standard typewriter contains approximately 1800 to 2000 parts which require approximately 20,000 different factory operations to manufacture. An operator typing at a speed of 60 to 70 words per minute motivates approximately 10,000 parts per minute, approximating 160 to 200 parts per second. In no other machine does so much depend upon the operator's touch and rhythm.

If a typewriter is properly adjusted and the typist maintains an even touch and perfect rhythm, the typewriter will respond perfectly. Uneven touch and erratic rhythm will cause a perfectly adjusted typewriter to skip, pile, crowd or shadow. Too often a flimsy or not level table or desk will create a vibration or condition resulting in these complaints in a perfectly adjusted typewriter. Fully 80% of all typewriter service calls are caused by the operator's failure to properly install a new ribbon, failure to keep the platen clean and wiped periodically with alcohol, failure to operate the typewriter on a solid desk or table or lack of even touch and rhythm.

This Manual is prepared in Sections presenting the five standard late model typewriters and is laid out, as nearly as possible, in the proper sequence of adjustment. It is recommended that the Chapter "Sequence of Adjustments" on Page 42 be referred to as a guide for approaching adjustments on any specific make of machine. Forewords explaining principles involved precede various Sections of this Manual in order that a complete understanding may be had by the reader.
1. Cover Plates and the Typewriter Unit of the Remington No. 17 may be removed in the following manner:
   a. *Typewriter Cover:* Move Carriage to the left to position Line Space Lever out of contact with Cover. Move Cover forward lifting rear of Cover upward to disengage from detents. Move Cover forward and off machine.
   b. *Rear Cover Plate:* Grasp top edge of Rear Cover Plate and pull outward. Hooks on side edges of plate position on pins. Plate may be disconnected by moving downward and out.
   c. *Typewriter Unit* may be removed from the Base Frame in the following manner:
      [1] Remove Platen
      [5] Determine that Ribbon Drive Shaft Arm [inset left side of machine frame] points down toward rear rubber foot of machine, position indicated in drawing. The Ribbon Drive Gear and Stud are attached to the Base Frame, while the Ribbon Drive Shaft Arm is attached to the Unit. The position indicated in drawing is necessary in order that as the Unit is pulled forward out of the Frame, the Drive Shaft Arm may free itself from the Ribbon Drive Gear Stud.
      [6] With right and left thumbs located on Unit Locks [on either side of machine] pull forward while raising front end of unit keyboard upward so the Ribbon Universal Bar will clear the Space Bar Line Lock Pawls. [See Space Bar] Unit may be removed from Base Frame.
   [7] IMPORTANT: It may be necessary, on some machines, to loosen the Carriage Rail Assembly before the Unit can be removed. For method of loosening Carriage Rail Assembly, refer to Main Carriage.

8. A small wooden jig may be constructed to hold unit while adjusting, as levers and parts of mechanism extend below the Unit. Such a jig will permit operation of the Keylevers for testing purposes.
   d. *Typewriter Unit* may be replaced into Base Frame in the following manner:
      [2] Position Ribbon Drive Shaft Arm as shown in drawing.
      [3] Position Ribbon Drive Gear Stud in position so that Ribbon Drive Shaft Arm may straddle the Stud.
      [6] If difficulty is experienced in returning Unit to Main Frame, check the Tabulator Bellcrank [See Tabulator]. Check Unit sides to determine that it is positioned properly and squarely in frame.
      [7] With unit seated properly in Main Frame, connect and readjust Margin Stop Rack Pull Link Eccentric. [See Margin Stop and Line Lock].
      [8] Check position Space Bar Line Lock Pawls, which may be positioned between the wrong Keylevers causing levers to bind. If so remove Unit sufficiently to position properly.
      [10] Replace Rear Cover Plate.
      [12] Replace Typebar Cover.
1. Typebar Cover and Side Plates of the Royal Typewriter may be removed in the following manner:

a. **Typebar Cover**: Remove both Ribbon Spool Cups by removing two binding screws each. Remove Typebar cover Bracket Binding Screws (2 on each Bracket as indicated in drawing). Typebar Cover may be removed without affecting eccentric adjustments on Cover Bracket.

b. **Side Plates**: Entering a screwdriver through typebars or from bottom of machine, push bottom of Left Hand Plate outward and remove plate. It will be necessary to remove Touch Control Knob, by removing Knob Screw, before Right Hand Plate may be removed in the same manner. To replace Side Plates, enter top clamps into position in side opening and force lower clamps into position, using a screwdriver if necessary to clear clamps in opening.

c. **Top Cover Latches and Stops** are located on front inside edge of the Typebar Cover. The Latches may be formed outward to provide friction to hold Cover. The Stops may be formed to position Cover clear of the Ribbon Spools to prevent ribbon spools from binding on Cover.
1. Cover Plates on the Underwood S Model may be removed in the following manner:

   a. Front Name Plate may be removed by reaching hand inside Front Rail of Main Carriage and pressing the Plate outward. Two lower lips ride over the top of the Keylever Comb. Name Plate may be lifted up and out.

   b. Side Cover Plates are held in position with two top binding screws, positioned as indicated in drawing. Lower edge of Side Cover Plates are seated on pins in side frame opening. Loosen two top binding screws, push Cover Plate out, lift up from pins and remove. R.H. Side Cover Plate requires removal of Ribbon Winding Handle before Plate can be removed. Holding Shaft tightly with wrench, screw may be backed out and cover plate removed.

   c. Rear Cover Plates may be removed by removing binding screws [one holding plate to frame, the other holding plate to Tabulator Housing.]
1. Typebar Cover (Cowl) and Rear Housing may be removed from the Woodstock in the following manner:

a. **Typebar Cover** may be removed by depressing ears of Cover nearest Carriage, on both sides, and slide cover forward. Earlier models of the Woodstock have Typebar Cover Latches on either side, which may be released by pressing in as the cover slides off the Top Plate. Care should be exercised in replacing the Typebar Cover. Both sides should be laid on the Top Plate edge and the Plate moved back slowly, being guided by the Top Plate. Do not force the Cover onto the machine. If properly guided by the Top Plate edge it will position properly, and freely. Otherwise, the Ribbon mechanism may bind.

b. **Rear Housing:**

   [1] Remove two Rear Cover Plate Binding Screws indicated in drawing.

   [2] Check to determine if Manual Ribbon Reverse Rod Extensions are located on the Ribbon Reverse Rod. If so, remove them. Facing machine from the rear, the Rear Housing may be withdrawn. The Sides of the Housing have clips fitting into the front post frame. Slight pressure with screwdriver applied between Top Plate and Rear Housing will assist in freeing Housing up for removal. In Replacing, keep sides of Housing parallel and as the Housing is moved into position press in the sides of the Housing to reinsert clips into position on front post frame.
1. Cover Plates may be removed from the L. C. Smith Typewriter in the following manner:

a. **Typebar Cover**, which pivots on Type Bar Cover Bracket by two studs [one on either side] entering pivot hole in Bracket, may be removed, after raising Typebar Cover, by entering screwdriver between Typebar Cover Bracket and Cover Stud Bracket on either side and turning screwdriver a half turn to dislocate the Stud from the Pivot hole. Lift cover to disconnect. Move the Cover over toward the opposite side to dislodge opposite stud from pivot hole in bracket. Disconnect Typebar Cover Plate Springs. If not positioned properly they will cause a bind in the ribbon feed mechanism.

b. **Rear Top Cover Plate** is held in position with two Binding Screws indicated in drawing which are accessible by moving the Carriage to the left and right. Center carriage properly on base when screws are removed. Rear Top Cover Plate may be withdrawn from rear of machine.

c. **Back Plate** is held in position with two springs. It may be lifted up, springs disconnected and Plate removed, or may be dropped down, with springs connected, as indicated in drawing.

d. **Front Name Plate**: Remove Front Name Plate Binding Screws, one on either side of Plate near bottom edge, as indicated in drawing. Remove Front Cover Plate Binding Screws, right and left. Front Name Plate may be lifted out of position.

e. **Side Cover Plates** [left and/or right]: Remove Front Cover Plate Binding Screw. Remove Rear Cover Plate Binding Screw. Remove Front Name Plate Binding Screw. Side Cover Plate may be dropped down from contact with Typebar Cover Plate and removed from machine.

f. **Paper Table Cover Plate**: Disconnect and remove Paper Ball. Remove two binding screws at either end of Plate. Remove Tabulator Universal Clear Lever Screw and Lever. Spring Cover Plate out [left end] and up and move to the right to disengage from Tabulator Universal Clear Lever Shaft.
The Royal Carriage rides on one Bottom Rail, using [2] ball bearings which are positioned in Pinions that are guided by teeth in the upper and bottom rails, and is held to the Bottom Rail by Carriage Clamps. The Carriage is stabilized by the Carriage Roll riding upon the Carriage Roll Guide Rod [not pictured in drawing]. The Carriage Support Rail provides additional stabilization for the carriage especially when the carriage is overhanging the ends of the Bottom Rail.

2. ADJUSTMENTS:
   a. The Carriage Assembly: Before attempting carriage adjustments, remove the Carriage End Cover Plates and tighten the carriage end screws to ensure a solidly assembled carriage. The Top Rail, Carriage Roll Guide Rod, Reel Roll Support and Peel Roll Arm Support Binding Screws should be tightened.
   b. Bottom Rail must be true, otherwise binding will occur. If not true it should be removed [See Motion and Shift Mechanism], straightened or replaced.
   c. Ball Bearing and Pinions should be separated as far apart as possible for carriage stability without dropping out of the lower rail when carriage is at either extreme end. With the Carriage positioned alternately at either extreme end the ball bearing Pinions on that end should set not more than three nor less than two teeth in from the end of the Bottom Rail. With Carriage Clamps loosened, Ball Bearing Pinions may be positioned properly by using a thin screwdriver while lifting the carriage slightly to permit their free movement. If Ball Bearing Pinions are improperly separated binding of the carriage Clamps will occur when the carriage is moved to either extreme end.
   d. Carriage Clamps fitted to Top Carriage Rail Casting adjust the carriage to the Bottom Rail. Diagonal slots are provided in the Carriage Clamps for adjusting purposes. In adjusting Carriage Clamps, start with the Two extreme outside end clamps first, adjusting one to a snug fit without binding then adjust the other. Continue the adjustment with the next two inner clamps, adjusting the center clamp last.
   e. Carriage Support Rail: With the Carriage Roll riding upon and in contact with the Carriage Roll Guide Rod and all Carriage Clamps properly adjusted, the Carriage Support Rail may be adjusted, after slightly loosening Support Rail Adjusting Screws on either end of Support Rail. Move the carriage to the right or left end, making adjustment [moving the rail up or down] so that the Tabular Rack Roll contacts the lower rail. Tighten adjusting screws on that end, then repeat adjustment on the other end.
   f. Carriage Roll Guide Rod must be perfectly true, otherwise it will cause the Tabular Rack Roll to bind on the Carriage support Rail or the Carriage Clamps to bind on the Bottom Rail. To test Carriage Roll Guide Rod for trueness, loosen Carriage Roll Guide Rod Screws slightly and turn the rod around slowly. If this movement of the Guide Rod causes an up-and-down movement of the Carriage the Guide Rod is bent and should be removed, straightened or replaced.

3. TO REMOVE CARRIAGE: Remove Right Hand Cover Plate Screws and Cover Plate as indicated in drawing. Replace Drawband Anchor Screw to Main Frame. Disconnect Drawband from Carriage and attach to anchor screw.

Facing machine from rear, remove two carriage clamps shown removed in drawing. Loosen center Carriage Clamp. Move carriage to within one inch of its full allowable movement to your left [direction indicated in drawing] tilting carriage back [towards you] to disengage Tabular Rack Roll from Support Rail. Move Carriage remaining distance to your left, lifting the end of the carriage to your right upward while you slip the Back Space Rack Lock Arm through opening between the carriage end and the Rack Rail. Carriage may now be lifted from the machine.

4. TO REPLACE CARRIAGE: Position Bottom Rail Ball bearings and pinion properly as indicated in drawing; with carriage at extreme end of writing line [position indicated in drawing] bottom rail pinion should be set two to three teeth inside end of rail. Replace carriage, feeding Back Space Rack Lock Arm through opening between carriage end and Rack Rail, then tilt carriage and move to your right about one inch so that the Tabular Rack Roll returns to its position in Carriage Support Rail [Ball Bearing and Pinion should move in with the carriage]. Adjust Carriage Clamps as outlined under Paragraph 2d above. Replace drawband to carriage anchor screw. Replace Right Hand Cover Plate and screw. Check Carriage Support Rail and carriage adjustments for smooth fitting without binding.
1. The Remington No. 12 carriage rides between two Rails on an Upper and Lower Carriage Truck equipped with a Rack and Pinion. The Carriage and Rail assembly are fitted into the Carriage Frame which in turn is affixed to the Main Frame. The Carriage and Rail assembly are adjustable to accommodate different types of carriage and rail truck assembly. The Carriage and Rail assembly are fitted into the Carriage Frame which in turn is affixed to the Main Frame.

2. ADJUSTMENTS:

a. Lower Carriage Roll Cover. If bent, cause a bind in the Carriage. Check first before attempting adjustments for binding or sluggish carriage.

b. Carriage Rollers: The Upper Carriage Roll is adjustable to provide for proper carriage fitting. Adjustment may be made by loosening the four Upper Carriage Roll Screws and adjusting roll properly. Press Rear Roll down slightly, tighten the two Center Screws. Move Carriage Roll Screws first, repeating process on either end Rear Carriage Roll Screws. After adjusting, check the carriage to determine that there is no bind or excess play in its entire end-to-end movement.

c. Carriage Truck: The Upper Carriage Trucks are maintained in proper position by means of three Carriage Truck Rack Screws, which is maintained by the Upper Carriage Roll Rack Screws. With carriage to the extreme left or right contacting Carriage End Stop Screw, the Carriage Truck on that end should be positioned inside the carriage rolls. If not, with carriage moved to the extreme left, loosen three Upper Carriage Rack Screws and position Carriage Trucks just inside the left end of the Carriage Rail. Tighten Upper Carriage Truck Rack Screws to move carriage to the right end contacting Carriage End Stop Screw and check truck for position which should be just inside the right end of the Carriage Rail.

3. TO REMOVE CARRIAGE FRAME: As the Elite 12 pitch machine differs in the number of teeth in the Starwheel (16) and the Piston (15), to eliminate necessity of resetting tables, table and margin roller, carriage to extreme left, the escapement wheel and the rack should be marked so that they may be returned to exact position when carriage frame is replaced.

4. TO REPLACE CARRIAGE FRAME: On Elite 12 pitch machines, remove Escapement Unit first—see Paragraph 2(b) Escapement Action.

5. CARRIAGE FRAME OFF MACHINE:

a. To Remove Carriage from Carriage Rail: Remove Tabulator Stop Set Arm Bracket by removing two screws as shown in drawing. Remove two Carriage End Stop Screws. Carriage may be now moved out of its rails to the right (direction indicated in drawing).

b. To Replace Carriage to Carriage Rails: With Carriage Trucks removed slide Carriage into Carriage Rails from the right end of frame. Place two Carriage End Stop Screws in position shown in drawing. Move Carriage to extreme left with Carriage limiting against Stop Screw. Place Lower Front Rail Carriage Track into position by entering from left end of Lower Front Rail, and place with left end roller just inside left end of Lower Front Rail. Loosen three [6] Upper Carriage Truck Rack Screws. Insert Upper Rear Carriage Truck from left end of Carriage with left end roller of track just inside left end of Upper Rear Rail. Check both ends [without moving carriage] to determine that both tracks are within carriage ends.

6. CARRIAGE FRAME ON MACHINE:

a. To Remove Carriage from Carriage Rail: Removes Rack Panel. Disconnect Drawband by loosening its Anchor Screw and attach Drawband to Drawband Anchor Screw in machine frame. Back off Margin Stop Rack Pivot Screw, after loosening its Lock Nut, and move Margin Stop Rack back over the machine (do not disconnect Margin Stop Rack Plug) Lift Escapement [Margin Stops and Line Lock]. As movement of the Carriage Racks forward or reversed affects the Ring and Cylinder Adjustment, it is suggested that a mark be made on the type writer frame at the bottom of the Front Carriage Rail on each side so that the Carriage Frame may be replaced with the least possible chance of affecting the Ring and Cylinder Adjustment.

b. To Replace Carriage to Carriage Rails: With Carriage Trucks removed slide Carriage into Carriage Rails, noting that Lip of Tabulator Stop Set Bracket (See Keyset Mechanism) is positioned over Tabulator Stop. Slide Rear Rail into position, replacing Rear Carriage Screws loosely.

Replace two Carriage End Stop Screws in position shown in drawing. Move Carriage to the extreme left with Carriage limiting on Carriage End Stop Screw. Place Lower Front Rail Carriage Track into position by entering from left end of Lower Front Rail, and place with left end roller just inside left end of Lower Front Rail. Loosen three [6] Upper Carriage Truck Rack Screws. Insert Upper Rear Carriage Truck from left end of Carriage with left end roller of track just inside left end of Upper Rear Rail. Check both ends (without moving carriage) to determine that both tracks are within carriage ends. Tighten three [6] Upper Carriage Truck Rack Screws. Adjust Upper Carriage Truck to position. Replace Margin Stop Rack and properly position Stop Rack Pivot Screw so that Margin Stop Rack will be free of its Pivot without end play. Tighten Stop Rack Pivot Screw Lock Nut. Replace Drawband to Carriage Anchor Screw.
1. The rear of the Underwood Carriage is fitted to a Wayrod with two Carriage Frame Bearings equipped with two rollers each [See inset drawing] which ride the Wayrod to remove friction of the Bearing Sleeve. The front of the Carriage is equipped with two Front Carriage Frame Rolls which are positioned in the formed rail of the Front Scale Plate.

2. ADJUSTMENTS:

a. Wayrod and Carriage Frame Bearings. The Carriage Frame Bearing Sleeve must be fitted properly on the Wayrod to remove all excess play without binding. Adjustment may be made, after removing Carriage from machine, by forming [lapping] the Bearing Sleeve at point of opening. Rollers must be free on their pivots. If the Wayrod is not true throughout its entire length, the Carriage Frame Bearings will bind. In such case, if it cannot be straightened it should be replaced.

b. Carriage Frame Roll [front]. The Left Hand Carriage Frame Roll which provides the bearing for the carriage front, should be seated on the lower lip of the Front Scale Plate. The Right Hand Carriage Frame Roll [Carriage Frame Roll Eccentric Adjustment] provides up-stop bearing and is adjustable to remove excess up-and-down play in carriage skeleton. The Right Hand Carriage Frame Roll should be adjusted to just clear the upper lip of the Front Scale Plate. Adjustment is made with Carriage Frame Roll Eccentric after loosening Eccentric Adjusting Set Screw.

c. Carriage Frame Points must be aligned to Margin Stop Points and to front scale markings. Adjustment is made, after loosening the Front Scale Screws and Margin Stop Binding Screws by positioning points properly.

d. Carriage Frame Stop should provide .001" clearance with Marginal Stop Release Lever when Margin Stop is in extreme Right Position contacting Margin Stop Release Lever. Adjustment is made by filing Carriage Frame Stop.

e. TO REMOVE CARRIAGE:

1. Disconnect Carriage Drawband from Carriage Drawband Stud and position it on Drawband Stud on Main Frame. Remove Front Scale Plate Screws as shown in drawing being careful not to lose Carriage Frame Stop. Slide Front Scale Plate out of engagement with Carriage.

[b] Machines Equipped with Brake Band:
Lifting front of carriage up slightly, slide carriage to the LEFT. As the Right Hand Brake Band Stud [R. H. end of Carriage] nears the Brake Band Guide on Tabulator Housing, tilt the left end of carriage downward so that R. H. Brake Band Stud will clear the Brake Band Guide. Continue movement to the Left to remove Carriage from the Wayrod.

[b] Machines Not Equipped with Brake Band:
Lifting front of carriage up slightly, slide carriage to the Right until it is disengaged from the Wayrod.

f. TO REPLACE CARRIAGE:

[a] Machines Equipped with Brake Band:
Place Right Hand Carriage Frame Bearing on Wayrod and move carriage to the right [lifting front up slightly] until Right Brake Band Stud at right end of carriage nears the Brake Band Guide on the Tabulator Housing. Tilt Left end of carriage downward so that Right Brake Band Stud will clear Brake Band Guide. Continue movement of Carriage to Right feeding Left Hand Carriage Frame Bearing onto Wayrod. Continue movement to the right until Carriage centers properly on machine frame.

[b] Machines Not Equipped with Brake Band:
Place Left Hand Carriage Frame Bearing on right end of Wayrod and move carriage to the left [lifting front up slightly] until carriage positions properly on machine Frame.

Replace Front Scale and Front Scale Plate Screws, positioning Carriage Frame Stop on Right Hand [long] Front Scale Plate Screw.
1. The Woodstock Carriage rides between two V-shaped rails on roller bearings affixed to Carriage Roller Retainer Frames. The position of the Retainer Frame is controlled by a pinion operating in the Anti-Creep Rack (screw attached to the carriage casting and the other to the front rail).

2. ADJUSTMENTS: Carriage Rails must provide smooth even surface. If pitted resistance with square file or emery stone.

   a. The Rear Carriage Rail, positioned with .025" clearance between each of the two Top Plate Castings and the rear of the Rear Carriage Rail provides a parallel with the Segment Adjustment Ring which should not be disturbed, except to correct mal-adjustment.

   b. The Front Carriage Rail is adjustable to provide proper carriage fitting. The carriage should be fitted snugly in its rails without binding in its entire length-to-length movement. Adjustment is made, after loosening Front Rail Binding Screws on either side of Front Rail, by adjusting Front Rail Adjusting Screws (moving the front rail forward or backward may be necessary). Front rail should be pulled up to contact with the Adjusting Screw and held while tightening Binding Screw to insure proper fitting. After adjust the Front Rail should be taut which may be accomplished with Front Rail Screws located in the V-Groove of the Front Rail, positioned directly behind either one or both of the Segments, which are held in position by Set Screws located on top of the rail. These are accessible by movement of the Carriage to the extreme left and right ends. Set screws must be loosened before adjusting screws in the V-Groove of the front rail. Care should be taken that adjusting screws are counter-buried in the rail after adjusting to prevent damage to Retainer Rollers.

   c. Roller Retainers must be perfectly straight to prevent binding and the lips of the Rear Roller Retainer must mesh smoothly in the slots of the Front Roller Retainer. You will note when removed from the carriage that the front and rear Roller Retainers may be disassembled by removal of the lips on the Rear Roller Retainer from the slots of the Front Roller Retainer. Rollers may be replaced in Retainer, after removing (grinding or filing pivot ends and removing pivot) by installing a new pivot and roller if necessary and burring the pivot ends.

   Roller retainers may be removed from Carriage by springing front rollers out of Carriage Casting when carriage is removed from its rails. To replace, place Rear Roller in Carriage Rail groove and spring Front Rollers into position. Slide Roller Retainer from side to side, noticing whether rear clear bottom of carriage casting all the way without binding in the Rear Anti-Creep Rack (no carriage casting).

4. Anti-Creep Rack: The pinion of the Roller Retainer must mesh smoothly, but firmly, in both Anti-Creep Racks along their entire length without binding and snugly enough to prevent their slipping out of place. If necessary to move the anti-creep rack in order to bring it into proper alignment with the pinion, loosen Anti-Creep Rack Screws and position Rack properly tightening binding screws when adjustment is made. The Sub-carriage wheel, attached to Sub-carriage frame, prevents removal of Anti-Creep Rack without first removing the Carriage from the machine.

3. TO REMOVE CARRIDGE: Disconnect Carriage Drum Strap from under B. H. end of carriage attached to Drum Screw. Fasten Strap End to Drum Strap Stud situated in Top Plate or insert piece of wire through Strap End and hook under edge of Top Plate.

   Remove Bakedite Carriage End Cover Plates, if machine equipped.

   Remove Tabulator Bar, after moving carriage to right end and loosening Right Hand Tabulator Adjusting Screw Nut, by backing out Right Hand Tabulator Adjusting Screw until it clears the end of the Tabulator Bar. Be careful not to lose washers on each end of Tabulator Bar positioned on Tabulator Adjusting Screws. Position them for return to same pivot as they are of different thickness.

   Remove Margin Stop Release Lever by removing two Release Lever Screws indicated in drawing. Remove two Front Rail Screws at either end of Front Rail.

   Place rubber band around top of Line Finder and attach to key on keyboard. Remove tenoning to Line Finder by disassembling Line Finder Tension Slides [Card Holding Device].

   Fasten machine from the front, holding forefoot in place, tip machine on its back and while holding Carriage and Rail firmly securing with end slide carriage backwards away from you] up and out. [Be careful, do not catch Front Carriage Scale underneath Line Finder Screws.

4. TO REPLACE CARRIDGE: Place machine on its back. Center the Roller Retainer Frame [center position may be located by two flat surfaces underneath carriage casting]. Place Front Rail over Roller Retainer Frame, taking care not to disturb position of Retainer Frame.

   Keeping ends of Front Rail even with ends of Carriage casting, place the Carriage over the Rear Rail, fitting the Rollers properly in the rear rail "V" and the ends of the carriage even with the ends of the Rear Rail.

   Bear down forward on carriage and front rail. The Carriage unit and Front Rail will fall into their natural position. Replace the Front Rail Screws but do not tighten them. Carriage will run freely, but there may be lost motion which must be taken up by adjusting the Front Rail adjusting Screws (See Paragraph 3 above). When carriage rail is properly positioned tighten the Front Rail Screws.

   Fasten Drum Strap to Stud under right end of Carriage.

   Replace Margin Stop Release Lever and the Tabulator Bar. Check Release Lever position for movement of carriage to contact Left Hand Margin Stop to determine that Margin Stop Release Lever is in correct position. Check Tabulator Bar by operation of Tabulator [See Tabulator] to determine that it is positioned properly.
1. The L. C. Smith Carriage rides between two Races (rails) on Ball Bearings located in position in the Upper and Lower Ball Retainers. The Lower Carriage Ball Race (rail) is embedded in the Top Plate, while the Upper Carriage Ball Race (rail) which is adjustable, is held in position on Top Plate Bracket Castings. The two piece Ball Retainer, Upper and Lower, fit together and are guided in movement by the Retainer Platen of the Lower Ball Retainer which is secured to the Retainer Rack.

2. ADJUSTMENTS:
   a. The Upper Ball Race is adjustable to provide proper carriage fitting. The carriage should be fitted snugly in its race (rail) without binding in the entire length-to-length movement. Adjustment may be made with Carriage Ball Race Adjusting Screws after loosening Ball Race Holding Screws.

   b. Fitted Races (rails) which are generally caused by improper packing for shipment will cause uneven flow of the Carriage resulting in piling or crowding. The surfaces of the races may be smoothed with special formed files or stone if necessary to remove dents or pits.

   c. Loose play in Carriage when centered on base with Ball Race Adjusting Screws adjusted properly indicates that the Roller Rail is lower in the center. There are two raised spots (bosses) on the Top Plate casting on which the center of the Roller Rail rests. Loose play in center of carriage may be removed by cutting up on Retainer Rack at rails and main up Roller Rail with paper or shim of approximately .002" thickness, or remove least thickness to remove loose play.

   d. The Lower Ball Race which is embedded in the Top Plate is held in position by screws entering race from under the Top Plate. While the Lower Ball Race is levelled at the factory and seldom requires releveling, if it does, the two adjustment screws for this purpose are provided in center of the race. Loosen Lock Nuts, by entering screw driver between Keyeyes No. 16 and No. 17 on the left hand side of the machine and between Keyeyes No. 26 and No. 27 on the right hand side.

   e. Ball Retainers must be perfectly straight to prevent binding and with Carriage centered on Top Plate, the Anti-creep Wheel of the Lower Ball Retainer should be snug up against the Sprocket Wheel. The Top Ball Retainer Arm Slot should seat over formed lip of the Lower Ball Retainer. With Carriage moved to extreme right or extreme left, the outside Top Ball bearing should be positioned approximately 45° in from the end of Top Race (rail). If the Ball Retainer is not centered properly, remove Top Anti-creep Rack (racing machine from rear and position Ball Retainers properly, then replace Top Anti-creep Rack. Determine that the Lower Ball Retainer Anti-creep Wheel is free on its pivot and positions properly in the Anti-creep Rack.

3. TO REMOVE CARRIAGE: Facing typewriter from the rear, with cover plates removed, disconnect Draw Strap by removing Draw Strap Screws and Washers, attaching Draw Strap to Frame Draw Strap Stud as indicated in drawing. Remove Ball Race Holding Screws (one on each end of bracket as indicated in drawing). Remove Ball Race Adjusting Screws on Sprocket Models (this is not necessary on the Model No. 6). Remove Top Ball Race (rail) by sliding out. Remove Upper Ball Retainer, lifting up slightly to disconnect from Lower Ball Retainer. Remove Plates. Move left end of Carriage to the front of machine and move Carriage out of position to the left. Remove Lower Ball Retainer Assembly.

4. TO REPLACE CARRIAGE: Place Lower Ball Retainer in central position with Anti-creep Rack Wheel parallel to the Sprocket Wheel. Move Carriage to rail position from the left and center over Lower Ball Retainer. Slide Top Ball Retainer into position and slotted arm over lip of Retainer. Slide Top Race (rail) over Top Ball Retainer into position, insert right and left Ball Race Holding Screws, tightening each screw. Check carriage to determine that it is free in its entire length. With Margin Stops placed at extreme right and left positions, check position of Ball Retainers as indicated under Paragraph 3 above by movement of carriage to both ends, right and left, making adjustment if necessary. Replace Ball Race Adjusting Screws, right and left, and adjust Carriage Mounting as provided in Paragraph 3 above.
1. The Underwood Sub-carriage (skeleton) cradles in the Carriage Frame pivoting in the Left and Right Hand Lift Hooks. In non-shift position the rear corners of the Skeleton seat uniformly on Carriage Skeleton Frame Rear Corners, while the front corners are positioned in and limited by the Motion Stop Plate. In Shifting, the Skeleton is raised through its Sub-carriage Roll by the action of the Lift Frame (See Motion and Shift Mechanism).

2. ADJUSTMENTS: With the Carriage Controlling Links disconnected the Skeleton should seat uniformly on both Rear Corners and Upper On-Foot Adj. Screws (right and left) should position uniformly on Motion Stop Plate. If the frame is spring building, such uniformity should be straightened (twisted if necessary). Uniformity in seating of the Skeleton, the following adjustments will ensure proper performance of the Skeleton in shifting.

a. Lift Hooks: The Lift Hooks must be parallel and Skeleton Pivots must seat uniformly in the Lift Hooks. Adjustment is made by turning the Lift Hooks.

b. Lift Hook Shaft must be so adjusted that the Carriage Skeleton will shift easily without binding and the Shaft should be adjusted to its highest position with a minimum of end shake. These adjustments are made with the Lift Hook Adjusting Screws after loosening Lock Screws. The Shaft may be moved to the right or left, as may be necessary, by loosening (counterclockwise) one Lift Hook Adjusting Screw while tightening (clockwise) the other. As movement of the Lift Hook Adjusting Screws affects Ring and Cylinder as well as Panel Parallel, both should be checked for proper position after adjusting.

c. Lift Hook Shaft supports must be parallel to the Lift Hook Shaft and must just clear the Shaft. The supports are adjustable by loosening Binding Screws and placing in proper position. The Lift Hooks should be held down while adjusting the Supports. After adjusting, release Lift Hook Shaft Spring (by loosening Spring Clutch Screw) and determine that the Lift Hooks drop down freely and that the Shaft has a minimum of end shake. Restore Shaft Spring Tension after testing or adjusting.

d. Lift Hook Shaft Spring tension should be adjusted to provide for right Skeleton shifting. Tension adjustment is made, after loosening Spring Clutch Screw, by turning the Clutch.

e. Skeleton Guide (Drawing C). The Right Hand Plate Knob should be adjusted to provide clearance with Skeleton Guide as indicated in drawing. Adjust Right Hand Knob position, after loosening Knob Set Screws. Test for clearance by turning Knob a complete revolution.

f. Carriage Controlling Links: When Skeleton seated uniformly as its four corners as specified in Paragraph 1. Adjustments, the Carriage Controlling Links may be replaced and should be formed. It is necessary that the four corners of the Carriage Skeleton on their resting places in normal non-shift position, as well as to remove surplus rocking motion from the Carriage Skeleton. These forming adjustments lengthen or shorten the Carriage Controlling Links. The more a machine has been used, the more apt these Links are to have lost their form preventing their control of the Skeleton accurately. It is important that they do not prevent four corner seating of the Skeleton, yet eliminate surplus rocking motion.

3. TO REMOVE CARRIAGE SKELETON: With Carriage End Cover Plates removed, remove Right Hand Carriage Controlling Link by backing out Screw. Disconnect both Controlling Links from pivot pin. With Carriage Indicator positioned between 15 and 20 on Front Scale, Hold Lift Hooks down with right thumb (See Drawing D) and grasp Carriage Skeleton in manner shown. Lift Skeleton up and towards the back of the machine to disengage Carriage Roll Hanger Latch from Lift Frame as shown in detail and to disengage Motion Stop Screws from position on Motion Stop Plate. Lift Skeleton clear of the Carriage Frame.

4. TO REPLACE CARRIAGE SKELETON: Position Carriage Indicator between 15 and 20 on the Front Scale. Determine that Lift Frame is held in "down" position. Holding Carriage Skeleton in manner shown in Drawing "D", feed Skeleton Frame Bearing into Lift Hooks. Tilt Carriage toward back of machine slightly to permit Carriage Roll Hanger Latch to engage Lift Frame properly, then seat front edge of Skeleton into position on Motion Stop Plate. Replace Carriage controlling Links, testing to determine that all four corners of the Skeleton seat uniformly.
1. The Sub-carrige cradles in the Main Carriage Frame being held in shiftable position by the Sub-carriage Pivot Screws existing the Sub-carriage end plates through the Shift Link [which controls the Ring and Cylinder Adjustment], the Shift Rock Shaft Pivot Screws which uniformly control upward movement and the Shift Stop Plates which limit and control On, First and Motion position. The Sub-carriage Wheels ride the Shift Rail and when the Shift Lever is depressed [raising the Shift Rail] the Sub-carriage is lifted into Upper Case position permitting the top of the typehead to print.

2. ADJUSTMENTS:

a. Sub-carriage Fitting Screw should be adjusted, after loosening Lock Nuts, to permit the end of the Fitting Screws to just touch the head of the Shift Link Screw to remove end shake in the Sub-carriage, yet must not bind the Sub-carriage when shifting. The adjustment should be made uniformly alternating from left to right Fitting Screw to prevent bind in the Shift Links. After adjusting, shift Sub-carriage to determine that there is no bind in shift position. Tighten Lock Nuts when adjustment has been made.

b. Shift Rock Shaft Pivot Screws [one on each end of Main Carriage Frame] should be adjusted to remove excessive end shake in the Shift Rock Shaft but must not bind the Shift in shifting. Adjustment is made after loosening Shift Rock Shaft Pivot Screw Lock Nuts, by alternately taking up slack from either screw. Tighten screws to make Sub-carriage bind, then back out screws until Carriage Shakes freely. Tighten Lock Nuts when adjustment has been made, holding screw to prevent turning.

c. Sub-carriage Pivot Screws [2 on each end of sub-carrige] and the Shift Stop Lever Screw on each end of Sub-carriage should be checked for tightness. If necessary to tighten Shift Stop Lever Screws be sure to also tighten Lock Nuts.

d. Shift Rail. The Shift Rail functioned to lift the sub-carriage when the Shift Key is depressed] pivots on either side, under the Top Plate, on Top Plate carriages. As the Ribbon Vibrator Bracket is attached to the Shift Rail, if the Shift Rail is loose on its pivot [which may be checked by pushing the Shift Rail to right or left, the Rods being accessible under the Carriage Frame and feed-collar, there will be a tendency of the Ribbon Guide to bind, especially with Ribbon Control Lever Set in Red position. Generally, in cases of this nature, only one pivot and set screw become loose. Lay the typewriter on its back, set the Shift Lock and insert a long screw driver below the sub-frame at either rear corner of base frame to contact the Shift Rail Pivot. If the pivot has loosened it may be forced back into position with the screw driver and the Set Screw tightened.

The Shift Rail must be level. If not, raise or lower Shift Rail by using Bender Tool on the rail or by prying under rail with a heavy screw driver [be careful not to break the welding to Shift Rail Arm].

TO REMOVE SHIFT RAIL: Remove carriage. Remove Main Spring Drum and Bell Bracket. Disconnect the Link Finder from the Shift Rail by removing the Link Finder Adjusting Screw. Disconnect the Ribbon Vibrator Link Screw and remove the Ribbon Guide Pin. Remove Left and Right Hand Shift springs and Ribbon Feed Springs. Loosen the Shift Rail Pivot Screws and remove Pivot, then remove the Shift Rail.

e. Rebound Latch: For adjustment instructions see Motion and Shift Mechanism Section.

3. TO REMOVE SUB-CARRIAGE: Loosen R. H. Platen Knob Set Screws and remove R. H. Platen Knob. Loosen L. H. Platen Knob Set Screws. Pull Platen Knob out to key into Variable Knob, then unwind [turn counter-clockwise] the L. H. Platen Knob until it is released from Platen Clutch Plate Wire.

Remove the Sub-carriage Pivot Screws [2 on each end of Sub-carriage]. Move carriage to extreme left and disengage Sub-carriage from Shift Stop Lever Arm at the Left by pulling sub-carriage toward you. Move Carriage to extreme right and disengage Sub-carriage from Shift Stop Lever Arm. Sub-carriage may now be lifted up and out of Carriage.

4. TO REPLACE SUB-CARRIAGE: See that Shift Rail is held down properly by Rebound Latch [See Motion and Shift Mechanism for adjustment]. Move Carriage to right and setting Sub-carriage in Main Carriage, place right Shift Stop Lever Screw in Right Shift Stop Lever Arm. Move Carriage to extreme left and place left Shift Stop Lever Screw in Left Shift Stop Lever Arm.

Replace Sub-carriage Pivot Screws in their respective positions. By shifting sub-carriage lower Pivot Screw will enter Shift Rock Shaft Arm. Replace Variable Spring [if previously removed] on Platen Clutch Plate Wire. Key Variable Knob into Platen Knob and install on Platen Clutch Plate Wire, turning clockwise until Platen Knob Shaft is tight against left Sub-carriage end plate, then back Platen Knob and Variable Knob [counter-clockwise] two complete revolutions or three, if necessary, push Platen Knob to the right with Set Screws over flat surface of Platen Red and Tighten Set Screws. Replace Right Hand Knob and tighten Set Screws. [For adjusting Variable refer to Variable Section].
1. The Bracket holding the Main Spring Drum is located in the left rear corner of the Remington No.17 Base Frame and is accessible by removing the Typewriter Unit from the Base Frame as outline in Chapter "Cover Plates". The Carriage should be fitted properly in its rails and must operate freely without binding, before attempting Main Spring tension adjustments. The typewriter should be checked to determine that it is being operated on a solid level table or desk, otherwise up-hill or down-hill travel will increase or decrease standard tension adjustment.

The Drawband is connected to the Main Spring Drum Stud as indicated in Drawing and to the Carriage Drawband Anchor Stud under the right end of the Carriage Casting.

2. ADJUSTMENTS:

a. Main Spring Tension should be set sufficiently to move the Carriage to the extreme left.

[1] To Increase Main Spring Tension turn Equalizer Pinion Screw clockwise.

Equalizer Pinion Screw is accessible after removing Back Panel. Detent Pawl will hold in each position, locking the Drum Detent.

[2] To Decrease Main Spring Tension, work Detent Pawl up and down.


[2] To remove Spring from Drum: tap geared Drum Cover to loosen, then remove. Remove Main Spring.

ROYAL 1. The Mainspring, providing the tension for the movement of the Carriage to the left, is housed in the Spring Barrel, bearing on the Spring Barrel Shaft and located under Left Hand Rear Cover Plate on the Spring Barrel Bracket. It will be noted that the Barrel is geared on one side for the purpose of driving the Ribbon Feed through meshing with the Ribbon Worm Shaft Pinion [See Ribbon Feed]. The Typerwriter should be operated on a solid level table or desk, otherwise up-hill or down-hill travel will increase or decrease standard tension adjustment.

2. ADJUSTMENTS: The carriage should be properly fitted in its rails, without binding or play before making tension adjustment.

a. Main Spring Tension should be set at 1 1/2 to 1 3/4 pounds, or sufficient to move the Carriage to the extreme left.

   [1] To increase tension turn Main Spring Adjuster [which is accessible through opening in Left Hand Rear Cover Plate by moving the Carriage to the right] counter-clockwise.

   [2] To decrease tension turn Main Spring Adjuster clockwise.

Drawband should be in good condition and fitted smoothly at Carriage connection and without bulge so that there will be no interference with the Ribbon Worm Shaft Pinion which seats on the Barrel Gear. Drawband must not be twisted between the Barrel and Carriage Anchor Screw.

c. Main Spring Barrel.

[1] To Remove Barrel, remove Typebars and Typebar Links No. 1 and No. 2 [left side of segment] lettered Q and A to permit passage of Spring Barrel Shaft under the bottom rail. Turn Main Spring Adjuster clockwise to release all tension, then turn it sufficiently more so that Worm Gear Set Screws are visible. Loosen Worm Gear Set Screws sufficiently for Spring Barrel Shaft to be drawn through Worm Gear and Spring Barrel Hub. Drum may now be removed.

[2] To Replace Barrel, reverse above procedure, being sure to properly assemble Worm Gear on Shaft before seating Shaft in its position on Spring Barrel Bracket.

[3] To Remove Main Spring with Barrel removed from machine, Barrel Cover may be pried or loosened from Barrel by tapping edge of cover with a light hammer. Spring may be removed and disconnected from Hub connection.

[4] To Replace Main Spring, place new spring with holding clamp in position over Barrel and force Spring into Barrel as the holding clamp is released. Return Cover to Barrel and tap into position.

UNDERWOOD 1. The Bracket holding Main Spring Drum is located on the left rear frame and is accessible by removing the Left Hand Rear Cover Plate. The Carriage should operate freely on the stray [which should be wiped clean with slightly oiled cloth] and run freely and smoothly in front rail before Carriage tension is adjusted. The Typerwriter should be checked to determine that it is operated on a solid level table or desk, otherwise up-hill or down-hill travel will increase or decrease standard tension adjustment.

The Drawband is connected to the Main Spring Drum in Drawband Slot, and to the Carriage Drawband Anchor Stud.

2. ADJUSTMENTS:

a. Main Spring Tension.

   [1] To increase tension turn Tension Adjusting Knob clockwise.


WOODSTOCK 1. The Main Spring Drum Bracket is located under Top Plate on the left rear side of the machine. The Carriage should be fitted properly in its rails and must run freely without binding before attempting Main Spring tension adjustment. The Typerwriter should be checked to determine that it is operated on a solid level table or desk, otherwise up-hill or down-hill travel will increase or decrease standard tension adjustment.

The Drawband is connected to the Main Spring Drum Stud and to the Carriage Drawband Anchor Stud located below right end of Carriage casting.

2. ADJUSTMENTS:

a. Main Spring Tension should be set at 1 1/2 to 1 3/4 pounds or sufficient to move Carriage to the extreme left.

   [1] To increase and decrease tension: Woodstocks 220,000 to 583,000 are equipped with a Ratchet Pawl for the purpose of releasing tension by movement of the Ratchet Pawl up and down, after backing out Ratchet Lock Screw. Machines in this group, marked with a Thumb Screw on a small machine for increasing the tension.

Woodstocks 583,000 to 600,000 are equipped with a Spring Tension Stud but do not have a Ratchet Pawl. To release tension, back out Ratchet Lock Screw, while braking Drum with fingers and let slip gradually until it unwinds. To increase tension, hold Drum with fingers while backing out Ratchet Lock Screw, wind Drum with fingers, resetting Ratchet Lock Screw between teeth of Ratchet when proper tension has been secured.

b. Main Spring Drum.

[1] To Remove Drum, release all Spring tension, by turning Tension Adjusting Knob counter-clockwise. Disconnect Drawband from Drum Connection. Remove two Spring Drum Hanger Screws. Spring Drum assembly may now be removed from rear of machine.


[3] To Remove Spring from Drum turn Spring Drum Cover plate counter-clockwise and remove. Main Spring may be disconnected from Drum Hub and removed. Care should be taken in removing or replacing Main Spring that the spring is kept under control. They are equipped with a holding clamp which may be removed as the spring is forced into the Spring Drum.

b. Drawband should be in good condition and Drawband should be attached to Drum slot smoothly and properly connected to Carriage Drawband Anchor Stud without twist of the band between the two connections.

b. Main Spring Drum.

[1] To Remove Main Spring Drum, release spring tension by method indicated above for machine of that serial. Unplug the Drawband from the Drum. Insert a screw driver from the front of the machine between Keylocers No. 5 and No. 6 and remove Drum Shaft Screw. The Drum may be dropped down from Bracket and removed.

[2] To Replace Main Spring Drum, reverse above procedure.

[3] To remove Main Spring, with Drum removed from machine, remove the Drum Disk by prying it forward and turning it clockwise. Spring may be removed and dis-engaged from spring on the inside of Drum shell.

[4] To Replace Main Spring, place new Spring with holding clamp in position over drum holding loose end of spring securely on inside of drum shell. Remove the holding clamp from the spring. Replace the Drum Disk in position and by pressing, turn counter-clockwise at the same time.

c. Drawband must be fitted smoothly to Main Spring Drum stud and must not be twisted between Spring Drum and Carriage Drawband Anchor Stud.
4. The heart of the operating mechanism of the L. C. Smith Typewriter is provided on or housed in the Main Spring Drum Bracket. Included are the Main Spring, the Escapement Ratchet, the Tabulator and Pinion, the Ribbon Feed and Ribbon Cover, the Back Space, the Tabulator and the Carriage Release Mechanisms. Whenever the Carriage moves to the right or to the left, the operating mechanism is actuated by means of the Two Drum Bracket Screws. If either or both of these screws become loose, any of the mechanisms may be thrown out of adjustment.

The Drum Shaft of the Ribbon Driving Ratchet [inner wheel] pivots on the Main Spring Drum. The Ratchet Driving Pinion is attached to the main spring drum. The main spring drum is a free float Brake Band. The Friction Spring tension sandwiches the Brake Band between the two Ratchet wheels providing friction to force one wheel to turn with the other or, if one is held stationary, to act as a brake to the other.

The Ribbon Driving Ratchet [outer wheel] is keyed to the Ribbon Driving Pinion shaft and actuated by the Main Spring. When the Ratchet Driving Pinion is rotated, the Ratchet Driving Ratchet is actuated by the main spring drum. A free float Brake Band is used to prevent the Ratchet Driving Pinion from rotating the ribbon driving Ratchet and the ribbon driving Ratchet assembly.

The Ratchet Driving Pinion is keyed to the ribbon driving Ratchet by means of the main spring drum. The Ratchet Driving Pinion is actuated by the main spring drum. The main spring drum is a free float Brake Band. The Friction Spring tension sandwiches the Brake Band between the two Ratchet wheels providing friction to force one wheel to turn with the other or, if one is held stationary, to act as a brake to the other.

To increase Main Spring tension, loosen the Main Spring Ratchet Nut and turn Main Spring Ratchet to proper tension. Tighten Ratchet Nut when adjustment has been made.

To decrease Main Spring tension, loosen Ratchet Nut and turn Main Spring Ratchet to proper tension. Tighten Ratchet Nut when adjustment has been made.

To remove Spring from Drum: Disconnect Back Space Link from Dog Connection Bellcrank [see Back Space]. Disconnect Tabulator from Full Arm [see Ribbon Cover]. Release Main Spring tension [see Paragraph 2b]. Disconnect Ribbon Driving Pinion from Main Spring Drum. Remove Escapement Connecting Screw on Universal Bar [see Universal Bar]. Moving Carriage to extreme right and left, loosen Drum Bracket Screws uniformly, alternating between them until Spring Drum Bracket is loose from Top Plate. Lower Spring Drum Bracket down to permit removing Tabulator; Tabulator Arm Connection from Carriage Release Bellcrank. See Tabulator. Slide Spring Drum Bracket out between Tabulator Housing and Hub Stud [see right viewing machine from rear].

To remove Drum from Frame: Disconnect Back Space Link from Dog Connection Bellcrank [see Back Space]. Disconnect Tabulator from Full Arm [see Ribbon Cover]. Release Main Spring tension [see Paragraph 2b]. Disconnect Ribbon Driving Pinion from Main Spring Drum. Remove Escapement Connecting Screw on Universal Bar [see Universal Bar]. Moving Carriage to extreme right and left, loosen Drum Bracket Screws uniformly, alternating between them until Spring Drum Bracket is loose from Top Plate. Lower Spring Drum Bracket down to permit removing Tabulator; Tabulator Arm Connection from Carriage Release Bellcrank. See Tabulator. Slide Spring Drum Bracket out between Tabulator Housing and Hub Stud [see right viewing machine from rear].
The function of the Shifting Mechanism is to provide the means to change case or vary the relationship between the Typebar [with two characters] and the Platen. In typewriter technical language Lower Case refers to the small letters [the lower type on the typebar] with mechanism in non-shift position. Upper Case refers to the capital letters which may be printed only by raising the platen or lowering the typebar through the Shifting Mechanism. These two types of mechanism are referred to as “Carriage Shift” and “Segment Shift”.

The face of each of the two type on the Typebar is formed to fit the radius of curvature of the platen. When adjusted properly a line drawn horizontally through the center of the type character [in either shift position] would bisect perfectly the Platen on a horizontal plane. This adjustment is referred to as the ON-FEET ADJUSTMENT, putting the type on their feet to provide a full and complete impression of the character. If the Platen is too high or too low in its relation to the curvature of the type face, impressions will be either light on the top [denoting platen is too low] or light on the bottom [denoting platen is too high]. The use of an improperly sized platen--too large in diameter, or ground down too small in diameter--will affect the fitting of the radius of curvature of one to the other resulting in imperfect typed impressions.

Aligning the Capital Letters [upper case] to the small letters [lower case] through limiting the change in relation between the typebar and the platen by controlling the shifting mechanism is referred to as the MOTION ADJUSTMENT. This adjustment is preferably made with the capital and small HhHhHh Hh, permitting aligning the horizontal feet of both case characters to each other.
REMINGTON 1. When the Shift Key is depressed on the Remington No. 17, through the Shift Pull Wire, the Shift Toggle Lever "B" is moved forward, forming a straight line with Lever "A" and moving the lower extension of the Shift Toggle Lever "B" forward [toward the front of machine] to contact the Front Toggle Lever Stop Felt Bumper. In this action, the Segment is moved downward to Shift position. If the Shift Lock Keylever is depressed, the Shift Lock Latch positions itself in Shift Lock Latch Plate on that side holding Segment in locked position until Shift Key is depressed to unlock Shift Lock engagement in Plate.

2. ADJUSTMENTS: Before attempting adjustments, determine that end shake in the Shift Lever Shaft, joining both Shift Keylevens [opposite sides of keyboard] located just to the rear of the front Keylever Comb, is reduced to a minimum and that the Shaft is free on its pivots. Adjustment is made with Shaft Pivot Screws [located on outside of Unit Frame] after loosening Lock Nuts.

Determine that Segment Shift Rocker, which pivots on either side of Unit Frame, whose movement is controlled up and down by the Segment Shift Stop Screws, is free on its pivots with end shake reduced to a minimum. Adjustment is made with Segment Shift Rocker Pivot Screws after loosening Lock Nuts.

The Segment must move up and down freely in its Race without binding or with out excessive side shake. Adjustment is made, after removing Unit from Main Frame, by disconnecting Segment Connection Screw and adjusting Segment Race fitting with Side Adjusting Screws [both sides] after loosening Lock Nuts. In this position, with no bind in Shift Keys, the Segment should float almost to the top of its Race. Replace Segment Connection Screw. Segment should rest at top position, governed by Segment Shift Stop Screws.

CAUTION: Segment Shift Stop Screws are never adjusted to provide On-Feet or Motion. Adjustment of front and rear Segment Shift Stops Screws is made only to remove excess movement to Segment after On-Feet and Motion adjustments are completed with Shift Toggle Eccentrics.

a. ON-FEET: The On-Feet Adjustment is made with the Upper Shift Toggle Lever Eccentrics in the following manner:

[1] Back up both Segment Stop Screws, after loosening Lock Nuts.


[3] With Segment held down in Shift position by the finger, adjust Front Toggle Lever Stop Screw to bring Links "A", and "B" into a straight line.

[4] Adjust Upper Shift Toggle Lever Eccentric, setting capital letters on their Feet as explained in the Forward Sheet of this Section.

[5] Releasing Shift Key, adjust Rear Toggle Lever Stop Screw to bring the Links "E" and "F" into position to form a straight line as indicated in drawing.

b. MOTION: With On-Feet adjustment properly made, Motion Adjustment made as follows:

[1] Adjust Lower Shift Toggle Lever Eccentric to bring capitals and small letters into alignment as explained in Foreword sheet of this Section.

[2] With Segment in non-shift position, adjust Rear Segment Shift Stop Screw just enough to remove up-play in segment. It turned in too deep this screw will cause a bind in Segment and Shift Keys.

[3] Holding Segment in down position by depressing Shift Key, adjust Front Segment Shift Stop Screw to remove up-play in Segment.

[4] Test motion with capital and small HhHh. If off a trifle, back up on Rear Segment Shift Stop Screw and raise Lower Shift Toggle Lever by adjustment of its Lower Shift Toggle Lever Eccentric. Readjust position of rear Segment Shift Stop Screw.

c. Shift Keylevens should be so adjusted that the top of the Shift Key is approximately 1/16" above bottom row of keys. Adjustment may be made, after loosening Shift Pull Wire Nut, by turning Shift Pull Wire Nut clockwise to raise the Shift Keys, counterclockwise to lower them. Tighten Shift Pull Wire Nut when adjustment is made.

After adjusting Shift Keylevens, check Motion and On-Feet and test Segment for locking in non-shift position by pushing Segment down with the hand. If not locking, check Shift Lock Lever extension, just below the Shift Pull Wire Connection, to determine that it is not limiting on Tabulator Key Shaft. If it is limiting on Tabulator Key Shaft, from the Shift Lock Lever extension to clear. Position of Shift Keys must be checked after forming extension to insure that they are positioned properly in relation to lower bank of keys, as outlined above.

d. Shift Lock Latch Plates should be adjusted to hold Segment down securely and both Shift Lock Keys must lock with equal tension and uniformity when both are depressed simultaneously. Adjustment is made, after loosening Shift Lock Latch Plate Binding Screws, by positioning Shift Lock Latch Plates properly, tightening binding screws when adjustment has been made. When this adjustment is properly made, both Shift Lock Keys may be depressed and will lock simultaneously, while depression of either Shift Key should release the Shift Lock on that side a fraction prior to releasing the Shift Lock on the opposite side.

e. The Shift Toggle Lever Spring assists the Shift Balance Springs to return the Segment and Shifting mechanism to proper position after shifting and also performs the function of holding the Shift Toggle Lever in inactive position to prevent rebound of the Segment.

f. Race Limit Screws [Front and Rear] are provided for the purpose of aligning the Race Blocks to each other. These are adjusted true at the factory and unless maladjusted, should not be disturbed.

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g. To Remove Segment with unit removed from Main Frame, remove Typebars, after loosening Typebar Fulcrum Wire retaining Screws, by inserting Follow-up Wire in Segment Fulcrum Wire Slot. Typebars are formed for positions No. 1 and No. 42 inclusive and when removed should be laid out in order for convenience in replacing to slots from which removed. Typebar Links are special in size and shape and should be separated for replacement on Typebars in proper order.

Remove Typebar Rest Binding Screws from Segment and remove Typebar Rest. Remove Segment Fulcrum Screws, after removing Segment Fulcrum Screw Nuts [lower drawing]. Remove Segment Shift Bracket on which the Segment Connection Screw is fitted. Remove Segment Ball Stop Screw. Segment may be lifted up and out of frame, being careful not to lose the Segment balls. To replace Segment, reverse above instructions.
ROYAL 1. As Shift Key is depressed Shift Link draws forward Shift Rod Elbow causing Shift Rod to turn, drawing Segment downward through Shift Arms which are secured to the Rod. To uniformly adjust the pull of the Segment for the left and right hand Shift Keys, it will be noted that the Right Shift Arm is adjustable with an eccentric. The Royal Segment Ball Bearings [two on each end of the Segment] are fitted in Pinions which are enmeshed in Race Teeth similarly to the bearings and rails of the Main Carriage.

2. ADJUSTMENTS: Before attempting adjustments, determine that end shake in the Segment has been reduced to a minimum and that the Segment moves up and down freely in its rails with out binding. Adjustment is made with the Segment Rail Adjusting Screws. The Ring and Cylinder Adjustment should be made before making On-Feet, Motion and Shifting Mechanism adjustments on the Royal [See Ring and Cylinder].

a. On-Feet position is determined by use of the capital letters with Shift Key depressed. Adjustment is made with the “On-Feet” Adjusting Nuts, both sides, after loosening Lock Nuts, to limit the downward movement of the Segment by contact of the Upper Shift Stop with the Shift Stop Cushion. This adjustment must be uniform on both sides of the Segment and should be tested by inserting thin tissue strips between both Upper Shift Stops and the Shift Stop Cushions, determining by slippage that adjustments are uniform.

b. Motion: With the On-Feet adjustment properly made, the Motion [bringing the capital and small letters into alignment] is made with the Motion Adjusting Nuts on both sides of the Segment, after loosening Motion Adjusting Lock Nuts After adjusting, test for uniformity by inserting thin tissue strips between the Lower Shift Stops and Shift Stop Cushions, determining by slippage that adjustments are uniform. Tighten Lock Nut when adjustment is made. Test Segment Shift Lock for proper function after adjusting Motion.

3. Shift Mechanism: It should be determined that all springs are properly connected and lock nuts are tight before adjusting the Shifting Mechanism Adjustments.

a. Aligning Segment: The Lower Left Hand Segment Shift Rail is adjustable laterally to parallel the Segment. Binding Screw positioned in slot permits this adjustment. Unless loosened or in installing a new segment, adjustment of this Rail is rarely necessary.

b. Segment Shift Lock must be adjusted, after On-Feet or Motion Adjustments have been made, so that the Segment will lock and release properly and that all surplus play is eliminated. It should be adjusted to move out of position in the Plate when the Shift Key is depressed and just prior to movement of the Segment. This adjustment is made with the Shift Link Adjusting Nut, followed by adjustment of the Shift Lock Link. Up-and-down movement of the Segment is removed by adjusting Shift Lock Eccentric Stud.

c. Shift Keylever Eccentric should be adjusted to hold Segment securely in Shift Position, but to release freely with light pressure. This adjustment should be tested, by setting Shift Lock and tapping heavily on corner of the machine frame.

d. Shift Frame Extension should be adjusted, by forming, to permit 1/16” further depression of the Shift Key lever when the Upper Shift Stops have limited on the Shift Stop Cushions, in order to permit unlocking Shift Lock.

e. Shift Lock Arm should be adjusted so that it will hold Segment in locked position but will release freely with slight pressure. Adjustment is made with the Shift Keylever Eccentric.

f. Shift Lock Link [as suggested in 3b] should be adjusted so that the Shift Lock will take a firm hold on Shift Lock Plate. Adjustment should be made first with the Shift Link Sleeve Nut followed by adjustment of the Shift Lock Link with its Sleeve Nut.

g. Shifting Arms should provide uniform pull in Shifting with either lever. Adjustment is made with the Shifting Arm Eccentric [right hand side] as indicated in drawing.

h. Shift Lock Lever Spring functions to lock the Shift Lock under the Shift Lock Plate and should have sufficient tension to maintain the Shift Lock in position.

i. Shift Frame Spring providing Shift Release tension, is adjustable, in teethed positions, on the Shift Frame Rear arm to provide desired tension.

j. Shift Balance Spring should be adjusted for light shifting with sufficient tension to return Segment to inactive position. Shift Balance Spring Hook Arms, right and left, may be formed uniformly to increase or decrease shifting tension.

4. To Remove Segment: Remove Carriage [See Main Carriage]. Remove Keyset Stem [See Keyset Mechanism]. Remove Segment Dust Plate cover. Remove Line Finder Bracket by loosening two [2] Bracket Binding Screws accessible through holes in Segment. Insert Segment Rail Screws [Shown in drawing] to hold rails and bearings intact to Segment. Remove Segment Rail Adjusting Screws [two on either side position indicated in drawing]. Disconnect Top Shifting Arm Screws [both sides]. Remove Motion Adjusting Nuts and Lower Shift Stops. Remove Typebar Rel Arm connection to both sides of Segment. Lift Segment and Typebar assembly up and out. To Replace Segment, reverse above procedure, adjusting Segment Rails, Pull Arm Eccentric and Motion and Line Finder Scale properly.


To Replace Bottom Carriage Rail: Reverse above procedure, feeding Ribbon Vibrator into position on Typebar Guide. Position Rail so that it seats properly on Rail Seats. Replace other mechanism previously removed.
UNDERWOOD 1. The Carriage Shift Method is employed in Underwood No. 5 and No. 6, raising the Platen to change the case. With the Sub-carriage seated and adjusted properly in the skeleton frame as specified under Sub-carriage instructions, the Carriage Roll in position on the Shift Rail, the Shifting Mechanism indicated in the drawing will elevate the Sub-carriage to upper case position when the Shift Keylever is depressed. The drawing shows the sub-carriage in lower case, non-shift position. Depression of the Shift Keylever causes the upper extension of the Shift Keylever to contact the Lift Frame. The Lift Frame pivots on the Lift Frame Adjusting Screw pivots and as the lower portion of the frame is moved forward, the Shift Rail is raised lifting the Carriage Roll and through it the Carriage Skeleton upward to Upper Case Position. The Lift Frame Spring serves as a counter-balance to permit of easy shifting, eliminating some of the weight of the Skeleton from the Shift Keys and Shift Frame.

When the Shift Lock Key is depressed, the Skeleton is raised to Upper Case position as the Right Hand Lock Release Lever moves over the Right Hand Shift Keylever Stud locking it down while the Lift Frame Lock Stud positions itself in the front position of the heart-shaped Lift Frame Lock. Depression of the Left Hand Shift Keylever [Shift Lock Release] moves the Right and Left Hand Lock Release Levers forward, tripping the Lift Frame Lock which permits release of the Lift Frame Lock Stud at the same time releasing the Right Hand Shift Keylever Stud from control of the Right Hand Lock Release Lever. Weight of the Carriage Skeleton moves the Lift Frame back to lower case position with Lift Frame Lock Stud in rear position on the Lift Frame Lock.

2. ADJUSTMENTS: Before attempting adjustments, it should be determined that the Sub-carriage is seated and adjusted properly in the Skeleton Frame as specified under Sub-carriage instructions.

   a. On-Feet: With the Platen paralleled and the Ring and Cylinder Adjustment made as indicated on Pages 40 and 41, determine that the Motion Stop Plates clear the Sub-carriage Frame by about 1/32", which adjustment may be made by loosening Motion Stop Plate Binding Screw and positioning Motion Stop Plate to provide this clearance. The On-Feet Adjustment is made with the On-Feet Adjusting Screws, left and right, after loosening Adjusting Screw Set Screws, with the Carriage in Lower Case [no shift] position. After adjusting, check the Sub-carriage to determine that it seats uniformly on both rear corners and on both Motion Stop Plates by placing strips of tissue paper under rear corners and between On-Feet Adjusting Screws and Motion Stop Plates, determine by slippage that the two rear corners seat uniformly and that the On-Feet Adjusting Screws seat uniformly on the Motion Stop Plates.

   b. Motion: Test motion with Capital H and small h. If capital letters are lower than small letters, release Lower Motion Adjusting Screw Set Screws on both sides and turn Motion Adjusting Screws counter-clockwise until capital and small letters are lined up perfectly. If capital letters are higher than small letters, turn Motion Adjusting Screws clockwise. After adjusting, insert a thin sheet of tissue between the Motion Stop Plate and the Motion Adjusting Screws on both sides of Sub-carriage, and with Shift Keylever depressed, determine by slippage that adjustments are uniform. Tighten Motion Adjusting Screw Set Screws when adjustment has been properly made.

3. Shift Mechanism:
   a. Shift Keylevres must work freely on their fulcrum and in the Keylever Comb, and there must be a clearance of .010" to .020" between upper rear extension of both Shift Keylevres and the Lift Frame [point indicated in drawing]. This clearance may be had by forming Shift Keylever Stop at point of contact with sub-frame [lower right hand corner of drawing]. Tension of Shift Keylever may be increased or decreased with Keylever Spring adjusting Screw [lower rear end of Shift Keylevres].
   b. Lift Frame must operate freely on its pivots with a minimum of end shake. Adjustment may be made with the Lift Frame Adjusting Screw after loosening Set Screw. Lift Frame must be level in order to secure uniform pressure and may be formed at point indicated in drawing to level. The Shift Rail should be straight-edged to determine that it is level.
   c. Lift Frame Lock functions to lock the Lift Frame in both Upper and Lower Case [shift and non-shift] positions. Pressure of the Lift Frame Lock on the Lift Frame Lock Stud [which is exerted by the Lock Lever Spring] must be sufficient to hold carriage positively and equally in both positions. Lift Frame Lock Studs should position properly in the slots in both shift positions. Adjustment may be made by loosening Lift Frame Screws and moving Lift Frame Lock forward or rearward as may be necessary. Tighten Lock Screws when adjusted properly. If necessary, the Lift Frame Lock may be formed between Lock Stud positions, by mailing.
   d. Lift Frame Lock Lift Spring may be formed to increase or decrease tension.
   e. Lock Release Levers [right and left] are positioned permanently on the Lock Release Lever Rod and operate simultaneously. In non-shift position the Levers must clear the Shift Keylever Studs by .005" to .010" points indicated in drawing. Adjustment may be made by forming Lift Frame Lock forward extension at point indicated in drawing, to provide this clearance to both Release Levers.
   f. Carriage Roll Hangar Latch [which retains Carriage Roll on Shift Rail] must be adjusted to clear the Lift Frame Shift Roll by .005" to .010" between bottom of Shift Roll and Latch when Carriage is in non-shift lower case position. In Upper-case [Shift Key depressed] side of Latch should just clear side of the Shift Rail. Carriage Roll Hanger Latch may be formed to provide these clearances.
   g. Lift Frame Spring provides tension to act as counter-balance to weight of Frame and Sub-carriage to permit of easy light shifting. Its connection to the Lift Frame is adjustable in notched forming of the Lift Frame, to provide for lighter or heavier shifting touch.
ON FEET ADJUSTING SCREW
MOTION STOP PLATE
MOTION ADJUSTING SCREW
SET SCREW

FORM LIFT FRAME HERE TO LEVEL
CARRIAGE ROLL HANGER LATCH CLEARANCE 005 TO 010
.005 TO 010 CLEARANCE IN LOWER CASE
LOCK LEVER SPRING
LOCK RELEASE LEVER
LIFT FRAME LOCK
LIFT FRAME LOCK SCREWS
LIFT FRAME SPRING
LIFT FRAME ADJ SCREW
LIFT FRAME LOCK STUD
CLEARANCE 010 TO 020
LIFT FRAME STUD
SET SCREW
SHIFT KEY LEVER STOP

ADJUST BY FORMING HERE
005 TO 010 CLEARANCE IN LOWER CASE
WOODSTOCK 1. Depression of Shift Lever, moves the rear extension of this lever forward to contact the Shift Rail Bracket, raising the Shift Rail and the Sub-carriage, through contact with the Sub-carriage Roller riding on the Shift Rail. The Rebound Latch moves off the Shift Rail Bracket Stud as the rear extension of the Shift Lever contacts the Shift Rail Bracket. As the Sub-carriage mechanism relates to the Shift Mechanism, both drawings should be reviewed in referring to adjustments.

2. ADJUSTMENTS: Before attempting adjustments, Shift Rail should be checked to determine that it is not loose on its pivots. This may be determined by centering carriage on frame and inserting one finger under carriage at each end to contact shift rail ends and by alternately pushing determine whether Shift Rail is tight or loose on its pivot. [See Paragraph c(2) for Shift Rail Adjustments]. Sub-carriage must be fitted properly [See Sub-carriage], and Ring and Cylinder adjustment properly made.

a. On-Feet Adjustment: Type are put on their feet in Upper Case [Capital letters] by properly adjusting On-Feet Adjusting Screws, after first releasing Lock Nuts. Light impressions should be made and adjustment continued until a sharp uniform impression is secured. After making On-Feet Adjustment, hold adjustment screws with screw driver while tightening Lock Nuts. Insert a thin sheet of tissue or cigarette paper between Shift Stop Lever Stop at point of contact with On-Feet Adjusting Screws on both ends of the carriage and holding the Shift Key depressed, determine by friction pull on tissue sheets that adjustments are uniform on both ends.

b. Motion: With On-Feet Adjustment properly made, test motion with capital H and small h. If capital letters are lower than small letters, release Motion Adjusting Screw Lock Nuts [on each end of carriage] and turn Motion Adjusting Screws clockwise until lined up properly. If capital letters are higher than small letters and a full sharp impression of the capital letter is secured denoting proper On-Feet Adjustment, and after checking the sub-carriage to determine that there is no obstruction holding sub-carriage from its maximum travel upward, turn Motion Adjusting Screw Counter-clockwise until positioned properly. Inserting a thin sheet of tissue or cigarette paper between Shift Stop Lever Stop and Motion Adjusting Screws at points of contact [both ends of carriage] determine by slippage that adjustments are uniform. Tighten Lock Nuts, while holding screws in position, to prevent turning.

c. Shift Mechanism:

[1] The Shift Levers should be checked to determine that they are straight and not binding in the comb and that the end of the Shift Lever is so formed as not to strike the sides of the Base Frame Posts which would cause the Carriage to hang up after shifting.

[2] Shift Rail should be checked to determine that it is free on its pivots without excessive end shake. In centering Shift Rail, Ribbon Guide should be tested in red position, with Shift Lock set, to determine that Shift Rail is properly centered. If not, the ribbon guide will bind when Key lever is depressed and will not return to its normal position after impression has been made. Shift Rail Pivot Set Screw is accessible by setting Shift in locked position, turning machine up on its back and inserting a long thin screw driver between Rear Frame and Sub-Frame casting at either rear post position. Loosen Shift Rail Pivot Set Screws. Force in [with screw driver] the Shift Rail Pivot located on outside edge of Pivot Casting. Tighten Set Screw and then check Shift Rail for binding and Ribbon Guide for centering properly on Type Guide.

[3] Shift Locks [on either side] are adjusted by turning the Shift Lock Cam Stud, after loosening Shift Lock Cam Stud Lock Nuts, turning the Cam Stud toward the front of the machine [clockwise on right hand side, counterclockwise on left hand side], so that the Shift Lock Lever may be depressed deeper permitting more secure purchase. Both Cam Studs should be adjusted uniformly, so that you can depress both Shift Lock Levers simultaneously and both will hold on the Cam Studs. If adjusted properly, Shift Keys depressed for releasing Shift Lock, should require only minimum pressure to unlock Shift, which pressure should be uniform on both Shift Keys. Adjustment is made with Rebound Adjusting Arm Screw, after releasing lock nut. Shift must lock and release easily from both sides of the Keyboard.

[4] Rebound Latch locks the Sub-carriage in lower case [non-shift position] to prevent vibration of Sub-carriage in typing. Rebound Latch should be adjusted so that it rests lightly on top of stud on Rebound Latch Plate attached to Shift Rail. Adjust by loosening Rebound Latch Eccentric Collar Screw and turn Rebound Latch Eccentric Collar until positioned properly. If this position cannot be attained with the Eccentric Collar [Rebound Latch not positioning high enough, or too high] adjusting Arm, located behind Rebound Latch Bracket, may be adjusted by releasing Adjusting Arm Screws and moving Adjusting Arm up to raise Rebound Latch or down to lower Rebound Latch. Tighten Adjusting Arm Set Screws after adjustment has been made. Readjust Rebound Latch Eccentric Collar, as may be necessary. Determine that sub-frame binding screws are tight before adjusting Rebound Latch.
MOTION AND SHIFT MECHANISM

1. As the Shift Lever is depressed, the Shift Lever Connector moves the Toggle Arm and the Rock Shaft downward drawing with it the Segment basket which performs the shifting operation. The Segment moves in the Segment Ball Race on ball bearings as indicated (right and left) in the upper drawing. The Toggle Arm (on the right) controls the shift of the basket.

2. ADJUSTMENTS: Before attempting adjustments determine that the basket moves freely in the ball race with minimum of end shake. Adjustment may be made with the Ball Race Adjusting Screws and Nuts. Determine that end shake in Rock Shafts is reduced to an absolute minimum by adjusting Pivot Screw Lock Nuts. If the Typebar Basket fails to return when Shift Key is depressed and released, then the Ball Race is improperly lubricated or the Ball Race is binding.

   a. Keylever Assembly (viewing machine from beneath). If not positioned properly, moved to the rear too far or to the front too far, will affect the shifting mechanism. Three positioning plate attach Keylever Assemblies to Main Frame and are adjusted with sliding brackets after loosening binding screws.

   Proper location of the keylever assembly should be tested before attempting any adjustments. The test may be made by shifting the basket with the Shift Lever. If the tip of the Bar Keylevers on either the middle or center of the Keyboard bounce (move up or down) while shifting, the Sliding Keylever Bracket on the left side, the center, or the right side, whichever location the keylevers move, should be adjusted. This unbalance condition, unless corrected, will create a bind or sluggish movement of the Segment in shifting and must be corrected before Shift mechanism is adjusted.

   b. On-Feet Adjustment: For explanation see Foreword. The Segment must be adjusted to snug fit in its Ball Race and all loose play in Rock Shafts eliminated, providing a smooth shifting Segment before attempting any on-foot adjustment. Ball Race adjustment may be made with Ball Race Adjusting Screws after loosening Lock Nuts. End shake in Rock Shafts may be removed, after loosening Lock Nuts, by turning Rock Shaft Pilots alternating from right to left in order that basket be centered properly and that there be no bind in the Shift Rock Shafts.

   The On-Feet Adjustment on 1a Models is made with the small letter [lower case] Segment in non-shift position. Loosen Segment Stop Screw Lock Nut and back out On-Feet Adjusting Screw. Back out Segment Locating Plate Mounting Screw which is fitted in slot at the shif segment so that lower nut will turn a little heavy on the bottom, and light on their tops. Tighten Segment Locating Plate Mounting Screw. Now turn the On-Feet Adjusting Screw clockwise to remove the lightness in lower tops until they make a uniform impression. Tighten Segment Stop Screw Lock Nut.

   Late Model No. 8 prior to 1A model, reversed the position of the On-Feet Adjusting Screw and the Motion Adjusting Nut-the On-Feet adjustment being made with the Top Nuts instead of with the lower Screw.

   c. Motion: With the On-Feet Adjustment made as called for under Paragraph a above and Segment in Shift Position-Shift Key held down by the finger, unlock Motion Adjusting Nut of lower Nut clockwise or counter-clockwise to bring the Capital letters into alignment with the lower case Letters. Use the letter H for this test as suggested in the Foreword. Hold lower Motion Adjusting Nut stationary while tightening the Top [locking] nut.

   If, for any reason, the Motion Adjustment cannot be made, it is evident the On-Feet Adjustment was not properly made, and it will be necessary to retrace the steps and reset the On-Feet Adjustment.

   d. Shift Mechanism:

      1. If Segment has been located properly as outlined above in Paragraphs b and c, the Shift Balance Link will lock the Segment properly in non-shift position—there will be no up-and-down movement of the Segment when lifted by the hand.

      2. Shift Lock Latch: It is essential that the Shift Lock Lever be free when the Shift Key is held depressed by the finger. The Shift Lock Lever may be adjusted by loosening Shift Lock Latch Abutment Adjusting Screws and properly positioning Shift Lock Latch Abutment, raising or lowering the abutment until the Shift Lock Latch makes a click under the Abutment Plate with slight pressure on Shift Lock Key. Tighten Shift Lock Latch Abutment Adjusting Screw when adjustment is made.

      3. Shift Lever Adjusting Screws (both sides) should be adjusted after unlocking Lock Nut to provide about 1/16 drop on Shift Key before it picks up the Basket Mechanism.

      4. Lock Release Arm Assembly on the Super Speed Model should be adjusted to provide approximately 1/16 clearance between right hand Shift Lever and the Right Hand Lock Release Arm. If properly adjusted the Shift Lock Latch on the Left Shift Lock Lever will be positioned properly to release Shift Lock when the Shift Lever is depressed. There is no Right Hand Shift Lock Release on the Model No. 8.

   e. To Remove Typebar Basket: Remove On-Feet Adjusting Screw, after removing Segment Stop Screw Lock Nut and Motion Adjusting Nuts. Remove Right Hand Segment Rock Shaft Pivot Screw and Nut. [There may be occasion to break down and remove Left Hand Segment Rock Shaft Pivot Screw and Nut but this should be avoided if possible to conserve adjustment]. Remove Line Finder Frame and Bushing Screws located on Top Plate under the Carriages which are accessible after removing Platen, by moving the Carriages to the left and right, screws being accessible at end of Deflector [Paper] Pan. Disconnect Ribbon Guide. Remove the Line Finder Frame. Disconnect all Typebar Links (available at top of Typebar Segment Bracket). Back out Ball Race Adjusting Screws after loosening Lock Nuts on both sides. Typebar Basket may now be removed. In replacing, reverse above procedure. It will be necessary to reset On-Feet and Motion, Ball Race, Rock Shaft Pivot and Line Finder adjustments.


   To clean the Shift and Typebar mechanism it is suggested that the enamelled surface of the four Main Frame Posts and the base be covered thoroughly with heavy greasy. The main frame may be immersed in a cyanide solution to a depth covering the basket and Shift mechanism, but not submerging the Keylevers, Keyboard or base bottom Submergence in cyanide solution should not exceed 10 minutes (in stubborn cases this procedure may be repeated). The green may readily be removed from the enamelled surfaces, after cleaning, by using carbon tetrachloride or gasoline. This procedure will insure perfect cleaning of the Shift and Typebar mechanism as well as the basket mechanism. Immediately after immersion in cyanide solution, the entire mechanism should be thoroughly washed with water [not preferred] to stop the action of the cyanide, and then mechanism dried in a drying oven. An mechanism should be immersed in a solvent [mineral spirit] mixed with fine [white] oil, blown out with compressed air and dried.
**FOREWORD** The Platen Rubber must adhere uniformly to the core to prevent faulty typed impressions. Adherence to the core may be determined by tapping the Platen across its width with a screwdriver or metal object, determining by uniform sound that adherence is uniform. It is essential that the Platen be ground [by the manufacturer or recoverer] uniformly and Platen should be straight-edged to determine that it is true in its entire length. If Platen rubber is inflated [from use of duplicator stencils] it should be recovered or replaced with new. If Platen rubber is hardened from age, it will cause excessive wear and tear to the typewriter ribbon and should be replaced.

To remove slick finish of the Platen, rub with cloth immersed in alcohol. If the Platen is pitted, good impressions are impossible and it should be removed and resurfaced, by grinding with 00 emery, preferably on a lathe to provide a smooth even surface, but must not be ground down more than .010 from original diameter, in which event it should be replaced. IMPORTANT: War Model Platen[s] [recovers and new] are manufactured of Buna synthetic rubber and cannot be ground with emery. Instead, such platens should be washed with cloth immersed in carbon tetrachloride. A perfect working surface is important if the best typed impressions are to be secured. If in doubt, have the platen recovered or replaced with new.

**REMODEL**

1. The Remington No. 17 utilizes a Platen with diameter of 1.594".
2. **ADJUSTMENTS:**
   a. **Platen Fitting:** Platen should fit properly in Carriage without excessive end play. Right Platen Knob is adjustable, by threading onto Platen Shaft, to remove end shake and fit properly. After adjusting, tighten Platen Locking Screw.
3. **To Remove Platen:** release Right and Left Platen Locks and lift platen assembly out of the carriage.
4. **Platen Locks:** The tension of Platen Locks is determined by Platen Lock Adjusting Screws on either end of the Carriage. Locks should be adjusted to hold the Platen shaft snug, without binding. Tighten Lock Nut when adjustment is properly made.

**ROYAL**

1. All models Royal Typewriters utilize platen with diameter of 1.456".
2. **ADJUSTMENTS:**
   a. **Fraction Cylinder End** [See Variable] teeth should be in good condition and Cylinder End springs should provide sufficient tension to properly operate the Variable.
3. **To Remove Platen,** loosen Left Cylinder Knob Set Screws. Loosen Right Platen Set Screw and Fractional Line Space Aligning Screw. Grasping the Right Hand Platen Knob with the right hand while holding the platen with the left hand, draw out the Platen shaft from the right. Platen may be lifted out of the carriage.
4. **To Replace Platen,** place Platen in Carriage, fitting Fractional Cylinder End into Ratchet. Feed Platen Shaft through right carriage end bearing and through Platen. Replace Fractional Line Space Aligning Screw and aligning Screw positioning holes in Platen with Platen Knob Set Screws, tighten Platen Set Screw and Fractional Line Space Aligning Screw. Tighten Left Cylinder Knob Set Screws.

**UNDERWOOD**

1. Underwood Typewriters No. 5 and No. 6 utilize a platen with diameter of 1.750".
2. **ADJUSTMENTS:**
   a. **Fitting a Platen:** A Platen End Reamer may be used to reduce the length of the wood Platen core, if necessary [after removing platen end] to provide proper fitting. Add Washers on Shaft between platen end and Skeleton frame to remove end shake.
   b. **Right Hand Cylinder Knob** should be positioned properly to clear right hand Carriage Skeleton Guide [See Sub-carriage] without binding in either shift position. Adjustment may be made with Cylinder Shaft Knob Screws. After adjusting, turn knob and check shifting in each position.
3. **To Remove Platen:**
   a. Remove Left Carriage End Cover Plate.
   c. Disconnect Detent Spring from Spring Post, permitting removal of Line Space Disengaging Cam.
   e. Holding Platen with right hand, draw out the Cylinder Shaft with the Left Hand Platen Knob, from the left.
   f. Platen may be lifted up and out of Carriage Skeleton.
4. **To Replace Platen:** Reverse above procedure.
WOODSTOCK 1. All model Woodstock Typewriters utilize a platen measuring 1.500” in diameter. All Woodstock Typewriters above 567,600 serial use a Platen with the Metal Platen End on the right end only. Woodstocks below 567,600 serial use a Platen with Metal Platen Ends on both ends of the Platen.

2. ADJUSTMENTS:
   a. Platen Set Screws: Right end screws, all serials, are pointed to fit embossed points drilled in Platen Shaft. It is important that these Right hand set screws be positioned in Shaft properly and heads must be flush with platen metal end.
   The Set Screws on Left Platen End [Woodstocks below 567,600 serial] have flat ends and seat on the lips of the Platen Clutch Sleeve. These screws should be uniformly tightened, alternating from one to the other, and heads must be flush with metal end of platen.

3. To Remove Platen:
   a. Woodstocks below 567,600 serial: The Platen on machines below this serial number may be removed without removal of the Left Hand Platen Knob. To the left of the two Left Hand Platen Knob Set Screws, on the Platen Knob Shaft, is the Platen Rod Screw. Back out this screw and the two Platen Set Screws on each end of the Platen. Withdraw the Platen Rod from the Right. The Platen may be moved to the right, the right end lifted slightly to disengage the left end of the Platen from the Clutch Shaft Lips, then out.

   b. Woodstocks above 567,600 serial: Loosen Left Hand Platen Knob Set Screws. Move Left Hand Platen Knob to the left to permit the Variable Knob to Key into the Platen Knob Slot. Turn Platen Knob counter-clockwise [the Variable Knob will turn with it] until Variable Knob unscrews from Platen Clutch Plate wire thread. Variable Knob and Platen Knob may then be removed from the Clutch Wire, being careful not to lose the Compression Spring located in the Platen Knob. Loosen R. H. Platen Set Screws [2 of them]. As these screws are pointed, they should be backed out sufficiently to prevent scoring the Platen Rod. Grasping the Right Hand Platen Knob and holding the Platen, withdraw the Platen Shaft to the right. Platen may now be moved slightly to the right, to disengage Platen Clutch Sleeve prongs from holes in the left Platen end, up and out.

4. To Replace Platen:
   a. Woodstock below 567,600 serial: Replace the Platen in the Carriage, with end with large hole in position on left of Carriage, slipping over the projecting lips of the Platen Clutch Sleeve and with the Platen Set Screws positioned over the flat spot on the lips. Slide Platen Rod into position from the right and locating positioning holes in the Rod for reception of the Right Hand Platen Set Screws, tighten these pointed screws into position. Move the Platen to the left until the left end of the Platen is about 1/32" from the face of the Platen Clutch Cover. Tighten the Left Hand Platen Set Screws carefully, seeing that they are positioned to contact the flat spot on the Lips of the Sleeve, alternating from one to the other screw to insure a uniform tightening of each screw. Tighten Platen Rod Screw on left hand Platen Knob Shaft.

   b. Woodstock above 567,600 serial: Inspect Line Space Lever Mechanism to determine that it is in its proper place. Place Platen in Sub-Carriage with two Platen Set Screws facing upward. Turn the Platen slowly to align the three pins in the Clutch Sleeve with the three holes in the Platen Core. Then push Platen to the left.
   Insert Platen Rod through right Sub-carriage end bearing and through the Platen, revolving it slowly as it nears the clutch end. Push it to the left until it finds its proper position in and through the Platen Clutch Drum. Turn the Right Hand Platen Knob until Knob Set Screws are in the same position as Platen Set Screws [facing upward] and Knob Shaft is up against right hand Sub-carriage end. Tighten Platen Set Screws, being sure that these pointed screws enter embossed spots in the Rod.
   Place Compression Spring on Platen Clutch Plate Wire. Turn the Right Hand Platen Knob until flat surfaces on the Left end of the Platen Rod face upward. Fitting Variable Knob Key into Left Hand Platen Knob, replace on Platen Clutch Plate Wire and turn clockwise until Platen Knob, keyed to Variable Knob, is solidly against left end of Sub-carriage frame. Back Platen Knob and Variable Knob out [counter-clockwise] two complete turns and push the Left Hand Platen Knob to the right [moving it away from the Variable Knob] with Knob Set Screws in position over flat surfaces of the Platen Rod. This position may be checked by reference to Set Screws on Right Hand Platen Knob. Tighten Set Screws. Check Variable Knob for release and operation. If it does not work freely, loosen L. H. Knob Set Screws, pull Knob back to engage Variable Knob and turn both Knobs counter-clockwise an additional full turn, resetting Platen Knob in position on Platen Rod and tightening Set Screws.

L. C. SMITH 1. All model L. C. Smith Typewriters utilize a platen with a diameter of 1.750”.

2. ADJUSTMENTS:
   a. Platen should be fitted properly in Carriage without excessive end shake and without binding. Adjustment may be made by inserting or removing thin washers between the Platen Bushing and the Platen.

   b. Late model machines utilize an adjustable Platen Latch, which may be adjusted, to remove up and down shake in the bearings.

3. To Remove Platen: Two types of Platen Latches are used on the L. C. Smith. To remove, release Right and Left Hand Platen Locks and lift Platen Assembly out of the Carriage. In replacing Platen, check position of the Line Space Pawl, moving it up out of the way, before positioning Platen Shaft in its bearing in Carriage Casting. Set locks properly.
REMINGTON

1. The Variable mechanism is provided in the Platen Assembly to disengage the Platen from the control of the Ratchet when the typist desires to relocate a line of writing or to write on ruled forms. The Platen is held to the operation of the Ratchet and Line Spacing mechanism by the positioning of the Clutch Dogs in the inner Ratchet teeth, held in place by pressure of the Clutch Dog Cams because of tension applied by the Clutch Dog Cam Springs. Pressing the Variable Knob [to the right] causes the Plunger to push back the Clutch Dog Cams [to the right] releasing their pressure from the Clutch Dogs and permitting the Clutch Dogs to disengage themselves from contact with the inside teeth of the Ratchet. With the Clutch Dogs disengaged from inner teeth of the Ratchet, the Platen may be turned [with the Platen Knob] without transmitting this movement to Ratchet.

2. ADJUSTMENTS: In order for the Clutch Dogs to mesh with the inner teeth of the Ratchet, the teeth of the Ratchet must be in good condition and not worn. The flat Cam shaped backs of the Clutch Dog Cams must be positioned under the individual Clutch Dogs in order that movement of the Cams in or out will control the position of the Clutch Dogs in their relation to the inner teeth of the Ratchet. Tension of the Clutch Dog Cam Springs must be sufficient to hold the Clutch Dog Cams engaged to the Clutch Dogs. The Clutch Dog Cams must not limit on the Plunger end. Clutch Dogs should be positioned parallel with the Variable Cover Plate to prevent their sticking in the teeth of the Ratchet. The mechanism should be lubricated sparingly.

a. Variable Knob [with left hand Platen Knob screwed in tight] must have a little end play to prevent Plunger to which it is attached from limiting the Clutch Dog Cams which would prevent the Clutch Dogs from seating properly. Adjustment is made by grinding hexagon face of contact end of the Plunger slightly to permit of this clearance. The Left Platen Knob screws into the left Platen end and is held by friction only, therefore it should be turned in tightly.

b. Ratchet Inner Teeth must be in good shape and not worn. If worn the Ratchet must be replaced.

Clutch Dogs should not stick in the slots of the inner Ratchet Teeth, and the Springs must have sufficient tension to hold the Dogs properly. If the Clutch Dogs are not engaging the inner Ratchet Teeth properly, with pressure of the Clutch Dog Cams applied, remove the left hand Platen Knob, Plunger, Platen Roll Bushing, Platen Roll Spring and Clutch Head by removing three Clutch Head Screws. Entering a flat end hexagon pencil in position between the Clutch Dogs contacting ends of the Clutch Dog Cams, push in to depress Clutch Dog Cam Spring tension, slipping the Ratchet over the Pencil. Position the Clutch Dogs properly in their relation to the Ratchet Teeth and to the flat surfaces of the Clutch Dog Cams, determining at the same time that the Clutch Dog Cam Springs are in good condition. With the Clutch Dogs positioned properly in Ratchet teeth, replace mechanism as the Clutch Dog Cams move into position, slowly remove the pencil.

c. Platen Roll Spring should be in good condition and provide proper tension.

d. The Ratchet should be positioned properly in its relation to the Detent Roll and the Detent Roll should have proper tension. [See Line Space Lever].

ROYAL

1. The Variable mechanism is provided in the Platen Assembly to disengage the Platen from the control of the Ratchet when the typist desires to relocate a line of writing or to write on ruled forms. The Platen is equipped with a Fractional Cylinder End inbuilt in the Platen Core with springs located in drilled holes in the wood core which are contacted by the Pins of the Fractional Cylinder End to provide the tension to hold the Fractional Cylinder End outward. This pressure forces the teeth of the Fractional Cylinder End into mesh with the inner teeth of the Ratchet, holding the Platen to the movement of the Ratchet. When the Variable Knob is depressed the Line Space Release Knob is moved into engagement with the Fractional Cylinder End, pushing the Cylinder End [to the right] out of engagement with the inner Ratchet Teeth, thereby permitting the Platen to rotate without transmitting this movement to the Ratchet. Release of the Variable Knob permits the Fractional Cylinder End teeth to re-engage the inner teeth of the Ratchet, locking the Platen to the movement of the Ratchet.

2. ADJUSTMENTS: The Fractional Cylinder End must move in and out of Platen End without binding and with sufficient tension applied by the inbuilt springs to hold the Cylinder End outward for engagement in the Ratchet. Teeth of the Fractional Cylinder End, if not in good condition, will not permit of proper mesh with inner Ratchet teeth.

Late model Platens bind the Fractional Cylinder End to Platen Core with three binding screws instead of rivets. The Removal of these screws frees the Fractional Cylinder End Assembly for removal. Fractional Cylinder End tension springs are located free in holes in wood Platen Core and may be removed and replaced if necessary. Fractional Cylinder End Pins [3] are riveted to the Cylinder End. To remove pins from the assembly the burled rivet head may be driven down through the Cylinder End Plate.

b. Tongue Washer is contacted by the Release Rod when the Variable Knob is depressed, and must be in place in Fractional Cylinder End, otherwise the Release Rod will not be able to release the Cylinder End from engagement with inner Ratchet Teeth.

c. Ratchet: If inner Ratchet teeth are worn, Cylinder End teeth cannot mesh properly and Variable will not function to hold the Platen rigidly to the movement of the Ratchet. If worn, the Ratchet should be replaced.

d. Variable Knob-Line Space Release Rod-Spring: On Late model machines, this is a complete assembly, the Variable Knob being sweated onto the Line Space Release Rod in manufacturing. The assembly may be removed from Platen Shaft by loosening Knob Set Screws.
UNDERWOOD 1. The Variable mechanism is provided in the Platen Assembly to disengage the Platen from control of the Ratchet when the typist desires to relocate a line of writing or to write on ruled forms. The Platen Shaft is held to the movement of the Ratchet by the pressure of the Friction Band in the Line Spacer Drum exerted by the Line Spacer Cone when the Variable Push Button is in normal engaging position [pushed in and Button locked by Line Space Cone Lock Rod Lever]. When the Variable Push button is pulled out [to the left] the Line Spacer Cone [held to the prongs of the Variable Push Button] moves out of engagement with the Friction Band in the Drum, permitting the Platen shaft and the Platen to turn without transmitting this motion to the Ratchet. It will be noted that the Variable mechanism of the Underwood is attached to the Platen Shaft and not to the Platen.

WOODSTOCK 1. The Variable mechanism is provided in the Platen Assembly to disengage the Platen from control of the Ratchet when the typist desires to relocate a line of writing or to write on ruled forms. Two types of variables have been used on the Woodstock, as illustrated in the Drawing. The Cam Clutch Type Variable was used on Woodstock Typewriters below 567,600. The Friction Variable is used on Woodstock Typewriters above 567,600.

The Cam Clutch Type Variable holds the Platen to the operation of the Ratchet and Line Spacing mechanism by the pressure of the four Platen Clutch Rollers exerted by the Platen Clutch Springs applied against the Platen Clutch Levers [L. H. and R. H.]. When the Variable Knob is turned, the Platen Clutch Cam is moved [to the right or left] by the Platen Clutch Release Wire, causing it to contact the points of the Levers releasing the tension on them and the Rollers and thereby permitting the Platen to turn without transmitting this movement to the Ratchet. The Variable Knob relies upon the tension of the Platen Clutch Release Knob Spring, located contacting the Left Hand Platen Knob to return it to position. [See Platen].

The Friction Type Variable is engaged to the Platen, by the three prongs of the Platen Clutch Sleeve Assembly entering three embossed holes in the Left Hand Platen End. The Platen Clutch Plate [equipped with three holes] rides between the Platen end and the clutch on the three prongs of the Sleeve Assembly. When the Variable Knob is pressed in it moves the Platen Clutch Plate teeth out of mesh with the inner Ratchet teeth, freeing the Platen from control of the Ratchet. When the Variable Knob is released, the Variable Spring pressure pushes the Variable Knob out [to the left] and it draws the Platen Clutch Plate into engagement with the inner Ratchet Teeth.

2. ADJUSTMENTS:
   a. Cam Clutch Type Variable: Causes of slippage: Clutch has been oiled; Rollers are gummy or dirty. Remove the Variable Clutch from the Carriage [See Platen]. Remove the Clutch Cover by removing three Cover Binding Screws. Grasping the Platen Clutch Release wire [to which the Variable Knob is attached when assembled] firmly in a pair of pliers held against the Clutch Sleeve to retain the curved end of the Release Wire in engagement with the Platen Clutch Cam, with the Wire POINTING UPWARD [face of Clutch downward], turn Wire with the Pliers forcing the Wire and the Clutch Sleeve downward cautiously until the Clutch parts are disengaged from the Ratchet Drum. [Be careful that you do not lose the four [4] Platen Clutch Rollers from their position on the prongs of the Platen Clutch Levers.] With the Drum free of its mechanism, wash and thoroughly dry the inside of the Drum. No oil or grease is used in the Drum. Remove the four Platen Clutch Rollers from their position on the prongs of the Clutch Levers and polish them with crocus cloth. Replace the Clutch Rollers on the Platen Clutch Lever prongs [holding mechanism face downward] reinsert wire in Drum and pull mechanism back to edge of drum, then holding wire with pliers up against the Clutch Sleeve, turn the wire slowly and pull upward. Mechanism will reseat itself in the drum.

   b. Friction Type Variable:

2. ADJUSTMENTS:
   a. Cam Clutch Type Variable: Causes of slippage: Insufficient pressure of Friction Band to the Drum will cause slippage. To adjust, loosen Adjusting Screw Set Screw. Turn Line Space Adjusting Screw clockwise to increase tension pressure; counterclockwise to decrease pressure. This adjustment should be carefully made to exert only enough pressure to overcome slippage. Tighten Adjusting Screw Set Screw when adjustment has been made.

   b. Line Space Cone Lock Rod Lever should lock the Line Spacer Cone securely when Variable Push Button is moved to the right. Adjustment is made by loosening Platen Knob Screw Set Screw and Platen Knob Screw. Move Variable Push Button [in or out] until Line Space Cone Lock Rod Lever locks over the Line Space Cone Lock Rod properly. Tighten Platen Knob Screw and Platen Knob Set Screw when adjustment has been made.
[L. H.] should be in position on the flat surface of the Platen Shaft. If there is insufficient movement of the Variable Knob [to the right], the clearance between the Variable Knob and the Platen Knob must be increased. [See Paragraph 4b, Platen].

[2] Ratchet Teeth, inside the Ratchet, if worn, will affect operation of the Variable by failing to permit the Platen Clutch Plate teeth to mesh properly. In such cases, the Ratchet should be replaced.

[3] Platen Clutch Plate Teeth, if worn, will prevent proper mesh in Ratchet inner teeth and in such event should be replaced.

[4] Platen Clutch Plate Wire must be straight and centered properly in Platen Clutch Plate to prevent binding in the Platen Clutch Sleeve and Platen Knob. If the Platen Clutch Plate Wire becomes unsoldered from its head, unless it can be soldered and centered accurately it should be replaced. Late model Platen Clutch Plate Wires are brazed to the head.

3. To Remove Variable: [See Platen].
4. To Replace Variable: [See Platen].
1. The Variable mechanism is provided in the Platen Assembly to disengage the Platen from control of the Ratchet when the typist desires to relocate a line of writing or to write on ruled forms. The Platen is held to the operation of the Ratchet and Line Spacing mechanism by the pressure of the rollers to the inside of the Ratchet Drum, which pressure is exerted to the rollers through the Wedge by the Cam Spring tension. When the Platen Release Sleeve is moved into the Platen Knob, the Platen Release Plunger is forced to the right moving the Wedge inward thereby releasing its pressure on the rollers and permitting the Platen to turn without transmitting this movement to the Ratchet.

2. ADJUSTMENTS:
   a. Cam Spring must provide sufficient tension to maintain Wedge pressure on Rollers when pressure of Platen Release Sleeve against the Wedge [through the Plunger] is released. Adjustment may be made by tightening [turning clockwise] the Spring Adjusting Nut.
   b. Platen Release Plunger must be positioned in Wedge Adjusting Plate so that when the Platen Knob is turned into the Platen Knob the Plunger will force the Wedge Adjusting Plate and Cam Spring back to take pressure off the Wedge freeing the Roller pressure on the Ratchet Drum. There must be slight free play between the Platen Release Sleeve and the Platen Shaft Collar, in normal position Platen Release Sleeve not engaged to allow full pressure of the Wedge against the Rollers. Adjustment may be made by positioning Wedge Adjusting Plate after releasing Adjusting Plate Screw.
   c. Rollers: As the pressure of the Rollers against the Drum controls the locking of the Platen to the Ratchet, and in the event of creeping caused by too much play between the Rollers, larger sized Roller may be installed to take up slack and increase the tension of the Rollers against the drum to correct the creeping trouble. Rollers are available in the following sizes: .091", .094", .096", .099", .102". The standard sized roller is .091". In the absence of rollers, it is possible to form the end of Wedge [where it contacts the Adjusting Plate] downward with three prong pliers to cause contact with sloping edge of the Wedge Plate to increase the pressure on the rollers somewhat.
   d. Plunger Spring must be in good condition and have sufficient tension to return the Plunger to normal inactive position when released.

FOREWORD

The Ring and Cylinder Adjustment comprises the movement of the cylinder [platen] forward or rearward so that a typebar held contacting the abutment ring will also contact the platen with one sheet of paper inserted, which condition must exist uniformly across the entire platen. In order to make this adjustment, it may be necessary to make:

[a] RING and CYLINDER ADJUSTMENT: Move entire platen forward or rearward in a horizontal plane as indicated in the drawing above, and / or

[b] PARALLEL PLATEN: Move the right or left end of the platen forward or rearward in order that the front surface of the platen may lie horizontal to the segment abutment ring.

[c] FORM INDIVIDUAL TYPEBAR: To bring into uniformity with balance of typebars, which information is covered under Chapter "Alignment".

Before attempting Ring and Cylinder or Parallel Adjustments, determine that:

[1] The platen is of correct diameter, which information is indicated under Ring and Cylinder Adjustments for the individual make of machine. Whenever a platen has been ground down more than .010 in. from the factory grinding size, the type face, which is rolled to fit the radius of the platen, will not strike squarely and fully on the paper, resulting in incomplete character impression. The platen should be replaced in such instances.

[2] The platen is true in its entire length, which may be determined by use of a straight-edge.


[4] The typebar is off the segment ring or off the platen, which may be determined by holding a typebar against the platen or the segment ring. If the typebars [try several bars across the keyboard] are universally off the ring the platen must be moved rearward; if off the platen, the platen must be moved forward.

[5] Platen is parallel to the segment abutment ring, which may be determined by holding a typebar or bars individually to segment ring and move the carriage across its entire width checking clearance between the type face and the platen in all carriage positions.
RING AND CYLINDER

REMINGTON 1. Ring and Cylinder Adjustment on the Remington No. 17 is performed by movement of the Carriage Frame, including the carriage assembly and its rails. The size of a Remington No. 17 Platen is 1.594 in.

2. ADJUSTMENTS: Before attempting adjustments refer to Foreword.

   [a] Ring and Cylinder Adjustment: Forward movement of the platen [to contact a typebar held against the Segment Ring] may be made, after loosening Carriage Rear Mounting Screws [2] and Carriage Rail Eccentric Lock Nuts [2] by alternately adjusting the Eccentrics, noting forward movement of the Carriage Frame, until the platen contacts the typebar. Rearward movement of the platen [to permit a typebar to contact the Segment Ring] may be made by adjusting Carriage Rail Eccentrics, noting rearward movement of the carriage. Tighten Carriage Rear Mounting Screws and Eccentric Lock Nuts when the adjustment has been made.

   NOTE: In remote instances, new carriage frame installation will not permit positioning the Carriage Rail Eccentrics in Top Plate Holes. A large washer may be placed under the Eccentric, after removing eccentric from slot, and the carriage tightened properly without the use of the Carriage Rail Eccentrics.

   [b] Parallel Platen: Movement of one end of carriage, forward or rearward, to properly position platen in its relation to typebar held to Segment Ring, may be accomplished by loosening Carriage Rear Mounting Screw and Carriage Rail Eccentric Lock Nut on side involved, adjusting Eccentric Screw to properly position the Carriage Frame. Tighten Mounting Screw and Eccentric Lock Nut when adjustment is accomplished.

ROYAL 1. Ring and Cylinder Adjustment on the Royal Typewriter involves movement of the Bottom Rail and Carriage Assembly. After making this adjustment it is necessary to recheck and adjust Type Bar Trip, Segment Lock, Shift Stops and Locks, Escapement Rear Limit Stop and the Universal Bar Ribbon Adjusting Screw. The size of a Royal Platen is 1.486 in.

2. ADJUSTMENTS: Before attempting adjustments refer to Foreward.

   [a] Ring and Cylinder Adjustment: Forward movement of the platen [to contact a typebar held against the Segment Ring] may be made, after loosening both Bottom Rail Binding Screws, by turning Ring and Cylinder Adjusting Screws alternately equally counter-clockwise [to the left] moves the platen forward; clockwise [to the right] moves the platen rearward. Determine that Platen is parallel after adjusting Ring and Cylinder and before tightening Bottom Rail Binding Screws.

   [b] Parallel Platen: Movement of one end of carriage, forward or rearward, to properly position platen in its relation to typebar held to Segment Ring, may be accomplished, after loosening Bottom Rail Binding Screw on side of machine involved, by turning Ring and Cylinder Adjusting Screw clockwise [to the right] moves the platen rearward; counter-clockwise [to the left] moves the platen rearward. Tighten Bottom Rail Binding Screw when adjustment has been made.
UNDERWOOD 1. Ring and Cylinder Adjustment on the Underwood Typewriter is controlled by the position of the Carriage Lift Hooks, which pivot on Eccentric Studs. These Eccentrics also provide adjustment for paralleling the platen. Size of the Underwood No. 5 and 6 Platen is 1.750 in.

2. ADJUSTMENTS: Before attempting adjustments refer to Foreword.

   a. Ring and Cylinder Adjustment: Adjustment is made, after loosening Eccentric Stud Lock Screws on both ends of the Lift Hook Shaft, by adjusting the Eccentric Studs uniformly until the platen has been brought forward or rearward to its proper position in relation to a typebar held to the printing point. Eccentric Stud Lock Screws must be tightened when adjustment is made, holding Eccentric Stud with screw driver to prevent its movement during the tightening of Lock Screw.

      b. Parallel Platen: Loosen Eccentric Stud Lock Screw on end of platen involved and adjust [move platen forward or rearward] with Eccentric Stud until positioned properly. Tighten Lock Screw when adjustment is made.

WOODSTOCK 1. Ring and Cylinder Adjustment on the Woodstock Typewriter involves movement of the sub-carriage [not the Carriage and Carriage Rails]. The Rear Carriage Rail position is set with .023 in. clearance between bosses on top plate and rear surface of rear rail and if correctly positioned must not be altered. Size of the Woodstock Platen on all models is 1.500 in.

2. ADJUSTMENTS: Before attempting adjustments refer to Foreword.

   a. Ring and Cylinder Adjustment: Determine that rear carriage rail is positioned properly by measuring the clearance between top plate bosses and the rear carriage rail. Determine that sub-carriage is paralleled properly by measuring clearance between sub-carriage ends and margin bar. If sub-carriage and carriage rear rail is positioned properly, Ring and Cylinder adjustment is made, after loosening Shift Link Screw Nut on each end of the carriage, by alternately tapping Shift Link Slide Adjusting Collar, left and right, until the platen is positioned properly. Tighten Shift Link Screw Nuts when adjustment is made.

      b. Parallel Platen: Determine that rear carriage rail is positioned properly by measuring the clearance between each top plate boss and the rear carriage rail, which should be .023 in. Clearance should be uniform. Determine that both ends of sub-carriage are parallel by measuring clearance between rear edge of sub-carriage ends and margin bar. If Platen is out of parallel, adjustment may be made on right sub-carriage end, after loosening Platen Adjusting Plate Screws by turning Platen Adjusting Eccentric. If sub-carriage is out of parallel adjustment may be made, after loosening Shift Link Slide Adjusting Collar Lock Nut on end of sub-carriage involved and tapping Shift Link Slide Adjusting Collar until sub-carriage is properly paralleled. Tighten Lock Nut when adjustment has been made.
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| **ROYAL**          |
| Carriage fitting and tension  |
| Platen fitting  |
| Variable  |
| Line Space Lever  |
| Rack, Pinion and Starwheel  |
| Paper Feed  |
| Paper Bail [clamp]  |
| Segment fitting and tension  |
| Platen Parallel  |
| Ring and Cylinder  |
| On-Feet  |
| Motion  |

| **UNDERWOOD**      |
| Carriage fitting and tension  |
| Sub-carriagé [skeleton] fitting  |
| Platen fitting  |
| Lift Frame and Shift mechanism  |
| Variable  |
| Rack, Pinion and Starwheel  |
| On-Feet  |
| Motion  |
| Ring and Cylinder  |
| Line Space Lever  |
| Paper Feed  |
| Paper Bail  |

| **WOODSTOCK**      |
| Carriage fitting and tension  |
| Sub-carriage fitting  |
| Platen fitting  |
| Variable  |
| Sub-frame and Keylever comb fitting  |
| Platen Parallel  |
| On-Feet  |
| Motion  |
| Ring and Cylinder  |
| Line Space Lever  |
| Paper Feed  |
| Paper Bail  |

| **L. C. SMITH**    |
| Carriage fitting and tension  |
| Tighten Drum Bracket Binding Screws  |
| Margin Stops  |
| On-Feet Adjustment  |
| Motion Adjustment  |
| Keylever Assembly, position  |
| Shifting Mechanism  |
| Universal Bar  |
| Escapement Rocker, Dogs, etc.  |
| Escapement Trip  |

| **Universal Bar Pick-up** |
| **Rocker Limit** |
| **Ribbon Cover** |
| **Space Bar** |
| **Line Lock and Release** |
| **Tabulator** |
| **Ribbon Feed** |
| **Typebar Action** |
| **Keylever Action and tension** |
| **Aligning** |
To feed the paper [one or two sheets or a combination of several sheets and carbons] around the cylinder to printing position, keeping the sheets feeding in perfect alignment and retained snugly against the Platen, requires the combined pressure of [1] the Guiding Roller (rear feed rollers); [2] the Feeding Rollers (front feed rollers) and [3] the Paper Finger or Bail rollers. The front and Rear Feed Rollers are positioned in slots in the Paper [Deflector] Pan, the Pan serving to guide the paper between these rollers.

The Paper Feed Mechanism has its limitations as to the quantity and thickness of papers it will properly feed. The standard adjustment, by the manufacturer, permits of entry and perfect feeding of 4 sheets of regular bond paper with 3 interspersed sheets of carbon paper and provides sufficient clearance when the Feed Roll Release Lever is operated to allow for straightening and aligning movement of this set of sheets. Where a greater paper capacity is required it is necessary to open the throat [increase the clearance between the Paper Pan and Platen] to permit of entry of this additional thickness. Such adjustment would automatically lighten the pressure of the Feed Rollers against the Platen when one or two sheets of Paper are used, causing some feeding and registration difficulty because the position of Paper Pan in most typewriters controls the position of the Feed Rollers in their relation to the Platen.

The Paper Table is positioned to guide the set of sheets into the V formed by the contact of the Rear Feed Rollers and the Platen, without obstruction between the Paper Table and the Paper Pan. The Paper Pan is formed to conform to the curvature of the Platen and the degree of curvature must provide a uniform gradual slope between the Paper Table and the Rear Feed Rollers. A sharp bend in the Paper Pan between these points would prevent proper entry and feeding of the Paper into the Paper Feed.

'Veering of carbons and smudged carbon copies may be caused by [1] Typist forcing set of paper into the paper feed, [2] Too much tension on one or all Feed Rollers or Bail Rollers, or [3] Use of soft finished carbon.


Before attempting Paper Feed Tension Adjustments, the Paper Feed Mechanism should be checked, after first cleansing the Platen and Feed Rollers with alcohol, to determine that the following common causes of Paper Feed troubles do not exist:

It is a good policy, in overhauling a typewriter, to replace both the Platen and the Feed and Bail Rollers to make possible readjusting to factory standards. Whenever the Platen is replaced, the Ring and Cylinder and any other adjustments involved should be checked and readjusted if necessary.

**COMMON CAUSES OF PAPER FEED TROUBLES**

**CAUSES**

Platen and Feed Rolls glossy.
Platen Rubber loose on core.
Feed Rollers binding.
Feed Roller bearings dry.
Finger or Bail Rollers binding.
Variable slipping.
Platen binding or improperly fitted.
Ratchet Detent not contacting the Ratchet properly.
Worn Ratchet or Worn Detent Roller.
Insufficient Ratchet Detent tension.
Improper sizes of Feed Rollers.
Flat, cracked or inflated Feed Rolls.
Paper [Deflector] Pan improperly positioned, or formed.

**CORRECTIONS**

Should be cleaned with alcohol.
Replace Platen.
Feed Rollers should have a little end play and be absolutely free on shafts.
Bears should be oiled sparingly.
Shafts should be polished with crocus cloth.
Should be free on their shafts and apply equal tension to Platen.
See instructions under Variable.
See instructions under Platen.
Check Ratchet and Detent Roller for position.
Check and replace if necessary.
Check and form or adjust Spring to provide additional tension.
Straight-edge assembly. All rolls must be of uniform size.
Replace rolls if necessary.
Replace Feed Roll.
Adjust or form, if necessary.
**PAPER FEED**

**REMINGTON** 1. It is recommended that the Foreword of this Section be referred to and such action taken as indicated therein prior to attempting other action in adjusting Paper Feed Mechanism.

2. **ADJUSTMENTS:**
   a. **The Rear Feed Rollers** must have equal tension on both ends of the Feed Roll Shaft. Test for uniform tension may be made by inserting a strip of paper at each end of the Rear Feed Roll with Feed Rolls engaged to the Platen. Uniformity of tension may be determined by slippage. Rear Feed Roll Tension may be adjusted with Rear Feed Roll Tension Adjusting Screws as indicated in drawing. These screws are accessible from rear of Carriage by moving Carriage to the right and left. Tension on Rear Feed Rollers should be slightly less than the tension on the Front Feed Rollers and in neither case should it be excessive.
   b. **Front Feed Roller** tension must be equalized across the three front Feed Rollers. Tension may be tested for uniformity by inserting a strip of paper between each of the front feed rollers and the Platen with the Feed Rollers engaged to platen. Determine by slippage that all are uniform. Tension of the Front Feed Rollers is made with the Front Feed Roller Tension Adjusting Screws available from rear of Carriage by movement of the Carriage to the Right and Left.
   c. **Paper Pan** must conform to the curvature of the platen, and may, with Platen removed, be removed from its Bracket.

3. **To Remove Feed Roll Assembly:** With Platen and Paper Pan removed, the rear and front feed roll assemblies may be lifted out of Shaft Arms.

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**ROYAL** 1. It is recommended that the Foreword of this Section be referred to and such action taken as indicated therein prior to attempting other action in adjusting Paper Feed Mechanism.

2. **ADJUSTMENTS:**
   a. **Rear Feed Roll** tension should be equalized on both ends of the Feed Roll Shaft but must not be excessive. Feed Roll should be tested for uniform tension by inserting two strips of paper between the Platen and the Rear Feed Roll only. Determine uniformity of tension on both ends of the Rear Feed Roll by slippage. Adjustment of Rear Feed Roll tension may be made with Large [rear] Feed Roll Adjusting Nuts located behind the Platen, under the Rack, on each end of the Feed Roll. Adjustment Nuts are available from the rear of Carriage by moving Carriage to right and left, tilting the machine up on its front frame cross member. Turning large Feed Roll Adjusting Nut clockwise will increase tension; counter-clockwise will decrease tension.
   b. **Front Feed Roll** tension should be equalized across the three front feed rollers and should be slightly less than tension on Rear Feed Roll. Tension may be tested for uniformity by inserting three strips of paper one between platen and each front feed roll. Determine uniformity of tension on all three front rollers by slippage. Front Feed Roll tension may be adjusted with the Small Feed Roll Adjusting Screws after loosening Lock Nuta. It is necessary to remove the Top Rail Cover [front lower edge of Carriage] which is held in position with three screws. The outer screws are accessible by movement of the Carriage to the right and left, while the center screw may be reached by raising the type bar cover, positioning the Segment in Shift Lock position and move the carriage so that its center is slightly to the left of the type bar guide. Turning Front Feed Roll Adjusting Screws clockwise will increase tension; counter-clockwise will decrease tension. Tighten Lock Nuts when adjustment has been made.
   c. **Paper Pan** must conform to the curvature of the cylinder and should be adjusted [dropped down] to provide for free entry of 7 sheets of paper, without carbons, or 4 sheets of paper with three carbons. If carbon copies fail to feed along with the original, the paper pan should be formed at the back in line with bottom of the rear feed roll to provide a uniform gradual slope, rather than a sharp bend.
   d. **Paper Clamp** rollers must be free on their bearings and there must be no bind or excessive end play in the Clamp Frame. Clamp springs must provide equal tension.

3. **To Remove Feed Roll Assembly.** With Platen removed, the rear Feed Roll may be lifted out of its bearings. The Front Feed Roll Rod Nut may be backed out and the Front Feed Roll Assembly removed.
Adjust paper bail. Bend opposite side in opposite directions to raise or lower bail. Use small rolls on one side.

Large (Rear) feed roll adjusting nut.

Small feed roll adjusting screws and lock nuts.

Rear feed roll rod nut.

Front feed roll rod nut.
UNDERWOOD 1. It is recommended that the Foreword of this Section be referred to and such action taken as indicated therein prior to attempting other action in adjusting the Paper Feed Mechanism.

2. ADJUSTMENTS:
   a. The Rear Feed Rollers should have equalized tension across all four rollers. Test for uniform tension by inserting four strips of paper between the Platen and the Rear Feed Rolls only. Determine by slippage that tension is uniform. Adjustment is made with the Rear Feed Roll Tension Adjusting Screws. As the Underwood Carriage may easily be removed, it is recommended that the adjustments be made with the Carriage off the machine. Determine that Screw Locks on Feed Roll Tension Adjusting Screws lock the heads of screws properly.

   b. Front Feed Rollers should have equalized tension across all four rollers. Test for uniformity of tension in same manner as specified for rear feed Rollers. Adjustment is made with the Front Feed Roller Tension Adjusting Screws.

   c. Feed Roll Tension Spring Retainers must be positioned to provide approximately .003” clearance with Feed Roll Release Rod. Adjustment is made, after loosening Feed Roll Tension Spring Retainer Set Screw, by moving Feed Roll Tension Spring Retainers to clearance position. Tighten Set Screw when adjustment has been made.

   d. Feed Roll Release Rod must operate freely and must clear Feed Roll Release Rod Levers [point indicated in drawing] by .003” when in normal pressure applying position. With Feed Roll Release Lever engaged, Front and Rear Feed Rollers must release simultaneously and should clear cylinder by approximately .075”. Adjustment is made by forming Feed Roll Hanger Release Lever Bracket up or down as may be necessary, but clearance of .003” with Release Levers must be maintained.

   e. Paper Table must be adjusted to clear Platen by approximately .070”. Adjustment may be made by forming Paper Rest Extensions.

   f. Paper Pan [Deflector] must be free, providing proper clearance with Feed Rollers and be adjusted with a minimum of end shake, which is accomplished by forming the forked ends of the deflector. Deflector must clear the Platen in its entire length, adjustment being made by forming Bumper Ends to just contact the rear of the Paper Table. Front end of Deflector must clear the platen by .010” to .012” which may be adjusted by forming front edge of Paper Pan.


WOODSTOCK 1. It is recommended that the Foreword of this Section be referred to and such action taken as indicated therein prior to attempting other action in adjusting the Paper Feed Mechanism.

2. ADJUSTMENTS:
   a. The Rear Feed Roller tension should be adjusted so that the pressure of the rollers on the Platen is sufficient to just carry the paper into the paper feed-[Front Feed Rollers]. Tension must be uniform across the entire Rear Feed Roll [or Rollers] with slightly increased tension on the center adjustments. Test for uniform tension by inserting three strips of paper between the Platen and the Rear Feed Rollers only. By slippage determine that tension is uniform. Adjustment is made with the Rear Feed Roll Tension Adjusting Screws indicated in drawing. The End Adjusting Screws are accessible by moving the Carriage to the right and left end of the machine, while the center adjusting screws may be reached, facing the machine from the rear [with Cover Plates removed], tipping the machine forward, move the Carriage to the right until the Sub-carriage Wheel Bracket is visible between the Drum Bracket and the Carriage Shift Rock Shaft. In this position the Center tension Adjusting Screws may be seen and a screw driver inserted between the third and fourth keylever from the right, directly behind the Lower U-Bar and in front of the Drum Bracket can reach the Screw for Adjustment. It is not necessary to remove the Carriage to make Paper Feed Adjustment.

   b. The Front Feed Roller tension should be adjusted to about 234 lb. tension, or approximately three complete turns of the end adjusting screws and 3½ complete turns on the Center Adjusting Screw after the Feed Rollers have just been brought up to the Platen without any tension on them. Test for uniform tension by inserting strips of paper between the Front Feed Rollers only and the Platen as suggested in Paragraph a above. Tension Adjusting Screws are accessible by following instructions outlined above. Tension Adjusting Screws are accessible by following instructions outlined above.

   Throat Opening: [to accept a larger paper capacity] is made with the Paper Feed Release Arm Bushing, after loosening Paper Feed Release Arm Nut and Bushing Set Screw. Paper Feed Release Arm Ratchet teeth may be positioned on Arm Bushing to permit Release Lever to position as far back as possible, yet limiting clear of the Paper Table.
L. C. SMITH

1. It is recommended that the Foreword of this Section be referred to and such action taken as indicated therein prior to attempting other action in adjusting the Paper Feed Mechanism.

2. ADJUSTMENTS:

   a. Feed Rollers: All Pressure [Feed] Rollers must rest against the Platen with equal tension, which must be sufficient to insure even feeding of the paper. Test for uniform tension by inserting strips of paper between Rear Feed Rollers and Platen, determining by slippage that tension is uniform. Repeat the test on Front Feed Rollers. Arm Springs may be formed upward to increase tension, downward to decrease tension, after removing ends from slotted position in Roller Shafts. Replace spring ends in their slotted position on Roller Shafts when formed properly.

   b. Roller Release Arms should be secured firmly to the Release Shaft and must be adjusted to provide a little play between the Roller Release Arm and Pressure Roller Arm when Platen is in position. Adjustment is made with Roller Release Arm after loosening Set Screw on Shaft.

   c. Paper Pan [Deflector]. To remove, remove Front Pressure Roller Pivot Screws.


KEYBOARDS

1. Many thousands of Keyboard combinations providing characters applying to various professions, types of business and languages are available from American typewriter manufacturers. The Standard Keyboard is, however, the generally accepted Keyboard, even to the arrangement of keys for most foreign languages.

**STANDARD KEYBOARD**

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**PICA GOTHIC DOUBLE CASE CAPITALS**

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**PICA GOTHIC DOUBLE CASE CAPITALS**

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**REGULAR ELITE OR PICA**

It differs from the original Keyboard developed by Louis Sholes, son of Christopher Latham Sholes, the inventor of the typewriter, only in added keys and movement of the question mark from over the comma to its present position over the diagonal. The following Keyboards are presented to acquaint the reader with some of the more popular keyboards in use today:
**LINE SPACE LEVER**

**REMINGTON**
1. With the Platen locked to the movement of the Ratchet Wheel as outlined in Chapter "Variable", movement of the mechanism is controlled by the Line Space Lever or the Platen Knob. A Line Space Adjustment is provided on all typewriters to control movement of the Line Space Lever or Line Space Pawl for single, double or triple spacing of the Ratchet. With Line Space Lever inactive the Line Space Pawl is held clear of the Ratchet by the Line Space Adjuster Stud, the Adjuster being positioned to permit the Pawl to contact the Ratchet teeth for position determined by setting of the Adjuster, i.e., single, double or triple spacing. As the Line Space Lever is moved to the right, the Ratchet pawl is pushed down into position to contact the teeth of the Ratchet. Movement of the Pawl is limited by the Variable Line Space Ratchet when the Line Space Lever has reached its limit of movement to the right. All typewriters are provided with a Detent Release, which functions to disengage the Detent Roll from contact with the Ratchet. Use of the Detent Release [for purposes of filling in blank forms etc.] voids the benefits of Line Space control by the Line Space Lever.

2. **ADJUSTMENTS:** Determine that Left Hand Carriage End Binding Screws are tight and that Line Space Lever Nut is tight properly locking Line Space Lever Screw before attempting adjustment of the mechanism.

   a. The Detent Roll must be free on its pivot and should seat between two teeth of the Ratchet when the Line Space Lever reaches the limit of its movement to the right with the Line Space Pawl seated fully on the Ratchet without excess movement of the Ratchet. This excess movement may be determined by holding the Line Space Lever to the extreme right and attempting to turn the Platen Knob. Adjustment may be made with the Ratchet Detent Arm Bearing Eccentric, after loosening Ratchet Detent Arm Bearing Nut. Tighten Ratchet Detent Arm Bearing Nut when adjustment has been made.

   b. Line Space Ratchet Detent Spring Anchor controls the tension of the Detent Roll on the Ratchet Tooth and may be increased or decreased, after loosening Anchor Set Screws by adjusting Line Space Ratchet Detent Eccentric, moving the Anchor back or forward until proper tension is secured. Tighten Anchor binding Screws when adjustment has been made.

   c. Line Space Regulator Detent Spring, Ratchet Detent Spring and Line Space Pawl Arm Spring provide the tension for return of the Line Space Pawl and Line Space Lever to inactive position and must be checked properly and provide sufficient tension to perform their function.

**ROYAL**
1. With the Platen locked to the movement of the Ratchet Wheel as outlined in Chapter "Variable", movement of the Ratchet is controlled by the Line Space Lever or the Platen Knob. A Line Space Adjustment is provided on all typewriters to control movement of the Line Space Lever for single, double or triple spacing of the Ratchet. With Line Space Lever inactive the Line Space Pawl is held clear of the Ratchet by the Ratchet Shield upon which it rides until proper position is reached [as determined by the Line Space Adjuster] contact with the Teeth of the Ratchet. As the Line Space Lever is moved to the right, the Line Space Pawl moves rearward on the Ratchet Shield dropping down to contact the teeth of the Ratchet teeth (not to transmit the movement of the Line Space Lever to the Ratchet to perform single, double or triple line spacing. Movement of the Pawl is limited by the Line Space Pawl Eccentric Screw, which provides the Line Space Lever is limited by the Line Space Lever Eccentric Stop Screw. Inactive positioning of the Line Space Lever is provided by the Line Space Lever Stop. All typewriters are provided with a Detent Release, which functions to disengage the Roll from contact with the Ratchet. Use of the Detent Release [for purposes of filling in blank forms etc.] voids the benefits of Line Space control by the Line Space Lever.

2. **ADJUSTMENTS:** Before attempting adjustments determine that the Left Carriage End Plate Binding Screws are tight.

   a. **Line Space Lever** must be free on its pivot and Line Space Lever Spring must provide sufficient tension to return Line Space Lever to inactive position after operation. When the Line Space Lever contacts its Eccentric Stop Screw, the Line Space Detent Roll should be securely engaged between the Ratchet teeth. If the Line Space Lever Eccentric Stop Screw is set so that the Line Space Detent Roll is not seated correctly between the Ratchet teeth the roll [after spacing and during typing] until that position is gained causing an uneven writing line. To adjust, loosen Line Space Lever Eccentric Stop Screw, adjusting screw so that the lever will be stopped just prior to the Line Space Pawl engaging fully between the teeth of the Ratchet. Tighten Lock Nut when adjustment is made. Line Space Pawl Spring should provide sufficient tension to position and hold the Pawl engaged in teeth.

   b. **Line Space Pawl** must be free on its pivot and the Line Space Pawl Eccentric Screw should be adjusted so that the Line Space Pawl Eccentric Stop Screw there will be a little movement between the Line Space Pawl and the Line Space Pawl Eccentric Screw which can be determined by holding the Line Space Lever to its Stop Screw and turning the Platen Knob. If the Line Space Pawl does not move off the shield to contact proper teeth of the Ratchet, the end of shield may be formed up or down slightly to make this possible.

   c. **Detent:** The Detent Roll must be free on its pivot and the Detent Spring must provide sufficient tension to seat Roll between the teeth of the Ratchet. Tension of the Line Space Lever Detent Roll may be increased or decreased by adjustment of the Line Space Detent Adjusting Screw, turning Screw counter-clockwise will increase tension on Detent Roll, clockwise will decrease tension on Detent Roll.

**UNDERWOOD**
1. With the Platen Shaft locked to the movement of the Ratchet Wheel as outlined in Chapter "Variable", movement of the Ratchet Wheel is controlled by the Line Space Lever or the Platen Knob. A Line Space Adjustment is provided on all typewriters to control movement of the Line Space Lever or Line Space Pawl for single, double or triple spacing of the Ratchet Wheel. With the Line Space Lever the Line Space Pawl is held clear of the Ratchet Wheel by the Line Space Adjuster Stud, the Adjuster being positioned to permit the Pawl to contact the Ratchet teeth for position determined by setting of the Adjuster, i.e., single, double or triple spacing. As the Line Space Lever is moved to the right the Line Space Pawl is moved clear of the flat prostruction of the Line space Adjusting Lever. As the Line Space Lever is moved to the right the Line Space Pawl is moved clear of the flat guide- ing prostruction of the Adjuseter stud and the Line Space Pawl Spring forces the Pawl downward to engage the Ratchet tooth. Contact position of the Line Space Pawl is thereby directed through position of the Line Space Adjusting Lever for single, double or triple spacing. All typewriters are provided with a Detent Release, which functions to disengage the Detent Roll from contact with the Ratchet. Use of the Detent Release [for purposes of filling in blank forms etc.] voids the benefits of Line Space control by the Line Space Lever.

2. **ADJUSTMENTS:**

   a. **Line Space Lever:** The position of the tip of the Line Space Lever in its relation to the face of the Line Space Plunger with Line Space Lever in inactive position is controlled by the left hand Stop Stud Eccentric and the Line Space Lever [Pivot] Eccentric. The tip of the Line Space Lever should just engage the Line Space Plunger lightly with Line Space Lever in inactive position. Adjustment is made by loosening L. H. Stop Stud Eccentric Screw [located under carriage below its member] driving the Stud Screw upward to disengage Stud Rim Teeth from Pin, positioning Stud Screw and provide light engagement of Line Space Lever Tip with the Plunger facing. Reset Stud Rim Teeth on Pin before tightening Stop Stud Eccentric Screw. If proper engagement cannot be accomplished in this manner, the Line Space Lever [Pivot] Eccentric Nut should be loosened, driving Stud Rim Teeth from Pin and locating Eccentric to provide proper engagement of Line Space Lever Tip with Plunger. Reset Stud Rim Teeth properly on Pin before tightening screw and Nut.

   b. Overthrow of Ratchet Wheel by Line Space Lever may be corrected by adjustment of R. H. Stop Stud Rubber Eccentric, after loosening Screw located under carriage be- low this member and driving Stud Screw upward to disengage Teeth from Pin, moving eccentric to proper position to overcome overthrow, reset Rim Teeth in Pin and tighten Screw.

   c. **Line Space Pawl should clear Line Space Pawl Stop**
by .005" to .010" point indicated in drawing, when Line Space Lever is limiting on R. H. Stop Stud Rubber. Adjustment may be made by forming bottom of Line Space Pawl Stop, point indicated in drawing. Be careful that top of Stop does not move when forming bottom. After adjusting, determine that Line Space Pawl engages Ratchet Teeth properly when Adjusting Lever is set for single, double and triple spacing.

c. Line Space Adjusting Lever should be free on its pivot with proper tension to hold Lever in set position. Tension adjustment may be made by forming flat tension spring.

d. Detent: Detent Roller Arm should be free on its bearing and Detent Roll should be free on the arm and be in good condition. Detent Arm Spring must have sufficient tension to insure free and positive movement of the Ratchet. Tension adjustment may be made by forming end of the Detent Spring upward to increase tension, downward to decrease tension.

WOODSTOCK LINE SPACE LEVER
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with new spring on Spring Arm Bracket and Line Space Lever. Replace Line Space Lever Screw in bearing position [up from the bottom], replace washer install and tighten Link Screw Nut.

e. Detent: The Detent Roll should be positioned to engage teeth of the Ratchet squarely and Detent Spring should provide sufficient tension to hold roll engaged properly between teeth of the Ratchet. Detent Roll Spring may be formed to provide proper tension and Detent Roll Arm may be formed to locate Roll between teeth of the Ratchet. Detent Roll must be in good condition and free on its pivot.
LINE SPACE LEVER

L. C. SMITH 1. With the Platen locked to the movement of the Ratchet as outlined in Chapter "Variable", movement of the Ratchet is controlled by the Line Space Lever or the Platen Knob. A Line Spacer Adjustment is provided on all typewriters to control movement of the Line Space Lever or Line Space Pawl for single, double or triple spacing of the Ratchet. With Line Space Lever inactive the Line Space Pawl is held clear of the teeth of the Ratchet when the throw has been completed. Line Space Lever Spring must provide sufficient tension to return Line Space Lever to inactive position after operation. Line Space Lever Spring may be formed to increase or decrease tension.

b. The Detent Roll must be in good condition and free on its bearing and must be positioned to rest between the teeth of the Ratchet when the throw has been completed. Adjustment may be made, after loosening the Adjuster Lock Screw, by moving the Adjuster Assembly into proper position so that the Detent Roll will engage between the Ratchet Teeth.

c. The Line Space Bellcrank Stop Screw limits the throw of the Line Space Lever by contact with the Platen Shaft Hub. It may be adjusted, after loosening Lock Nut, to stop movement of the Line Space Lever when the Detent Roll rests between the teeth of the Ratchet at the completion of the throw. The adjustment of the Detent Roll, the Line Space Bellcrank Stop Screw and the rear arm of the Line Space Pawl should be synchronized in these stop adjustments.

d. Line Space Pawl: The Rear Arm of the Line Space Pawl must rest on top of a tooth when the forward extension is engaged in the teeth of the Ratchet at the time the Line Space Bellcrank Stop Screw limits the throw of the Line Space Lever to prevent over-throw. The Rear Arm of the Line Space Pawl may be formed, if necessary, to provide for this contact.

WOODSTOCK 1. With the Platen locked to the movement of the Ratchet as outlined in Chapter "Variable", movement of the Ratchet is controlled by the Line Space Lever or the Platen Knob. A Line Spacer Adjustment is provided on all typewriters to control movement of the Line Space Lever for single, double or triple spacing of the Ratchet. With Line Space Lever inactive, the Line Space Pawl is held clear of the Ratchet teeth by pressure of the Line Space Adjuster forming contacting the rear extension of the Pawl, holding the tooth of the Pawl upward. As the Line Space Lever is moved to the right this control is lost and the Line Space Pawl Spring forces the tooth of the Pawl downward to engage the tooth of the Ratchet. Continued movement of the Line Space Lever to the right moves the Line Space Pawl and the Ratchet around the number of spaces allowed by the position of the Line Spacer Adjustment, i.e., single, double or triple spacing. A stop is provided for the Line Space Pawl and for the Line Space Lever, as indicated in the drawing. It will be noted that with the Line Spacer Adjustment set in the top position [single space] all lost motion of the Line Space Lever is eliminated and just sufficient movement is provided to make the single spacing. With the Line Spacer Adjustment set in the center position the arm of the Line Space Lever moves to the left sufficiently to cover the double spacing movement requirement of the Line Space Pawl. Positioned in the bottom hole [triple space] the Line Space Lever moves its furthest position to left to provide for the three space movement of the Line Space Pawl and Ratchet. All typewriters are provided with a Detent Release which functions to disengage the Detent Roll from contact with the Ratchet. Use of the Detent Release [for purposes of filling in blank forms, etc] voids the benefits of Line Space Lever by control of the Line Space Lever.

2. ADJUSTMENTS:

a. Line Space Lever must fit snugly on its bearing, the Line Space Lever Screw, without binding and with all up and down play in the Lever removed. Line Space Lever Screw Lock Nut, located below Line Space Lever Bracket should be loosened to make this adjustment, holding it engaged by wrench tighten the Line Space Lever Screw simultaneously locking the Lock Nut. Test Line Space Lever. If binding, readjust. The Line Space Lever should return to its normal position quickly with up and down play reduced to a minimum. Line Space Lever, if bent down contacting typebar cover, may be straightened by holding the Lever Arm with pressure of hand downward at point midway of the Arm, bend the front end of the Lever upward to clear.

b. Line Space Pawl Arm is moved into position by the Line Space Link which is attached to the Line Space Lever carrying arm. The Line Space Link should be attached to the Line Space Pawl Arm snugly but with sufficient freedom of the Link to pivot on the Pawl Arm Screw.
Line Space Pawl Arm Pivot Screw and Lock Nut are accessible for adjustment by setting the Line Space Adjuster in bottom [triple spacing] position.

c. **Line Space Pawl:** The correct throw of the Line Space Pawl is regulated by the Line Space Bracket Stop Screw and Nut and the Line Space Pawl Stop Screw and Nut. To adjust, loosen both lock nuts and move the Line Space Lever to the right until the roller on the Ratchet Detent engages between the Ratchet Teeth at extreme end of the throw. Holding the Line Space Lever in this position, adjust the Line Space Bracket Stop Screw and the Line Space Pawl Stop Screw until they both just touch their respective members. Tighten both Lock Nuts.

If movement of the Line Space Lever fails to space the Ratchet and the Platen, inspect the Line Space Pawl Spring for breakage. It may be replaced by loosening Line Space Pawl Pivot Screw Lock Nut, moving Line Space Lever to the right so that the Line Space Pawl can be moved to the right of its Stop Screw to provide further clearance between the Pawl and the Pawl Arm Spring Stop. The old spring may be removed with tweezers and a new spring installed in the hole in the top of the Line Space Pawl. Guide the Pawl back into position and tighten Pawl Pivot Screw Lock Nut.

d. **Line Space Lever Spring:** Broken Line Space Lever Spring may be replaced, by loosening Line Space Link Screw Nut [located atop Line Space Lever Arm] pushing screw down [don't lose washer under the nut] disengage from Line Space Lever. Lever may then be swung around to the left to disengage the old spring and replace—Continued on Pg. 51
MARGIN STOPS AND LINE LOCK

REMETTINTO 1. When the Margin Rack is attached to the Main Frame of a typewriter [does not move with the Carriage], the Margin Stop on the Left controls the Right Hand Margin and Line Lock and the Margin Stop on the Right controls the Left Hand Margin. This principle applies to the Remington. The Margin Stop Lever is mounted on the Carriage and in this drawing is shown contacting the L. H. Margin Stop which controls the Right Hand Margin and Line Lock. When the Margin Stop Lever contacts the first [bell ringer] protrusion of the Left Hand Margin Stop, the Margin Stop Lever is tripped, forcing the Line Lock Trip Ball downward momentarily to trip the Bell Ringer, the Margin Stop Lever returning to upright engaging position immediately. Approximately 6 spaces later on Pica [10 pitch] and 8 spaces later on Elite [12 pitch] machines, in a step-by-step movement to the right of the Margin Stop Lever, the Line Lock Trip Ball is moved downward [step-by-step] moving the Bell Ringer Bracket Roller Arm downward. The Line Lock Bell Crank Throw-In Lever Screw, positioned in the Throw-In Lever, is moved to the right in this movement contacting and moving to the right the Line Lock Pull Wire Sleeve Arm of the Bell crank Bracket. The Line Lock Pull Wire is moved forward in this action, causing the top extension arms of the Universal Bar 'to move forward and the bottom blade of the U-Bar to move rearward into engagement position with the stop forming of the Key lever and Space Bar Levers preventing them from downward movement.

It will be noted that the Margin Rack pivots on its Brackets and when the Margin Release Key lever is depressed, the Rack is tilted permitting the Margin Stop Lever to return to upright position clearing the Margin Stop and freeing the Line Lock Trip Ball, which, through the Line Lock Pull Wire and Line Lock Bell Crank, moves the Line Lock U-Bar blade forward to clear the stop forming of the Key lever and Space Bar Levers.

2. ADJUSTMENTS: Before attempting Margin Adjustments determine that the Margin Stop Rack is free on its pivots with a minimum of end shake.

a. Right Hand Margin Stop [controlling the left margin] should be so positioned that when in contact position with the Margin Stop Lever there is a clearance of not more than 1/8" between the two to prevent banking trouble [carriage rebound to the right]. If there is less clearance over throw trouble [carriage moving to the left] may result. Adjustment is made, after loosening Stop Rack Pivot Screw Lock Nuts by moving Margin Rack to the left or right as may be necessary, backing out one Stop Rack Pivot Screw while coming in with the other. Tighten Lock Nuts when adjustment has been made. Margin Rack should be free on its pivots with a minimum of end shake.

b. Line Lock:

[1] Left Hand Margin Stop [controlling the right margin and Line Lock] is provided with two protrusions. The small [bell ringer] protrusion on the right of the Margin Stop functions to trip the Margin Stop Lever causing the Ball ring and permitting the Lever to return to upright engaging position immediately after the trip. The Margin Release Pull Link [through the Margin Stop Rack Pull Link Eccentric] positions the Margin Stop Rack and the Margin Stops for proper engagement with the Margin Stop Lever and should be adjusted to provide proper contact of the Margin Stops with the Margin Stop Lever [both as to bell ringing and Margin and Line Lock Setting]. The large [left] protrusion of the Left Hand Margin Stop [shown contacting the Margin Stop Lever in the drawing] functions to hold the Margin Stop Lever and may not release the lever until the Margin Stop is raised from this contact [Margin Stop Rack Tilted by the Margin Release Key lever].

[2] Margin Stop Lever should be free on its pivot and facings of the lever [contact point of the Margin Stops] should be free from burrs. Margin Stop Lever Spring should provide sufficient tension to maintain Margin Stop Lever in upright position contacting its left Bracket Stop. It will be noted that the Margin Stop Lever [fully engaged by large protrusions of the L. H. Margin Stop in the drawing and limiting on right Bracket Stop] has moved the Line Lock Trip Ball downward and in this position the Line Lock Trip Ball should just clear its Stop Screw. In this position, the Trip Ball should have moved the Bell Ringer Bracket Roller arm downward and the Line Lock Bellcrank Throw-in Lever Screw should have moved the Line Lock Pull Wire Sleeve Arm to the right sufficiently to cause the Line Lock Pull Wire to move the Line Lock U-Bar Blade into engagement position with the Key lever and Space Bar lever formed stop.

[3] Line Lock Trip Ball should be free on its pivots, true in its entire length and when fully contacted by Margin Stop Lever Roller should just clear its Line Lock Trip Ball Stop Screw. Ball may be formed to true and Line Lock Trip Ball Stop Screw adjusted to just clear the Ball when fully depressed by Margin Stop Lever Roller.

[4] Line Lock Bellcrank Throw-in Lever position for contacting the face of the Line Lock Pull Wire Sleeve Arm is governed by the Line Lock Bellcrank Throw-In Lever Eccentric.

[5] Line Lock Bellcrank Throw-In Lever Screw should be adjusted so that with the Line Lock Trip Ball moved to furthest down position by the Margin Stop Lever Roller, the Line Lock Pull Wire Sleeve Arm will be moved to the right sufficiently to cause the Line Lock Pull Wire to position the Line Lock U-Bar blade in engaging position with the Key lever and Space Lever stop forming.
[6] *Line Lock Pull Wire Sleeve Arm* on Line Lock Bell Crank Bracket should be free on its pivot and Spring should be properly connected and provide sufficient tension to return Arm to inactive position when Margin Release Keylever is depressed.

[7] *Line Lock Universal Bar Pull Wire Sleeve* provides the adjustment for the blade of the Line Lock Universal Bar to clear the keylevers in normal position. This clearance should be approximately ¼", adjustment being made with the Pull Wire Sleeve Nut.

[8] *Line Lock U-Bar* must be free on its pivots and true in its entire length.

[9] *Margin Release Keylever* must be free on its pivot, spring provide sufficient tension to hold lever in upright position and the Margin Release Bellcrank spring must provide sufficient tension to maintain Margin Release Pull Link and Margin Release Lever stable.
ROYAL 1. MAGIC MARGIN: The principle of Spring Motivated Margin Stops employed in the Magic Margin Model Royal, relies upon the tension of the Margin Stop Set Spring to move the L. H. Margin Stop to the right and the R. H. Margin Stop to the left when the Left or Right Margin Release Lever is moved forward, releasing pressure against the Margin Stop which is exerted by the Margin Balls. Movement of either Margin Stop is permitted to the point of contact with the Center Stop [the position of the carriage as reflected by the type guide]. The Margin Stops will move along with the carriage until the Margin Release Lever is moved backward into position. The L. H. Margin Stop moves only to the right under this spring tension power and the R. H. Margin Stop moves only to the left. Return of either stop [to the left for the L. H. Margin Stop and to the right for the R. H. Margin Stop] is performed manually, after moving the left or right Margin Release Lever forward and moving the carriage in the opposite direction. Margin Stop Set Spring provides this motivation. As indicated in Spring Drawing [top] one end of the Margin Stop Set Spring is attached to the Left Margin Stop with its Spring Hanger and the spring is threaded over the right pulley under and across the Left pulley attaching the other Spring Hanger to the R. H. Margin Stop.

LINE LOCK: The Line Lock is controlled by the R. H. Margin Stop. As the Margin Stop Adjusting Screw contacts the Line Lock Lever, the upper extension of the Line Lock Lever moves into contact with the Center Stop while the lower extension of the Lever is moved to the right. The Line Lock Crank, pivoting top and bottom, is swung around and its lower extension [to which the Line Lock Link is attached] is moved rearward drawing with it the Line Lock Link. In this movement the Line Lock Bail is pulled into position against the Keyleader Guide [comb] to stop the downward travel of the Keyleaders and Space Levers. When the Margin Release Key is depressed, the Center Stop and the Line Lock Lever is displaced from its position of contact with the Margin Stop, permitting the Margin Stop to pass. As the Line Lock Lever is moved out of contact with the Margin Stop, it returns to its normal position [away from the Center Stop] returning the Line Lock Crank, Line Lock Link and the Line Lock Bail to their normal positions.

2. ADJUSTMENTS:
a. Margin Stop Mechanism:
   [1] Margin Stops must be free on the Margin Stop Rod and the Margin Stop Set Spring Roller [right and left] must be free from bind on the Margin Release Ball. Pulley Fulcrum Brackets [left and right] located under the Margin Stop Rod must be securely fastened to carriage ends and Pulley Fulcrum Screw and Nut must be adjusted to permit the pulley to operate freely on its fulcrum without binding.
   [2] Margin Stop Adjusting Screws [left and right] provide for adjusting Left Hand Margin to correct banking or overthrowing-Right Hand Margin to contact Line Lock Lever properly. Before attempting to adjust L. H. Margin Stop Adjusting Screw, it should be determined that the Pinion Pawl on the Starwheel drops in between Pinion teeth when the L. H. Margin Stop Adjusting Screw contacts the Margin Stop Locator and that the L. H. Margin Stop Handle Tooth seats itself in the Margin Stop Rod Rack teeth when the Margin Release Lever is moved back to normal position. The Margin Stop Locator spring should have sufficient tension to return Margin Stop Locator to normal position.
   Adjust Margin Stop Adjusting Screw] L. H. Margin Stop to eliminate banking or overthrowing. Margin Stop Banking Screw may be made available for adjusting, with carriage moved to the extreme left, by disconnecting Ball Lift Screws, swinging Margin Release Bail Back out of position.

   [3] Margin Stop Set Spring may be replaced, if necessary, after removing Margin Stop Set Spring Guard Retaining Screws. Disconnect Spring from Left and Right Margin Stops. Thread end of new spring up through Left Pulley and attach end of spring to Right Margin Stop with its Spring Hanger. Thread other end of spring up through Right Pulley and attach to Left Margin Stops.

   [4] Margin Release Bails [right and Left] are pivoted on Right and Left Bail Fulcrum Screws which are attached to the Keyset Tabulator Rack. If the Keyset Tabulator Rack is not square with the carriage when it will cause the Margin Release Bail to bind against the Margin Stop Bail Handle [on Margin Stop] which will affect movement of the Margin Stops. The Margin Stop Rod and the Margin Release Bails [left and right] must be absolutely parallel. There is no adjustment provided for adjusting the spacing between these Bails. Margin Release Bails should be free from bind on their pivots, tolerance being provided by Bail Fulcrum Screws. Bent or misformed Margin Release Bails will not operate efficiently and should be straightened or replaced.

   [5] Bail Adjusting Arms [right and Left] provide adjustment, by forming, to control the throw of the Margin Release Bails. These Arms should be adjusted so that when Margin Release Lever is in forward position [toward the operator] it will lift the Margin Stop Handle Tooth [via the Margin Stop Bail Handle] approximately .002" to .003" from the Margin Stop Rod, but should be checked to determine that the adjustment does not cause the Margin Release Bail to force the Margin Stop Bail Handle, preventing its free movement.

   [6] Margin Release Lever Eccentric Stop Washer located directly behind the Margin Release Lever on each carriage end [see inset] provides proper stop for the Release Lever. This Eccentric Stop Washer should be so adjusted that Ball Lift Screw is centrally located in the notch in the Margin Release Lever. Margin Release Lever must not interfere with the Paper Holder Arm when Release Lever is set in forward [toward the operator] position.

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MARGIN STOPS AND LINE LOCK

UNDERWOOD 1. When the Margin Rack is attached to the Main Frame of a typewriter [does not move with the Carriage], the Margin Stop on the Left controls the Right Hand Margin and Line Lock and the Margin Stop on the Right controls the Left Hand Margin. This principle applies to the Underwood No. 5 and No. 6. The Bell Trip Adjuster is mounted on the Carriage Frame and in this drawing is shown contacting the first step of the L. H. Margin Stop. When the Bell Trip Adjuster contacts the first step of the L. H. Margin Stop the Bell Rack is moved downward causing the Bell Rack Frame Lever lower extension to move forward drawing the small pin [shown positioned in the V of the Bell Hammer Lever] forward. In this movement the rear of the Bell/Hammer Lever is raised. As the pin continues forward it drops off the Bell Hammer Lever permitting the Bell Hammer to drop down to ring the Bell. The Bell Rack Frame Lever remains in this position for seven spaces, when the Bell Trip Adjuster contacts the second step of the Margin Stop depressing the Bell Rack lower and the lower portion of the Bell Rack Frame Lever is moved forward causing the pin to contact the Keylever Lock Slide Arm tilting it sufficiently to draw the Keylever Lock Slide Arm Link Plate forward to arrest the movement of the Rocker Arm Extension, preventing escapement. Depression of the Margin Release Key unlocks the Line Lock by moving the Keylever Lock Slide to the right to displace the Keylever Lock Slide Arm from its position in front of the pin, permitting the Keylever Lock Slide Arm to move rearward displacing the Keylever Lock Slide Arm Link Plate from arresting position with the Rocker Arm Extension. Four additional spaces are permitted by Margin Stop. When the Bell Trip Adjuster contacts the third step of the Margin Stop when the Keylever Lock Slide Arm Link Plate is again drawn into arresting position of the Rocker Arm Extension Lip. Depression of the Margin Release Key unlocks the Line Lock for one additional space at which time the Escapement Wheel Tooth will be positioned directly in front of the Escapement Rigid [Stationary] Dog.

2. ADJUSTMENTS:
   
a. Margin Stops:

   [1] The Margin Stop Rod should be clean and wiped with lightly oiled cloth to permit free movement of the Margin Stops. Margin Stop Pointers should align with Carriage Frame Pointer when both are set in same position on the Scale. Adjustment may be made by loosening Front Scale Screws and Margin Stop Handle Knob and synchronizing these pointers. Tighten Screws and Knob when adjustment has been made. Margin Stop Screws should provide sufficient tension to hold Stop engaged in rack. Spring may be replaced by dis-assembling Margin Stop after removal of Stop from Margin Stop Rod.

   [2] The Right Hand Margin Stop [which controls the left margin] may be adjusted to prevent overhanging or banking, by adding or removing Front Margin Rod Washers. It should be determined that the Wheel Check [See Rack, Pinion and Starwheel] is positioned properly in Escapement Wheel, without binding, when adjusting [removing or adding] Front Margin Rod Washers.

b. Line Lock:

   [1] The Left Hand Margin Stop [which controls the Right Margin and Line Lock] is formed with three steps to cause bell ringing and line locking by various depth movements downward of the Margin Rack when contacted by the Bell Trip Adjuster.

   [2a] The Bell Trip Adjuster must move over the Margin Stop without being retarded or slowed down and should engage Margin Stop forming fully. Adjustment may be made by forming Bell Trip Adjuster. With the Carriage at extreme left, Bell Trip Adjuster in its furthest movement to the left, position of the Adjuster, which limits Carriage should permit Escapement Wheel Tooth to be positioned directly in front of the Escapement Rigid [Stationary] Dog. Adjustment may be made by loosening Bell Trip Adjuster Binding Screws and adjusting the Bell Trip Adjuster Adjusting Screw. Tighten binding screws when adjustment has been made.

   [2b] When the Bell Trip Adjuster contacts the first step of the L. H. Margin Stop, the Bell Hammer should be tripped and the bell ring, through the action of the Bell Rack Frame Lever on the front [formed] end of the Bell Hammer. Adjustment may be made by loosening Bell Rack Frame Lever binding screws and positioning Bell Rack Frame properly. Tighten binding screws when adjustment has been made.

   [2c] When the Bell Trip Adjuster contacts the second step of the L. H. Margin Stop the Keylever Lock Slide Arm must position the Keylever Lock Slide Arm Link Plate [forward] approximately 1/4" over the Rocker Arm Extension Lip. Adjustment is made by forming the Keylever Lock Slide Arm. The must be 1/16" clearance between the bottom of Plate and top of Lip. Adjustment may be made by loosening Ribbon Guide Actuating Arm Stop Screw and positioning Ribbon Guide Actuating Arm Stop to provide this clearance. Tighten Screw when adjustment is made.

   [2d] With Keylevers locked as provided in [c] above, depression of the Margin Release Key should release Carriage for four spaces. Adjustment is made by forming the right step of the Bell Trip Adjuster. After the four spaces Line Lock should relock. Depression of the Margin Release Key should permit one more space before Escapement Stationary Dog locks against the Starwheel Tooth.

   [3] Keylever Lock Slide Arm Link Plate in normal non-contacting position should clear the rear edge of the Rocker Arm Extension Lip by 1/16" as indicated in left inset drawing. Adjustment is made by forming Keylever Lock Slide Extension [see lower right hand corner of the drawing].
ROYAL MARGIN STOPS AND LINE LOCK

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b. Line Lock Mechanism: [Before attempting adjustments, press the Line Lock Lever against the Center Stop; checking the instantaneous movement of the Line Lock Ball into contact with the Keylever Guide. Determine that Line Lock Bearing Set Screw is tight and end shake in the Line Lock Ball is reduced to a minimum without binding.]

[1] Center Stop Adjustment: The Right Hand Margin Stop Adjusting Screw must make positive contact with the Center Stop, taking purchase of approximately .010" on the Margin Stop Banking Screw Head. This adjustment is made by shortening or lengthening Margin Release Link, after disconnecting Link from Line Lock Release Lever. Shortening [turning in loosened end of Margin Release Link into Link Adjusting Nut, clockwise] will decrease and lengthening [turning out loosened end of Margin Release Link out of Link Adjusting Nut, counterclockwise] will increase the amount of this purchase.

Loose side play in the Center Stop may be eliminated by loosening Tabulator Stop Set Arm Bearing, turning in Fulcrum Screw until proper fit of Center Stop and Center Stop Bracket is secured.

[2] Margin Release Link: With adjustments made as outlined in Paragraph [a] above, Margin Release should operate correctly. If, not further adjustment can be made by turning, in or out, Margin Release Link.

[3] Line Lock Bail should be free on its bearings without excess end shake. Adjustment is made with Line Lock Bearing after releasing set screw.

[4] Line Lock Link may be formed by shortening of lengthening to position set of Line Lock Bail. With Margin Stop Adjusting Screw contacting Line Lock Lever, the Line Lock Ball should be resting lightly against the Keylever Guide [comb]. By forming Line Lock Lever away from Center Stop at point just below its tip will lengthen the throw of the Line Lock Bail. The Line Lock Lever should fit squarely against Center Stop when contacted by Margin Stop Adjusting Screw.
WOODSTOCK  

1. MARGIN STOPS:  
The Left Margin Stop controls the left margin by contact of the Margin Stop Limit Screw with the Margin Stop Lever. The Margin Stop Lever position in relation to the Margin Stop Limit Screw is governed by the position of the Margin Release Lever, which, if incorrectly seated on the Lever may dislocate the Lever from Limit Screw position. Raising the rack [by depressing the Carriage Release Lever] lifts the Margin Release Lever and as it is positioned on the Margin Stop Lever it forces the Margin Stop Lever to pivot back out of engagement with the Margin Stop permitting the carriage to move back beyond the Margin Stop Lever.

LINE LOCK:  
The Right Margin Stop controls the bell trip and Line Lock Bail through the action of the Line Lock Trip on the Bell Clapper Stem and Line Lock Lever. The Space Bar is not affected by line lock mechanism but the mechanism is so adjusted that the Keylevers remain locked for four Space Bar trips before the Keylevers are automatically unlocked. Woodstocks above 630,000 are not equipped with Line Lock Bail or Margin Release Keylever. In place of Line Lock mechanism, a double bell ringing is provided through a union of the Line Lock Lever and Bell Clapper Stem.

2. ADJUSTMENTS:  

a. Margin Stops:  
[1] Both Margin Stops must be free to slide along the Margin Stop Bar and the spring action of the Margin Stop Lock Lever must lock the stop in position when the handle is released.
[2] L. H. Margin Stop Limit Screw controls the left margin when the L. H. Margin Stop contacts the Margin Stop Lever. If carriage is overthowing, adjustment is made by loosening Margin Stop Limit Screw Lock Nut and turning Margin Stop Limit Screw. Turning Limit Screw counter-clockwise will correct overthowing. Turning Limit Screw clockwise will correct banking. Adjust until correctly set, checking with front and Margin Scale to determine that they correspond, then tighten lock nut.

b. Line Lock Mechanism:  
[1] The R. H. Margin Stop Line Lock Trip controls the bell trip and sets the Line Lock Bail when the Trip contacts the Line Lock Lever. The Line Lock Trip should be adjusted so that it contacts the Line Lock Lever and acts on the Bail to lock Keylevers at position selected. Adjustment is made by loosening Line Lock Trip Adjusting Screw and moving Line Lock Trip to proper position. Tighten Trip Adjusting Screw when adjustment has been made.
[2] The Line Lock Bell Crank pivots on Line Lock Bellcrank Post on right rear post of machine frame and is held to shoulder screw by binding screw entering through Line Lock Bell Crank which is located behind Shift Keylever Extension. If binding screw becomes loosened, permitting Line Lock Bell Crank to disengage itself from shoulder of pivot screw, the line lock mechanism will be affected and cannot be properly adjusted until Line Lock Bell Crank is returned to its pivot position on the shoulder screw and binding screw tightened to hold it in position. Binding Screw may be made accessible by locking Right Hand Shift Lock and using a Dutch [offset] screwdriver, after positioning Bell Crank on shoulder pivot.

[3] Ball Ringer Stem-Line Lock Lever, Flat Spring located on rear carriage rail to the right of the escapement wheel provides tension [provided both binding screws are tight] for Bell Clapper Stem and Line Lock Lever. If broken, loose or improperly positioned, the lever and stem will not function properly.
[4] Line Lock Bail should be free on its pivots without excessive end shake and should be true in its entire length. Adjustment may be made by forming pivot ends and bail cross bar.
[5] Bail Spring and Release Lever Spring must be attached and provide sufficient tension to set and release Line Lock Bail.
[6] Margin Release Keylever must be free on its pivot and extension positioned properly under Line Lock Horizontal Link to raise Link, when Margin Release Keylever is depressed [to unlock line lock]. Adjustment is made by forming extension.
L. C. SMITH 1. The Principle of Spring Action Margin Stops employed in the late model L. C. Smith, relies upon the tension of the Stop Spring in the Stop Spring Drum to provide tension for moving the Left Hand Margin Stop to the right and the Right Hand Margin Stop [upon which the Stop Spring Drum is mounted] to the left, through the action of the Stop Cord joining the two. The Left Hand Margin Stop controls the Left Margin and the Right Hand Margin Stop controls the Right Margin and Line Lock. Movement of the Stops is controlled by the Release Bar Lever located on the right edge of the Paper Table. Moving the Release Bar Lever up to top position moves the Stop Release Bar rear blade downward where it contacts the Margin Stop Lever of the Left Hand Margin Stop, releasing the Left Hand Margin Stop from control of the Margin Rack for free movement toward the Right Hand Margin Stop to the position of the Carriage in its relation to the Type Guide. Moving the Release Bar Lever down to bottom position moves the Stop Release Bar Front blade downward, where it contacts the Margin Stop Lever of the Right Hand Margin Stop, freeing the R. H. Margin Stop from engagement in the Margin Rack, and permitting free movement toward the L. H. Margin Stop. Return of either Margin Stop in the opposite direction is performed manually after placing the Margin Release Lever in the proper position. Placing the Margin Release Lever in the upper position and moving the carriage to the right will move the L. H. Margin Stop back to the left. Placing the Margin Release Lever in the lower position and moving the carriage to the left will move the R. H. Margin Stop back to the right. When the Margin Release Bar Lever is in center [neutral] position, both Stops are locked in position on the Margin Rack.

As the Right Hand Margin contacts the carriage Stop [inset] the Stop Arm on the Margin Stop moves the Carriage Stop rearward causing the Margin Release Shaft to trip the Bell. Eight spaces later, as the Carriage Stop is moved to the rear, the Margin Release Shaft is turned throwing the Line Lock Connection downward, moving the Line Lock Bellcrank forward, which allows the Line Lock Bail to drop into position behind the Universal Bar, preventing further escapement action by the Universal Bar [and Escapement Rocker] until the Line Lock Bail is raised. Depression of the Margin Release Keylever rotates the Margin Release Shaft in the opposite direction withdrawing the Line Lock Connection, the Line Lock Bellcrank and raising the Line Lock Bail from its position behind the Universal Bar.

2. ADJUSTMENTS:
   a. Margin Stop Mechanism: Check both Margin Stop Assembly Screws [2] and Margin Stop Lever coil springs, and determine that both Margin Stops operate freely on Margin Rack before attempting other adjustments.
   [1] Stop Release Bar, operated by the Margin Stop Release Lever, operates within the confines of the upper and lower limit plates attached to the Lever. Limit Plates must be adjusted [by forming] to provide just sufficient upward and downward movement of the Stop Release Bar to free the Margin Stops without binding them. Stop Release Bar Spring may be formed to provide sufficient tension to retain Stop Release Lever in center [neutral] position. Stop Release Bar must pivot in Release Bar Bracket snugly without binding. Adjustment is made by forming the Bracket Arms.
   [2] Left Hand Margin Stop: The Right Hand Margin Rack Adjusting Screw provides for movement of the Margin Rack to the left or right, after loosening left and right hand Margin Rack Binding Screws, to overcome banking or over-throw troubles. Slots in Margin Rack are provided for this adjustment. The Margin Rack must be positioned so that the teeth of the Margin Rack enter the Rack teeth without catching either side of slot at time the Margin Stop engages the Carriage Stop. Margin Stop Assembly Screws [2] must be tight. Those screws should always be checked for tightness before attempting other adjustments for Margin troubles.
   [3] Right Hand Margin Stop:
      [a] Spring Drum must be free on its pivot and provide sufficient tension to move the Margin Stops. Tension may be increased by winding the Drum with the fingers, positioning the Stop Cord on the Drum when proper tension has been secured. This tension should be six revolutions of the Drum.
      To Replace Spring, remove Tension Screw Lock Nut and remove Drum Cover. New Spring may be installed and tension applied as outlined above. Replace Drum Cover and Lock Nut.
      To Replace Stop Cord, remove Stop Spring as outlined above. Feed new Stop Cord from inside of Drum out through Cord Slot, tying knot in end to remain inside the Drum. Replace Spring Drum Cover and Lock Nut. A slip knot in opposite end of Stop Cord fits over stud in Left Margin Stop.
   [4] Carriage Stop [See Inset] is adjusted for the operation of the Right Hand Margin Stop only. The Carriage Stop should be adjusted by its Adjusting Screw so that it moves freely to the notched Margin Stop Stop Arm where the Line Lock should be set and when the Margin Release Keylever is depressed, the Carriage Stop should move out of engagement with the Stop Arm, permitting the Margin Stop to pass the Carriage Stop. After the Margin Stop has passed, the Carriage Stop should return to engaging position.
   b. Line Lock and Release Mechanism: Determine that all parts are free on their pivots without bind or excessive end shake. Determine that Space Bar is not holding Universal Bar partly engaged before attempting Line Lock adjustments.
[1] **Line Lock Bellcrank** must be formed so that the Line Lock is not released until the Carriage Stop contacts the straight limiting surface of the Margin Stop Stop Arm.

[2] **Line Lock Bail** should work freely on its pivots and should clear the Universal Bar Stops by .015" when Margin Release Key is depressed. Adjustment may be made, after loosening Line Lock Bail Bracket Binding Screw, by positioning Line Lock Bail Bracket properly. Tighten Bracket binding screw when adjustment has been made.

[3] **Line Lock Bail Stop Adjusting Screw** may be adjusted to limit the upward throw of the Line Lock Bail to clear the Universal Bar by .015" when Universal Bar is pushed back with type-bar contacting platen.

[4] **Bell Hanger Connection** must clear the Bell Hammer. Adjustment may be made by moving Bell Hanger Bracket, after loosening Binding Screws.
RACK, PINION AND STARWHEEL

REMINGTON 1. As explained in the Introduction to this Manual, the Remington is an exception to the models selected for the explanation of the Principles of Mechanism in two ways. The Rack is attached to the Carriage Casting by two binding screws [may not be lifted up out of engagement with the Pinion] and is meshed in the Pinion. As a consequence, the Pinion Wheel and the Starwheel are attached transmitting the movement of one to the other.

When the Carriage is returned [to the right] the Loose Dog of the Escapement Rocker acts as a wheel pawl in permitting the Starwheel to move backward as the Carriage moves to the right. In this movement the Silencer moves into position contacting back of the head of the Loose Dog, moving the Dog down out of engagement with the Starwheel tooth to prevent noisy carriage return.

When the Carriage Release Lever is depressed, the Carriage Release Blade contacts the Escapement Loose Dog Release moving the Loose Dog from contact with the Escapement Wheel Tooth permitting free movement of the Carriage, the Pinion and Starwheel. The Rack is permanently engaged in the Pinion Wheel and the motion of the Pinion Wheel is transmitted to the Starwheel and vice-versa.

2. ADJUSTMENTS: Before attempting adjustments check Rack Binding Screws for tightness and determine that Rack teeth are in good condition.

a. Rack: The Rack teeth must mesh properly in the Pinion Wheel Teeth without bottoming. Adjustment may be made with the Rack Adjusting Screw and Feed Rack Eccentric after loosening Rack Binding Screws. Elongated slots for both Screws are provided in the Feed Rack to provide for uniform level adjustments. When Pinions have 15 teeth, a standard spacing Rack is used on the Remington No. 17.

1. To Remove Rack: Remove Rack Binding and Adjusting Screws. Remove the Rack, which may be removed out either end of Carriage.

b. Starwheel and Pinion are united and for purposes of Rack spacing the Loose Dog is disengaged from the Starwheel tooth position [See Back Spacer] permitting both the Starwheel and Pinion to back up with the Carriage Rack. Starwheel-Pinion combination should be free on its pivot. Teeth of Starwheel and Pinion must be in good condition otherwise skipping may occur. Pica Starwheel has 15 teeth, Elite has 18 teeth, all Pinions have 15 teeth.

1. To Remove Starwheel and Pinion [with Escapement Unit out of Frame—see Escapement]. Loosen Starwheel Shaft Lock Nut [from opposite side of Unit Frame], Turn out Shaft Screw [holding Pinion to Starwheel], should be free and the Release Bar Spring should have sufficient tension to return Carriage Release Bar to inactive position when Carriage Release Key is released. Carriage Release Bellcrank should clear Carriage Release Bar roller by .050 in inactive position. Adjustment can be made by forming Contact arm of the Carriage Release Bellcrank.

2. To Remove Carriage Release Bar, remove Carriage Release Bar Screws [one at each end of Release Bar] and disconnect Carriage Release Bar Spring. Carriage Release Bar may be removed from either end of the Carriage.

To replace, reverse above procedure.

c. Wheel Release Bellcrank:

1. Wheel Release Bellcrank Roller must be positioned to ride flush on Carriage Release Bar when depressed. Adjustment may be made by forming Wheel Release Bellcrank Roller Arm to position roller properly.

2. Wheel Release Bellcrank must be positioned properly in its relation to the Escapement Loose Dog, so that when the Carriage Release Bar contacts the Wheel Release Bellcrank Roller, the Effect of the Contact Arm must be formed downward to the extent of affecting purchase of Loose Dog on Starwheel tooth. Care should be exercised that Loose Dog Release Arm of Bellcrank does not conflict with or bind the Starwheel. There should be a .005 inch space between edge of Starwheel Tooth and Arm of Bellcrank.

d. Starwheel and Pinion must have an equal number of teeth and the Rack must correspond. Pica (10 Pitch) should have 12 teeth in both Starwheel and Pinion. Elite (12 Pitch) should have 15 teeth in each. Starwheel must be fitted snugly on the Pinion Shaft and end shake reduced to a minimum. Adjustment may be made, after loosening Wheel Set Screw, by positioning Set Screw or tightening Set Screw when adjustment has been made. If there is a grind in the Pinion [when carriage is returnable to the right] the grind may be eliminated by placing a drop of oil on the Pinion Shaft.

1. To Remove Starwheel and Pinion, disconnect Back Spacer Link [See Back Spacer], disconnect Ribbon Pull Link from Pull Arm [See Ribbon Cover], remove Escapement Connection Arm Pivot Screw on Universal Bar [See Main Spring Release Bar], Release Main Spring, Locker Ratchet Nut and move Adjusting Pallet until tension is fully released. Remove Spring Drum Bracket Top Plate binding screws, [See Mainpring and Drawland] releasing the screws uniformly, alternating them until the Drum Bracket is loose from Top Plate. Lower Spring Drum Bracket down to permit removing Adjusting Arm Connection from Carriage Release Bellcrank (See Tabulator). The Escapement Assembly is mounted on the Starwheel. Removal of the Spring Drum Bracket removes the complete assembly. Starwheel and Pinion may be removed by loosening Wheel Set Screw and removing Starwheel from the Rear and Pinion and Shaft from the front of the casting.
RACK, PINION AND STARWHEEL

FOREWORD  [Applies Royal, Underwood, Woodstock]
1. It is the function of the Carriage Rack, through the Pinion and Starwheel to control the step-by-step movement of the Carriage in typing. With the Carriage Rack meshed with the Pinion and the movement of the Pinion in typing carriage movement is controlled by the movement of the Starwheel because the Pinion Pawl (pivoting on the Starwheel) is meshed with the Pinion holding the Starwheel in this direction only, movement of the Carriage in typing is controlled by the Escapement. Loose Dog positioned on the Starwheel Tooth. Because of this geared action, it is important that the teeth of the Rack and Pinion be in good condition to permit of proper mesh with each other. In the event of broken or worn teeth in either the Rack or the Pinion, proper mesh would not be possible and skipping may occur. In the event the Carriage is not controlled by the movement of the Starwheel, the Pinion Pawl may cause the Rack to slip out of mesh with the Pinion thereby losing control of the Carriage. If the Carriage Rack is positioned too deeply in the Pinion, a rasping sound will result and movement of the Carriage affected which might cause piling or crowding. Rack and Pinion must be of the same pitch, Elite with Elite or Pica with Pica.

ROYAL  2. ADJUSTMENTS:
   a. Rack:
      [1] Rack Teeth should mesh as deeply as possible in the Pinion Wheel without bottoming. Adjustment may be made with the Lower Rack Ball Eccentric Stop Screws, after loosening Lock Nuts. Adjustment must be uniform on both ends of the Rack BAIL to keep the Rack level and in uniform mesh with the Pinion.
      [2] Rack Ball Arms should be parallel and Rack BAIL should be true in its entire length. Rack BAIL Arms may be formed, if necessary to parallel. Rack BAIL must work freely on its pivots without binding.
      [3] Rack Release Lever should be free on its pivot with slight play (not limiting the Rack).
      [4] Rack Ball Eccentric Stop Screws (upper), right and left, limit upper movement of Rack when Rack Release Lever is depressed and should be so adjusted that when Rack Release Lever depressed, Rack will clear Pinion teeth by about .05.
      [5] Rack Ball Adjusting Stud provides adjustment to remove end shake in Rack BAIL. Ball should pivot freely with end shake reduced to a minimum.

6. To Remove and Replace Rack: Remove Rack Binding Screws binding Rack to Rack Ball. Rack may be removed from either end of Carriage. When installing a new Rack care should be taken that an Elite Rack replaces an Elite Rack, etc.
   b. Starwheel and Pinion:
      [1] Starwheel must be free on its shaft and Shaft Nut should be adjusted, after loosening Set Screw, to provide a little play between Pinion Wheel and Escapement Frame. Starwheel Shaft must be true and Starwheel must be plumb. Bent or deformed Starwheel teeth or bent Shaft will cause Escapement troubles.
      [2] Pinion must be free on its Shaft. Pinion Pawl must be free on its pivot and Pinion Pawl Spring tensioned properly to hold pawl engaged in Pinion teeth. Note position of pinion teeth in relation to Pinion Pawl. In replacing Pinion care must be taken that Elite Pinion is installed in Pica (10 Pitch) machine and Pica (10 Pitch) machine, and that teeth face in proper direction [see drawing] otherwise improper meshing of the Pinion by the Pawl will cause Escapement troubles.

UNDERWOOD  2. ADJUSTMENTS:
   a. Rack: [Before attempting Rack adjustments determine that the Side Cover Plate Screws are not backed out contacting Rack.]
      [1] Rack Teeth should mesh as deep as possible in the Pinion Wheel without bottoming. Adjustment may be made with the Tabulator Lever Adjusting Screw, after loosening Lock Screw. Tabulator Lever Roller must be free on its Pivot without binding.
      [2] Rack Arms should be free on their pivots and Rack End-play Adjusting Screw on Left Rack Arm should be adjusted to permit of free movement of the Arm without binding and end shake eliminated. Rack Frame Release Lever Spring must provide sufficient tension to seat Rack in Pinion when Release Lever is released.
   b. Starwheel and Pinion:
      [1] Starwheel should be free on its bearing and must be perfectly true vertically. Wheel Shaft must be true. The Starwheel should fit snugly without binding. Adjustment may be made with Wheel Shaft Adjusting Nut, after loosening Adjusting Nut Screw. Worn Starwheel teeth will cause skipping.

WOODSTOCK  2. ADJUSTMENTS:
   a. Rack: Racks are designed special for each pitch of machine and should be ordered and used with the correct pinion.
      [1] Rack Teeth must be positioned properly in the Pinion Wheel Teeth, without bottoming. Adjustment is made with the Rack Adjusting Screw Eccentric [one on each end of Carriage] to raise or lower the Rack into mesh with the Pinion Wheel Teeth. Both adjustments should be uniform. After adjusting, check Rack by depressing at each end to determine if there is any play between the Rack Frame and the Rack Adjusting Screw Eccentric at point of contact.
      [2] The Rack Release Lever should be free on its Pivots with a minimum of end shake. Rack Up-Stop Screw and Lock Nut is located in left end of Tabulator Stop Bar. Adjustment should be made in such a manner that Rack, in raising, will not bind on Wheel Pawl Spring Stud in the event Wheel Pawl Spring Stud is momentarily positioned at top of Starwheel.

2. The Pinion Wheel is held in position on Starwheel Shaft by Pinion Screw. The Pinion Pawl [pivoting on Escapement Wheel and held in Pinion Engaging position by Pinion Pawl Spring] forces the Pinion to move with the Starwheel when the carriage is moving to the left in typing. When Carriage is returned to the right, Pinion Pawl releases from the Pinion Wheel, permitting the Pinion Wheel to move with Starwheel without transmitting this motion to the Starwheel which is held inoperative by the Loose Dog of the Escapement Rocker.

3. To Remove Starwheel and Pinion, remove Carriage, Tabulator Housing and rear cover plates. Loosen Wheel Shaft Adjusting Nut Screw and remove Wheel Shaft Nut. Wheel Shaft Cone and ball bearings may be removed. Starwheel and Pinion may be removed. Remove Pinion from Starwheel by removing Pinion Screw. To replace, reverse this operation, positioning Pinion Pawl in place as Pinion is returned to Starwheel position.

b. Starwheel: The Starwheel (Escapement Wheel) should be free on its bearing and must be perfectly true vertically. Wheel Pivot, if bent, will prevent Starwheel from retaining position in relation to Escapement Loose Dog. Pivot should be replaced, if bent. Soft or worn Starwheel teeth will cause skipping. Pica and Elite Starwheels have 16 teeth.

1. The Starwheel Pinion is held in proper position by Wheel Pivot Set Screws, located under the top plate of the machine. On late model machines, Wheel Pivot is released for proper positioning of Wheel Pivot Set Screw.
   c. Pinion: [Both Elite and Pica Pinion Wheels have 16 teeth. The Pica Pinion is larger diameter than the Elite Pinion]. The Pinion is held in position abutting the Starwheel by the Wheel Pivot Spring engaging the threaded end of the Wheel Pivot. Care should be exercised in replacing Pinion. Wheel to insure that teeth are properly locked [see drawing] otherwise skipping and improper carriage action will result.

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UNIVERSAL BAR

REMINGTON 1. It is the function of the Universal Bar, being propelled or moved into position by the Keylevers or typebars, to Trip the Escapement Rocker causing step-by-step escapement by dislodging the Loose Dog from contact with the Starwheel Tooth. The Type Bar Universal Bar operates in conjunction with the Type Bar Universal Bar Oscillator and the Escapement Operating Bail to perform this action in the Remington No. 17. The Universal Bar Blade fits into the rear Segment opening, directly behind the typebars and the Universal Bar pivots on the Typebar U-Bar Oscillator Bracket. The heel of the typebar is cam shaped and as the typehead nears the platen this cam shape form of the heel of the bar contacts and moves the Universal Bar [by contact with the blade] rearward. The Arm of the Universal Bar [left] contacts the Escapement Operating Bail Roller [on the left] moving the top of the Escapement Operating Bail rearward and drawing the lower extension of the Operating Bail forward, pulling with it the Escapement Rocker, through contact of the Escapement Link Sleeve. Direction marks on the drawing indicate the movements of the parts of this assembly.

2. ADJUSTMENTS: Before attempting adjustments check Universal Bar Oscillator Bracket Screws and the Oscillator Adjusting Plate Screws on both ends of the U-Bar Oscillator, for tightness. Oscillator Pivot Screws should be adjusted for free action of the Oscillator with a minimum of end shake. Universal Bar Oscillator Spring should provide sufficient tension to retain the Universal Bar Blade in its forward position in the Segment opening when Keylevers are inactive.

a. Universal Bar Oscillator should be free on its Pivot and the Escapement Arm connection to Escapement Link Sleeve should be true [not bent] and positioned properly to prevent binding of Escapement Link Sleeve in Rocker or binding of Sleeve Arm at pivot. Escapement Operating Bail-Pivot Screw on right arm of the Bail may be adjusted for proper fitting, after loosening Lock Nut.

b. Universal Bar Guide Stud must be positioned centrally and freely in the Segment Guide Hole. Adjustment may be made by positioning U-Bar Oscillator, after loosening Pivot Screws, coming in on one screw while going out on the other until U-Bar Stud is properly centered in Segment Guide Hole.

c. U-Bar Trip Position Adjustments: Before attempting adjustments because of lack of uniform trip on either end or center type bars, determine whether trip is off in the center of the Universal Bar or at the left or right end of the U-Bar, by raising one or two type bars on the left in the center and on the right of the typebar nest to the platen.

[1] If the Trip is off on the center bars [not uniform with the end bars], the Universal Bar Oscillator Bracket may be adjusted up or down, after loosening Bracket Set Screws located in elongated slots for adjusting purposes, positioning Bracket correctly. Moving the Bracket up will cause the Escapement Trip on the center bars to take place when the typebar is closer to the Platen. Moving the Bracket downward will cause the escapement trip on the center bars to take place when the typebar is farther away from the Platen. Tighten binding screws when adjustment has been made. Adjustment of Bracket up or down will affect the trip on end bars. Adjustment should be limited to a very slight up or down movement of the Bracket.

[2] If the Trip is off at either end typebar, adjustment may be made, after loosening Oscillator Adjusting Plate Screws on side involved, by moving Adjusting Plate to the rear will cause escapement to trip when typebar is closer to the Platen. Moving Adjusting Plate to the front will cause escapement to trip when typebar is farther away from the Platen. Tighten Adjusting Plate Screws when adjustment has been made.

ROYAL 1. It is function of Universal Bar [being propelled or moved into position by the Keylevers] to Trip the Escapement Rocker causing step-by-step escapement by dislodging the Loose Dog from contact with the Starwheel Tooth. The Royal Universal Bar is operated exclusively by the Universal Bar Links which pull the Universal Bar forward as the Keylever is depressed causing the escapement trip and positioning the Ribbon. The U-Bar does not utilize springs for return of the Bar to inactive position. As will be noted [by reference to Escapement Drawings] the Universal Bar Links hook over the U-Bar Rod. Depression of a Keylever moves the link forward drawing with it the U-Bar and causes the U-Bar Trip Plate to contact the Escapement Rocker Extension.

2. ADJUSTMENTS:

a. Universal Bar must be free on its Pivots. End shake adjustment is provided with adjustable slots in U-B, R.H. U-Bar Bracket. Determine that the U-Bar fulcrum is not binding on the U-Bar Hanger and that both U-Bar bearings are clean and slightly oiled. U-Bar Rod must be true in its entire length.

b. Universal Bar Ribbon Adjusting Screw controls Ribbon position. See instructions under Ribbon Cover.


WOODSTOCK RACK, PINION AND STARWHEEL

Continued From Page 66

d. To Remove Starwheel and Pinion: Remove Carriage [See Main Carriage]. Remove Rear Carriage Rail, being careful not to disturb Rear Carriage Rail Adjusting Screws. The Margin Stop Lever Assembly, which is hinged to the left of Starwheel, may be moved out [toward you] of the key of the Back Space Plate and swung over [to the left], making the Pinion and Starwheel accessible. Back out the Wheel Pivot Screw. The Pinion may be removed. Back out the Pivot Set Screw, Move the Starwheel and Pivot in [toward you] until the Pivot is free. It may then be removed. The Starwheel bears on the Pivot and is held in Place by the Pinion Wheel. It may be dis-assembled from the Pivot by applying slight pressure.

**UNDERWOOD**

1. It is the function of the Universal Bar to trip the Escapement Rocker when moved into contact position with the Rocker by the Cam Shape of the heel of the Typebar contacting and moving rearward the blade of the Universal Bar. This motion of the Rocker Arm also motivates the Ribbon Feed.

2. **ADJUSTMENTS:**
   a. **U-Bar Guide Stud** must be centrally and freely located in the Segment Guide Slot. Adjustment is made, after loosening Lock Screws, with Rocker Arm Pulls, left and right, positioning Stud centrally in Slot, and with end shake in Rocker Arm reduced to a minimum.

   b. **U-Bar Blade** must be positioned uniformly in Segment Groove. Adjustment is made with Rocker Arm Eccentric facing machine from the rear with Cover Plates removed, the Right Hand Rocker Arm Pivot is an eccentric adjustment for properly positioning the U-Bar Guide Stud and the U-Bar Blade.

   c. **U-Bar Frame Stop** should be adjusted so that the Universal Bar Frame Blade will be picked up by the cam heel of the typebar when the bottom of the type head is approximately 7/8" from the forward point of the Typebar Guide. Adjustment is made by positioning U-Bar Frame Stop, after loosening adjusting screws.

   d. **U-Bar Frame Arms** must be free in their fitting to Rocker Arm. Adjustment may be made by forming U-Bar Frame Arms.

   e. **U-Bar Spring** must provide just enough tension to return U-Bar to Segment Groove position. Too much tension will affect the touch and action of the machine. Adjustment may be made, after loosening U-Bar Spring Support Set Screw, by positioning Spring Support. Tighten Set Screw when adjustment has been made.

   f. **U-Bar Trip Position Adjustments:** Determine by raising left end, center and right end typebars to the platen, with the fingers, whether trip is off in the center of the Universal Bar, or to the left or right. Check position of U-Bar Guide Stud [See Paragraph 2a above], and position of U-Bar Blade [See Paragraph 2b above], adjusting if necessary. When adjusted, test end typebars, left and right, to determine that Trip is uniform.


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**WOODSTOCK**

1. The Universal Bar, Woodstock Typewriters above 580,000 Serial, is actuated by the Key levers. The downward movement of the Universal Bar Teeth moving the rear extension forward drawing with it the Lower Extension of the Escapement Rocker, causing the escapement trip. The Teeth of the Universal Bar on machines above this serial are for individual escapement trip only and must not be formed for ribbon adjustment. Woodstock Typewriters bearing serial numbers below 580,000 are equipped with an Upper Universal Bar which motivates the escapement in a similar manner to the Underwood. Machines below 580,000 utilize the teeth of the Lower Universal Bar for Ribbon position adjustment only.

2. **ADJUSTMENTS:** Determine that U-Bar is parallel with bottoms of Keylevers before attempting adjustments.

   a. **Position:** There should be practically no end play of the Lower Universal Bar on its Pivot, yet it must be perfectly free. These Pivots are cone type bearings and must be seated properly, otherwise typebar Trip will be affected. Do not form Teeth for Trip until it is determined that Pivots are adjusted properly. U-Bar Pivot Lock Nuts should be tight. Dog Rocker Link should not bind on its Pivot and should be free in its positioning hole in the Escapement Rocker.

   b. **Tension Adjusting Spring** [which provides touch adjustment] should be attached to Spring Arm and the Adjusting Plate seated in 1st, 2nd or 3rd position on Adjusting Plate Post in Rear Frame Crossbar. The central [2nd] position is standard touch adjustment.

3. **To Remove U-Bar:** Loosen Universal Bar Pivot Lock Nut on the right, backing out U-Bar Pivot sufficiently to permit moving the U-Bar to the Right to disengage from the Left Hand Pivot. Back out Dog Rocker Link Adjusting Sleeve Lock Nut and Dog Rocker Link Adjusting Sleeve. Disconnect Tension Adjusting Spring Plate. Remove Ribbon Feed Wire Nuts. The Universal Bar may be withdrawn from the machine being careful not to bend the Dog Rocker Link.

4. **To Replace U-Bar:** Feed the Dog Rocker Link into position between Keylevers No. 20 and No. 21 in position to reenter the Dog Rocker as you move the U-Bar back into position. Seat left bearing on Left hand Pivot, tightening R. H. Pivot Screw, being careful to keep U-Bar centered properly to prevent binding of the Dog Rocker Link on Dog Rocker at the same time positioning teeth of the U-Bar to contact their respective Keylevers. Replace Dog Rocker Link Adjusting Sleeve and Lock Nut. Connect Tension Adjusting Spring Plate. Test U-Bar for Bind, determining that it is free on its Pivots.
1. It is the function of Universal Bar, when contacted and moved rearward by the sub-levers, to trip the Escapement Rocker. The Line Lock Universal Bar operates on the U-Bar Bracket also and when the Line Lock is set the Line Lock Universal Bar moves into position to block the movement of the U-Bar, preventing the Escapement Rocker from functioning. Spring tension for returning the U-Bar to inactive position is supplied by the Escapement Rocker Spring.

2. ADJUSTMENTS:
   a. Position: The Universal Bar must be positioned parallel to the row of Sub-levers, in order to provide a uniform Escapement Trip on all Key levers. Adjustment may be made, after loosening U-Bar Bracket Binding Screws, by adjusting U-Bar position. Tighten Binding Screws when adjustment is made.

   b. Individual Trip:
      [1] Where Individual Trip on a Single Typebar is not uniform with the balance of the typebars, trip on that typebar may be adjusted by peening or filing, whichever is necessary, the contact point of the Sub-lever.

2] Where trip on center typebars is not uniform with the end typebars, adjustment may be made by forming the tail of the U-Bar [up or down] at Point X indicated in drawing. Forming the tail downward [with three prong pliers] will cause center typebars to trip farther away from the platen. Forming Tail Upward [with three prong pliers] will cause center typebars to trip closer to the Platen. Extreme caution should be utilized to limit bend to an absolute minimum.

3] U-Bar Tail must fit loosely in Dog Rocker Connection Arm. Use a Hex Wrench to position Connection Arm properly.

4] Universal Bar must operate freely on its Pivots with a minimum of end shake. Adjustment may be made with Pivot Screw, after loosening Lock Nut.

3. To Remove Universal Bar: Disconnect U-Bar from Escapement Rocker by removing Connection Arm Pivot Screw. Remove U-Bar Bracket Screws [4], Disconnect Line Lock Link. U-Bar may now be removed from machine. To replace U-Bar, reverse above procedure.
FOREWORD

The mechanism controlling the Escapement is oftentimes referred to as "the heart of the typewriter" controlling as it does the step-by-step movement of the carriage in order to position each character in its properly allotted space. It will be noted in the drawings for each make of machine that this function is performed simultaneously with the printing of the character by the Keylever-Typebar-Universal Bar combination. Synchronizing the tripping of the Escapement Rocker with the printing of the character is generally referred to as "setting the Escapement Trip".

The Escapement Trip is caused by movement of the Loose or Stepping Dog off the Starwheel Tooth to permit the Starwheel to rotate one tooth space at which time the Loose or Stepping Dog must be in position to engage the subsequent Starwheel tooth. The Loose Dog is affixed to the Escapement Rocker and it is the rocking action of the Escapement Rocker, caused by movement of the Universal Bar, striking, pulling or pushing one extremity of the Rocker in order that the other extremity, to which the Loose Dog is affixed, may rock out of position of engagement with the Starwheel tooth, that permits the Loose Dog to become momentarily disengaged from the Starwheel tooth.

The plane view of the drawings, from Keylever to Starwheel and including Sub-lever, Link and Typebar, provide an unobstructed view of this important mechanism which will materially benefit the mechanic and student in tracing the movement and synchronized action of the Keylever-Typebar-Universal Bar combination.

From the foregoing and previous chapters in this Manual it will be understood that proper performance of the Escapement mechanism of the typewriter relies upon:

1. A properly fitted carriage and carriage roller retainers.
2. Proper mainspring tension.
3. Carriage Rack with teeth in good condition properly engaged in Pinion.
5. Pinion Pawl pivoted on Starwheel properly and Pawl Spring holding Pawl properly engaged in Pinion.
6. Starwheel in good condition and free on its pivot.
7. Loose Dog positioned properly on Starwheel tooth.
8. Escapement Rocker properly adjusted on its pivots and limited properly to maintain position of Loose Dog on Starwheel tooth.
9. Universal Bar free on its pivots and adjusted properly.
10. Keyleviers free on their pivots with proper spring tension.
11. Typebars, Sub-levers and Links free on their pivots.

With all of these factors contributing to proper escapement action and to forestall hasty action in attempting to adjust the Escapement Dogs to eliminate complaints of skipping, piling or crowding, the following contributing causes of such faults are here enumerated. Each should be explored and checked before any adjustment of the Escapement Dogs is attempted.

CONTRIBUTING CAUSES FOR SKIPPING

1. Flimsy desk causing vibration.
2. Rebound of keylever caused by faulty touch.
3. Rack not properly meshed in pinion.
4. Broken or worn tooth in Rack.
5. Rack binding on pivots or some obstruction preventing rack from meshing properly in pinion.
7. Pinion Pawl not seating in Pinion or Pawl spring deformed, broken or misplaced.
8. Escapement Rocker Spring disconnected or improper tension.
10. Escapement Rocker binding on attachments.
11. Universal bar binding on pivots, or improperly adjusted.
12. Escapement Wheel teeth worn.
13. Loose Dog broken.
14. Too much clearance between Loose and Stationary Dogs.

CONTRIBUTING CAUSES FOR PILING AND CROWDING

1. Flimsy desk causing vibration.
2. Uneven desk causing Carriage to travel uphill.
3. Erratic touch of operator.
4. Typebars sticking or sluggish in segment slots.
5. Insufficient Mainspring tension.
6. Sub-carriage improperly fitted.
7. Loose segment fitting.
8. Rack too deeply emmeshed in Pinion.
9. Platen end shake.
10. Pinion binding on shaft.
11. Starwheel binding on shaft.
12. Escapement Rocker binding on pivots.
13. Tabulator Rack binding on Tabulator Stop Set or Clear Lever.
15. Universal Bar Pivots loose, improperly seated or binding.
17. Space bar connections binding Rocker.
18. Insufficient clearance between Loose and Stationary Dogs.
ESCAPEMENT ACTION

REMINGTON 1. The Escapement Action of the Remington No. 17 is motivated by the Cam Shape of the Typebar heel which contacts the lip of the Universal Bar as the type head nears the Platen, moving the Universal Bar back to engage the Escapement Operating Bail Roller. Pivot point of the Escapement Operating Bail is below the roller and as the top of the Bail moves rearward, the lower extremity [connecting arm to Escapement Rocker] moves forward, drawing with it the lower extension of the Escapement Rocker. In this movement the Loose Dog is disengaged from the Escapement Wheel Tooth at approximately the same instant the typebar head is from ¹⁄₄" to ¹⁄₈" from the platen. As in other machines, the Stationary Dog acts as a safety valve [moving in between the Starwheel teeth] as the Loose Dog releases the Starwheel, limiting the escapement to one tooth in the pinion or rack.

The Pinion Wheel is solidly attached to the Escapement Wheel in the Remington No. 17 and does not utilize a Pinion Pawl for releasing the Pinion when the Carriage is moved to the right. Instead, the Loose Dog acts as a wheel pawl in permitting the Starwheel to move backward as the Carriage moves to the right. In this movement the Escapement Dog Silencer moves into position contacting back of the head of the Loose Dog, moving the Dog down out of engagement with the Starwheel tooth to prevent noisy carriage return.

When the Carriage Release Lever is depressed the Carriage Release Blade contacts the Escapement Loose Dog Release moving the Loose Dog from contact with the Escapement Wheel Tooth permitting free movement of the carriage. The Rack is permanently engaged in the Pinion Wheel and the motion of the Pinion wheel is transmitted to the Starwheel and vice-versa.

When the Tabulator Lever is depressed, the Tabulator Blade contacts the Escapement Loose Dog Release, releasing the Loose Dog from contact with the Starwheel tooth, permitting free movement of the carriage, subject to the braking of the Escapement Wheel by the Escapement Wheel Friction Screw.

2. ADJUSTMENTS: Before attempting adjustments it should be determined that the Key levers, Typebar Bellcrank Links, Typebar Bellcranks, Typebar Links and the Typebars are free on their pivots and that the Bellcrank Springs and Keylever Springs are properly connected and provide proper tension. The Key levers should be free in the Keyleaver Comb Slots and the Typebars should operate in a clean segment slot. Distort Segment Slots or Typebar Bellcrank Links binding on Keyleaver Stud will cause a sluggish action.

a. Escapement Trip:

[1] Master Trip Adjustments:

Determine that the Universal Bar, the Escapement Operating Bail and the Escapement Rocker are free on their pivots, with a minimum of end shake. Moving a typebar to the Platen with the fingers, the Escapement Trip should take place when the type face reaches a point between ¹⁄₄" and ¹⁄₈" from the Platen. Adjustment is made by loosening Lock Nut and turning Escapement Trip Adjusting Sleeve clockwise will cause escapement to trip when type head is further away from the Platen. Turning sleeve counterclockwise will cause escapement to trip when type head is closer to the platen. Tighten Lock Nut when adjustment is properly made.

After resetting the Escapement Trip, turn the Starwheel to determine the amount of purchase the Loose Dog Silencer has in its position on the top edge of the Loose Dog. If Trip Adjustment positions the Loose Dog too far forward on Escapement Wheel Tooth, it may prevent the Silencer from engaging Loose Dog properly. [See Escapement Loose Dog, Paragraph C [2].

Hold typebar to the Platen with the fingers and check lower part of the Escapement Rocker for a minimum additional forward movement. Make same test with Space Bar depressed. The Upper Rocker Stop Screw should be adjusted to permit of this minimum additional movement.

[2] Individual Trip Adjustment: [See Universal Bar].

b. Escapement Unit: Because of the difference between the number of teeth in the Elite Pinion [15] and the Elite Starwheel [18] there is a special procedure for removing the Escapement Unit and the Carriage from Elite [12 pitch] machines to eliminate the necessity of resetting the Racks and Scales. The Pica [10 pitch] machine, having an equal number of teeth [15] in both the Starwheel and Pinion may be removed without utilizing this procedure.


[2] To Remove Escapement Unit from Elite-12 Pitch Machines: Move the Carriage to the extreme left with the right carriage end limiting against its Stop Screw. Mark the Starwheel Tooth and the Rack Tooth so that in replacing the Escapement Unit the Starwheel Tooth can be lined up with the Rack Tooth. Continue removal of Escapement Unit as specified under Paragraph [1] above.


[4] To Replace Escapement Unit in Elite-12 Pitch Machine: Move Carriage to the extreme left and line up marks previously made on the Starwheel tooth and Rack. Connect Es-
To Install New Carriage in Elite-12 Pitch Machine: Line up the Starwheel with the large hole directly under the small hole and the small hole lined up with the small hole in the Escapement Bracket [See Rack, Pinion and Starwheel drawing]. The Loose Dog should seat fully on the face of the Starwheel tooth directly below large hole in the Starwheel when holding the Starwheel firmly engaged to the Loose Dog with this tooth. If the Loose Dog does not seat fully on the face of the Starwheel Tooth, adjustment is made by loosening Rocker Pivot Screw Lock Nuts on either side and coming in with one screw while going out with the other until the Loose Dog is positioned properly. After adjusting check Starwheel to determine that small top hole in Starwheel is still lined up with the small hole in Bracket. Inserting a pin or rivet in the small top hole in Starwheel, flush with the Starwheel edge and entering into the small hole in Bracket, with the carriage to the extreme left [viewing machine from the rear] limiting against its Carriage Stop [release Left Margin Stop to accomplish this position, if necessary]. Holding the Carriage in this position, replace Escapement Unit in Machine. Connect Escapement Trip Adjusting Sleeve into Escapement Rocker opening, closing Link Arm and tighten screw. Replace and tighten Bracket Set Screws and Lock Nuts. Remove the pin or rivet in the small top hole in Starwheel and check position of front scale which should be set at zero "O".

c. Escapement Rocker:

[1] Removal and Replacement: Remove Right Hand Pivot Screw after loosening Lock Nut. Remove Escapement Rocker, being careful not to lose Escapement Rocker Spring which is positioned behind the top part of the Rocker on Rocker Spring Adjusting Screw.

To replace Escapement Rocker, return Rocker Spring to its position on Rocker Spring Adjusting Screw. Return rocker to Bracket. Replace Rocker Pivot Screw and lock nut, positioning rocker to provide free movement without bind or without excessive end shake.

[2] Escapement Loose Dog: The Loose Dog on the Remington No. 17 is formed differently than on other machines, hinging on the Loose Dog Carrying Arm and positioned in Loose Dog Guide. It functions both as an Escapement holding dog and as an Escapement Tooth Pawl. In the latter case, as Escapement Wheel moves backward when returning carriage to right, the Loose Dog Silencer moves into position contacting back of the head of the dog, moving the dog down to permit the Escapement Wheel tooth to pass. The upward movement of the dog is limited by forming of the Loose Dog Guide.

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ROYAL 1. The Escapement Action in the Royal Typewriter is motivated by the Universal Bar which is drawn forward by the action of the Keylever and Link to contact the Rocker at the position of the Trip Roller, opposite the Trip Adjusting Screw. Continuing its forward movement with the Rocker, the Loose Dog is disengaged from the Escapement Wheel Tooth when the Escapement Rocker is rocked at the same instant the typebar is making its impression. The Starwheel rotates immediately after this action, during which interim the Escapement Roll has moved in between the Starwheel Teeth and returned to inactive position as the Loose Dog resumes its normal position to engage the subsequent Starwheel tooth. The Escapement Roll [like the Stationary Dog in other machines serves as a safety factor limiting the Starwheel to one tooth escapement in the event the Keylever or Space Bar be held depressed.

The Pinion Wheel is positioned on the Starwheel Shaft and is held to the movement of the Starwheel. In typing-carriage moving to the left by the Pinion Pawl. The Pinion Pawl [pivoting on the Starwheel] permits the Pinion to rotate through engagement of the Rack [carriage returning to the right] without transmitting this motion to the Starwheel.

When the Carriage Release Lever is depressed the Rack is disengaged from contact with the Pinion, permitting free movement of the Carriage without transmitting this motion to either the Pinion or Starwheel.

When the Tabulator Lever is depressed, the Rack is raised by the Tabulator Lift Lever, which engages the Brake Gear into mesh with the Rack. The Carriage is freed from the control of the Pinion and Starwheel in this action subject only to the braking power of the Brake Gear.

2. ADJUSTMENTS: [Before attempting adjustments for skipping or binding, refer to Foreword Sheet of this Section]

4. Escapement Trip: Before attempting Trip adjustment, determine that the Universal Bar is free on its bearings [See Universal Bar]; Universal Bar Links are hooked properly on the Universal Bar Rod; Escapement Rocker is limited properly [See Paragraph 2b][5]; Escapement Drop is proper [See Paragraph 2b][3]; Space Bar Trip is proper [See Space Bar and that Individual Trip is uniform [See Paragraph 2a][2].

1] Master Trip Adjustment: Move several typebars [across the Keyboard] to the Platen with the fingers to determine that the Trip is uniform. The Escapement Trip should take place when the type head is approximately 9/16 from the Platen. Adjustment of the Escapement Trip may be accomplished, after loosening the Trip Adjusting Screw Lock Nut, by turning the Trip Adjusting Screw clockwise [to the right] will cause escapement to trip when type head is farther away from the Platen. Turning it counterclockwise [to the left] will cause escapement to trip when type head is closer to the Platen. Tighten Trip Adjusting Screw Lock Nut after adjustment has been made.

Important: Check Escapement Rocker Limit Plates after making Master Trip Adjustment [See Paragraph b][4].

[2] Individual Trip Adjustment: The Universal Bar Links should be positioned properly on the Universal Bar Rod [not riding one another]. When a single typebar is out of trip escapement with the balance of the typebars, it may be brought back into uniformity by forming the Universal Bar Link at point indicated in drawing. Forming the end of Link upward [shortening] will cause the escapement to trip when typehead is farther away from the Platen. Forming the end of the Link downward [lengthening] will cause the escapement to trip when typehead is closer to the Platen. Inspect the Universal Bar Link Spring for condition after forming.

b. Escapement Rocker.

1] Removal and Replacement: Remove Bichrome Ribbon Link Screw [See Ribbon Cover]. Disconnect Escapement Rocker Spring from Adjustable Plate; loosen R. H. Pivot Screw Lock Nut and back out R. H. Pivot Screw until Escapement Rocker can be removed from the L. H. Pivot. Escapement Rocker may be dropped down and removed through base of machine.

To Replace, return Rocker to its L. H. Pivot; Screw in R. H. Pivot Screw to its position permitting free movement of the Rocker without binding and without excessive end shake. Tighten R. H. Pivot Lock Nut. Replace Bichrome Ribbon Vibrator Link Screw.

[2] The Escapement [Loose] Dog is affixed to the Rocker Frame pivoting on its fulcrum screw. Its position in relation to the Escapement Roll is controlled by the Rocker Drop Screw, while the Washer between the Escapement [Loose] Dog and Escapement Frame positions the Loose Dog in its horizontal clearance with the facing of the Escapement Roll [as indicated in top right hand drawing]. Horizontal clearance between the Escapement [Loose] Dog and the Escapement Roll must be 9/32. Washer may be replaced with a thinner or thicker washer, as may be necessary, after removing Escapement Dog Pivot Screw Nut and Pivot Screw. The Escapement Loose Dog must be free on its fulcrum without excessive play between the Dog and the Rocker Frame. Adjustment is made with the Dog Pivot Screw and Lock Nut.

The Escapement [Loose] Dog must be set flush with the edge of the Starwheel tooth. Adjustment is made by forming the Front Limit Plate on late model machines and by adjusting Front Limit Screw on earlier models. The face of the Escapement Dog must position flush with the face of the Starwheel tooth. Escapement Dog in normal position holding Starwheel Tooth. Adjustment is made by positioning Rocker to permit of flush engagement with Rocker Pivot Screws.

The Escapement Dog Spring must have sufficient tension to return Escapement Dog to position instantly after being released from contact with the Escapement Wheel tooth.
[3] The Rocker Drop Screw controls the forward movement of the Escapement Dog. The spacing between the Escapement Dog in normal position [holding escapement wheel tooth and the pick up of the same escapement wheel tooth by the Escapement Roll when the Keylever or Space Bar is held depressed [as reflected by movement of the carriage] should be approximately \( \frac{1}{32} \)". If spacing is less than \( \frac{1}{32} \)" the Starwheel tooth may not be able to pass between the two dogs and if greater than \( \frac{1}{16} \)" escapement troubles may develop. Adjustment of the Rocker Drop Screw will affect Margin, Tabulator and Back Spacer adjustments, all of which should be checked, if position of the Drop Screw is affected. Turning the Rocker Drop Screw clockwise will increase the distance of movement of Carriage; counter-clockwise will decrease the distance of movement.

[4] The Escapement Roll performs the function of the Stationary or Rigid Dog used in other machines and is equipped with a roller permitting the Escapement Roll to roll off the face of the Starwheel tooth after releasing a held Keylever or the Space Bar. The Escapement Roll Roller must operate freely on its pivot and the horizontal clearance between the Escapement Dog and the Escapement Roll of \( \frac{1}{48} \)" must be maintained.

[5] Limit Plates: Late model Royal Typewriters are equipped with Front and Rear Limit Plates which are adjusted by forming the plates. Earlier model Royals are equipped with Front and Rear Limit Screws to provide Rocker limiting adjustments. Rear Limit Screw or Plate should be adjusted to provide a minimum of additional play in the Rocker when a typebar is held by the fingers firmly engaging the Platen. Front Limit Plate or Screw should be adjusted to position Escapement [Loose] Dog edge flush with the Escapement Wheel Tooth.

[6] Rocker Pivots: The Escapement Rocker must be free on its Pivots with a minimum of end shake. L. H. Pivot Screw is adjusted to seat the face of the Escapement Dog squarely on the face of Escapement Wheel Tooth when the Escapement Dog is in normal position holding the escapement wheel tooth, loosening R. H. Pivot Screw to permit positioning of the Dog.

[7] Rocker Pivots: The Escapement Rocker must be free on its Pivots with a minimum of end shake. In removing end shake, it should be determined after adjusting that face of the Escapement [Loose] Dog lies flush on the Starwheel tooth.

[8] Rocker Springs: Late model machines are equipped with both a front Rocker Spring and a rear kick back spring. Front Rocker Spring tension is controlled by Adjustable Plate held in place by Adjusting Screw. On machines equipped with both springs, the Adjustable Plate

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1. The Escapement Action of the Underwood No. 5 and No. 6 is motivated by the Upper Universal Bar which is pushed rearward as the cam shape of the typebar heel contacts the blade of the Upper Universal Bar [typebar near the platen], causing the contact of the Universal Bar with the end of the Trip Adjusting Screw [on the Escapement Rocker]. The upper part of the Escapement Rocker is rocked rearward in this action moving the Loose Dog off the Starwheel tooth to permit of the escapement. In this movement the top of the Rocker Arm is driven rearward. The lower extension of the Rocker arm provides for Line Lock and for Space Bar contact.

The Pinion Wheel is positioned on the Starwheel Shaft [affixed with Pinion Screw] and is held to the movement of the Starwheel [in typing - carriage moving to the left] by the Pinion Pawl. The Pinion Pawl [pivoting on the Starwheel and held engaged in the Pinion by the Pinion Spring] pivots on the Starwheel permitting the Pinion to rotate through engagement with the Rack [carriage returning to the right] without transmitting this motion to the Starwheel.

When the Carriage Release Lever is depressed, the Rack is disengaged from contact with the Pinion, permitting free movement of the Carriage without transmitting this motion to either the Pinion or Starwheel.

When the Tabulator Bar is depressed, the Rack is lifted from engagement with the Pinion by the Tabulator Lever, freeing the carriage from the control of the Starwheel and Pinion, subject only to the braking power of the Brake Shoe applied to the Brake Band.

2. ADJUSTMENTS: [Before attempting adjustments for Skipping or Piling refer to the Foreword Sheet of this Section].
   a. Escapement Trip:
      [1] Master Trip Adjustment: Determine that Universal Bar Lip is positioned properly in the Segment groove, parallel with segment facing and Ring; that Universal Bar Guide is positioned centrally in Segment Slot and that Universal Bar is free on its Rocker Arm pivots. [See Universal Bar]. Moving several typebars [across the Keyboard] to the Platen with the fingers, the Escapement Trip should take place when the typehead reaches a point approximately ¾" from the Platen. Adjustment is made, after loosening Trip Adjusting Screw Lock Nut; turning Trip Adjusting Screw clockwise will cause escapement to trip when typehead is farther away from the platen; counter-clockwise will cause escapement to trip when typehead is closer to the Platen. Tighten Lock Nut when adjustment has been made.
   b. Escapement Rocker:
      To Replace, reverse this procedure.
   [2] Loose Dog: The Loose Dog is attached to the Rocker Frame [Dogs Assembled] by Pivot and Lock Screw. The Loose Dog should be free on its pivot and the Loose Dog Stop should limit movement of the Loose Dog [to the right] with a clearance of approximately .025" between the back of the Loose Dog and the back of the Starwheel tooth just passed. Loose Dog Stop may be formed to provide this clearance.
      Facing the machine from the Rear [same view as indicated in top drawing] the face of the Loose Dog should be positioned fully and flush on the face of the Starwheel Tooth. Adjustment may be made, after loosening Rigid Dog Fulcrum Pin Lock Screw [both sides] by coming in on one pin while going out on the other until the position of the Escapement Rocker permits of the flush position. Determine that the Rocker is free on its Pivot with a minimum of end shake. Tighten Fulcrum Pin Lock Screws when adjustment has been made.
      The edge of the Loose Dog should position flush with the edge of the Starwheel tooth. Adjustment is made with the Dog Rocker Limit Screw.
      Horizontal clearance between the Loose Dog and the Stationary Dog must be maintained at .052" to .055". Adjustment may be made by stoning or grinding Loose Dog at point it abuts against Escapement Rocker to reduce clearance or by forming top of the Loose Dog.
      Loose Dog Spring should be adjusted [by positioning its Spring Support] to provide just sufficient tension to return Dog to position against its Stop.
   [3] Stationary [Rigid] Dog must be in good condition. If worn or mutilated it should be replaced. Horizontal clearance between the Loose Dog and the Stationary Dog of .052" to .055" must be maintained as specified above. Moving the carriage to position a Starwheel tooth directly behind the Rigid Dog, clearance of .025" as indicated in drawing must be maintained. Adjustment may be made, after loosening Rigid Dog Adj. Screw Lock Screw, by adjusting Rigid Dog Adj. Screw.
   [4] Dog Rocker Limit Screw: Holding a typebar against the Platen with the fingers there must be a minimum of extra play in the Rocker, which may be determined by pressing lower extension of the Escapement Rocker. Adjustment is made with the Dog Rocker Limit Screw,
.025 CLEARANCE B/T RIGID DOG AND ESCAPE WHEEL TEETH WHEN TOOTH IS DIRECTLY BEHIND RIGID DOG.
WOODSTOCK 1. The Escapement action in the Woodstock Typewriter above 580,000 serial, is motivated by the Lower Universal Bar which is connected to the Escapement Rocker by its Upper Extension, Dog Rocker Link and Trip Adjusting Sleeve. The teeth of the Lower Universal Bar are positioned directly below their respective Keylevers and as the Keylever is depressed, the lower part of the Universal Bar moves downward while the extension of the Universal Bar moves forward. As the Type Bar, which is motivated in the same action by the Keylever, Sub-Lever and Type Bar Link, reaches a point between $\frac{3}{8}$” and $\frac{1}{2}$” from the Platen [when held by the fingers] the Trip Adjusting Sleeve, on its forward movement, carrying the lower part of the Escapement Rocker, causes the Loose Dog [which holds the Starwheel tooth] to move off the Tooth permitting the one-escapement trip. The Stationary Dog acts as a safety valve limiting the Trip or escapement to one-tooth in the Pinion or Rack. The Universal Bar Spring and the Escapement Rocker Spring cooperate in returning the Universal Bar to normal position after a Keylever has been released, while the Keylever Tension Spring returns the Type Bar and the Keylever to normal position.

2. ADJUSTMENTS:

   a. Escapement Trip: Before attempting adjustments check the Sub-frame Binding Screws in Base Frame openings below Carriage for tightness. Determine that the Lower Universal Bar is free on its pivots with a snug fit. Loss of trip on several keylevers on either side of the Keyboard does not necessarily mean that the teeth of the Lower U-Bar need reforming or that the U-Bar is bent. The Universal Bar cone shaped pivot may not be seated properly in female bearing of the U-Bar rod resulting in loss of trip and ribbon on certain keylevers. The pivot on that side of the Universal Bar should be checked for loose fitting and should be properly adjusted before attempting Trip Adjustments. This adjustment may be made by loosening Pivot Lock Nut, holding U-Bar with the fingers while running in the U-Bar Pivot Screw.

   1. Master Trip Adjustment: Move several different Typebars [across the Keyboard] to the Platen with the fingers; the escapement trip should take place when the type head is approximately $\frac{3}{8}$” to $\frac{1}{2}$” from the platen. Adjustment of the Escapement Trip is accomplished, after loosening the Trip Adjusting Sleeve Lock Nut, by turning the Trip Adjusting Sleeve clock-wise will cause escapement to trip when type head is farther away from the Platen. Turning the Trip Adjusting Sleeve counter-clockwise will cause escapement to trip when type head is closer to the Platen. Tighten Lock Nut when proper adjustment has been made.

   2. Individual Trip Adjustment: The teeth of the Lower Universal Bar in the Woodstock Typewriter above 580,000 serial, are formed only for individual trip adjustment. When a single type bar is out of trip escapement with the balance of the keyboard, it may be brought into uniformity by forming the tooth of the Lower Universal Bar contacted by that Keylever. To bend the tooth upward will cause the trip to break when the type head is farther away from the Platen. To bend the tooth downward will cause the trip to break when the type head is closer to the Platen.

   b. Escapement Rocker:

   [1] Removal and Replacement: Facing the machine from the rear remove the rear cover plate [s]. Loosen the Trip Adjusting Sleeve Lock Nut and remove both the lock nut and the Trip Adjusting Sleeve from the Dog Rocker Link [which protrudes through rocker slot]. Loosen the Dog Rocker Pivot Screw Lock Nut on the right and back out the pivot screw. Move the Rocker to the right to disengage it from the L. H. Dog Rocker Pivot Screw [being careful not to lose the washer on the L. H. Pivot] drop it down and disconnect the Space Wire. Disconnect the Rocker Spring and remove the Dog Rocker.

   To Replace: Connect the Space Wire. Raise the Escapement Rocker feeding the Dog Rocker Link through its slot in the Rocker as the Rocker is placed on the left hand pivot [be sure the small washers are in their proper position on the left hand pivot]. Tighten the right hand Rocker Pivot Screw, positioning the rocker properly, leaving a minimum of end shake to prevent Rocker from binding. Tighten Pivot Screw Lock Nut. Replace Trip Adjusting Sleeve and Lock Nut, setting Universal Escapement Trip as outlined in Paragraph 2a above. Connect the Rocker Spring. Tighten Trip Adjusting Sleeve Lock Nut.

   [2] Loose Dog: The Loose Dog is attached to the Rocker Frame by Pivot Screw and Lock Nut [on reverse side]. To remove, back out Pivot Screw Lock Nut, then back out Pivot Screw. Disengage Dog Link and Loose Dog Spring as the Loose Dog is removed from the Rocker Frame. The Loose Dog should be free on its pivot and the Dog Link should limit the movement of the Dog as well as act as a shock absorber. Facing machine from the rear, the rear edge of the Loose Dog should be flush with the edge of the Escapement Wheel tooth. Adjustment is made with the Upper Limit Screw. The face of the Loose Dog should seat fully on the face of the Escapement Wheel Tooth. Adjustment is made with the Rocker Pivot Screws, moving the Rocker to the left or right until the Loose Dog facing seats fully on the Escapement Wheel Tooth. Tighten both Rocker Pivot Screw Lock Nuts when the adjustment has been accomplished.

   [3] Stationary Dog: The Stationary Dog is attached to the Rocker Frame by two binding screws in the oval slotted section of the frame. The face of the Stationary Dog should not be worn or mutilated. Clearance between the Lip of the Stationary Dog tooth edge and the Loose Dog tooth edge should be $.036$” or the thickness of the Back Space Plate. This
clearance is governed by the thickness of the Stationary Dog Shim located between the dog and the Rocker Frame. The standard thickness of this shim is .025. The bottom edge of the Stationary Dog Lip should lie at the highest possible position on the top edge of the Rocker Frame. Binding screws should be tight.

[4] **Limit Screws:** The Upper Limit Screw adjusts the position of the edge of the Loose Dog in its relation to the edge of the Escapement Wheel tooth, which should be flush. The Lower Limit Screw limits the movement of the top of the Rocker which should be adjusted to prevent the Escapement Wheel tooth from rubbing on the body of the Stationary Dog. Holding a typebar against the Platen with the fingers there must be a minimum of extra play in the Rocker, otherwise a strain upon the tooth of the Lower Universal Bar will throw the Escapement Trip out of adjustment. The Rocker Limit Plate is attached to the Top Plate casting extensions, which also hold the Escapement Rocker. Rocker Limit Plate binding screws should be tight.

[5] **Dog Link:** The Dog Link should be formed, if necessary, to limit the movement of the Loose Dog and act as a Shock Absorber.

[6] **Rocker Spring:** Older model Woodstock Typewriters utilize a compression spring placed beneath the lower Limit Screw. Woodstock Typewriters above 580,000 serial utilize Rocker Spring shown in drawing. If disconnected it may cause skipping or piling. Manufacturer’s Spring provides the proper tension. To increase the spring tension will increase [make heavier] the touch and to lengthen the spring will cause sloppy action of the Rocker.

[7] **Back Lash Pawl:** [See Back Spacer] The Back Lash Pawl should be positioned so that it does not catch on the edge of the Escapement wheel tooth but slips under each tooth as it passes. It functions in connection with the Back Spacer and instructions for its adjustments are covered in that section.

3. **ESCAPEMENT TROUBLES:**
   a. **SKIPPING, PILING AND CROWDING:**
   Check contributing causes on Foreword sheet of Escapement Section. Determine that Universal Bar Spring Plate positioned properly on Frame Stud; face of loose Dog positioned FULLY FLUSH on face of Starwheel tooth and edge of Loose Dog is flush with edge of Starwheel Tooth. Reduce end shake in Escapement Rocker to minimum without binding. Holding Typebar firmly to Platen by depressing Keylever, determine that there is minimum additional movement of the Rocker. Make same test with Space Bar depressed. Check Escapement Rocker Spring. Eliminate end shake in Lower U-Bar by adjusting Pivot Screws, securing snug fit without binding. Set Escapement [while holding Typebar to the Platen with the fingers] to trip when Typehead is 3/8” from Platen. If these adjustments do not correct skipping, reduce clearance between Stationery Dog and Loose Dog by placing thinner shim between Stationery Dog and Rocker Frame. If adjustments do not correct piling or crowding, check following:

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L. C. SMITH 1. The Escapement Action in the L. C. Smith typewriter is motivated when the Keylever is depressed by the action of the Sublever upper extension moving back [rearward] to contact the Universal Bar [which is securely attached to the lower extremity of the Escapement Rocker]. As the Universal Bar moves rearward the top of the Escapement Rocker moves forward, disengaging the Loose Dog from position on the Starwheel tooth. The Rigid Dog serves as a safety valve to limit escapement to one space in the rack when the Keylever or Space Bar is held depressed. As indicated in the drawing, whenever the Universal Bar is motivated [by the Keylever or the Space Bar] the Escapement Rocker moves the ribbon up into position to cover the type.

The Pinion Wheel is permanently attached to the Escapement Wheel in the L. C. Smith and does not utilize a Pinion Pawl for releasing the Pinion when the Carriage is moved to the right. Instead, the Loose Dog acts as a wheel pawl in permitting the Starwheel to move backward as the Carriage moves to the right.

When the Carriage Release Lever is depressed, the Carriage Release Bellcrank contacts the Roller on the Carriage Release Bar, moving the Release Bar downward to engage the Wheel Release Bellcrank roller, which, through the Wheel Release Bellcrank, depresses the Escapement Loose Dog disengaging it from contact with the Escapement Wheel tooth, permitting free movement of the Carriage.

When the Tabulator Bar is depressed, the Tabulator Mechanism, working through the Wheel Release Bellcrank, depresses the Escapement Loose Dog, disengaging it from contact with the Escapement Wheel tooth permitting free movement of the carriage subject to braking of the Main Spring Drum by the Tabulator Brake Bell Crank [See Mainspring and Drawband explanation].

2. ADJUSTMENTS: Before attempting adjustments refer to the Foreword Sheet of this Section.

a. Escapement Trip:


2. The Escapement Trip should take place when a typebar, held by the fingers, is approximately 3/4" from the Platen. Adjustment may be made with Trip Adjusting Nuts [2]. Loosening Nut on the left, and coming in [turning clockwise] Adjusting Nut on the right will cause the Escapement Trip to take place when the Typebar is closer to the Platen. Loosening Nut on the right and coming in [turn clockwise] Adjusting Nut on the left will cause the Escapement Trip to take place when the Typebar is farther away from the Platen. Tighten opposite Nut when adjustment has been made.

3. Universal Bar Pick-up [by the Sublever] should take place when typebar is 1-3/8" from the Platen on Super-Speed models and 1-5/8" from the Platen on Model No. 8. As this adjustment affects the Ribbon Shifting Mechanism it is necessary to alter adjustment slightly to permit of the Ribbon Bi-chrome Lever operating properly. Adjustment of the Pick-up is made with U-Bar Pick-up Adjusting Screw, after loosening Lock Nut.

4. Limit Screw: The rocker Limit Screw may be adjusted, after Trip and Pick-up Adjustments have been made, to permit of approximately 1/8" additional movement in the Rocker while holding a typebar to the Platen with the fingers. Adjustment may be made with Rocker Limit Screw after loosening Lock Nut.

   a. Individual Trip Adjustment:
   1. Where individual trip on a single typebar is not uniform with the balance of the Typebars, trip on that Typebar may be adjusted by peening or filing [whichever is necessary] Universal Bar contact point on that Sub-lever. [See Universal Bar].
   2. Where trip on Keylevers at either end of Keyboard is not uniform with trip on the other end, the Universal Bar is not positioned parallel with the row of Sub-levers. Adjustment may be made, after loosening U-Bar Bracket Binding Screws, by positioning U-Bar Bracket properly. Tighten Bracket Binding Screws when adjustment is made.

   c. Escapement Rocker:
   1. Removal and Replacement: To remove: disconnect Ribbon Pulley Arm and remove Escapement Connecting Screw on Universal Bar. Loosen Right hand Rocker Pivot Screw Nut [Facing machine from the rear] and back out Pivot Screw. Rocker may be removed to the right and out. Carriage should be positioned at the extreme left in removing and replacing the Escapement Rocker. To replace Rocker, reverse above procedure.

   2. Escapement Assembly: [To Disassemble or Assemble, See Top Drawing]
   a. Escapement Loose Dog must be free on its pivot [to move up and down] and Loose Dog Spring must provide sufficient tension to return Loose Dog into Escapement Tooth contact position. Loose Dog must be checked for wear and if worn be replaced, otherwise skipping will result. Felt Pads in Escapement Assembly must be replaced if beaten thin or deteriorated with cleaning fluid. The Loose Dog Coil Spring [positioned behind Loose Dog] in the Escapement Assembly for quietness] must have proper tension. The face of the Loose Dog should position fully and flush with the face of the Escapement Wheel Tooth. Adjustment may be made by positioning the Escapement Rocker on its Pivots [moving rocker to left or right as may be necessary]. The Loose Dog should be positioned approximately three-fourths on Escapement Wheel Tooth. Adjustment is made with Rocker Limit Screw.
b. **Loose Dog Holder Stud** which limits upward movement of the Loose Dog, if worn will permit Loose Dog to move upward too high. Stud may be turned around on Holder to position round side to Dog which will permit proper limiting of the Loose Dog.

[3] **Stationary (Rigid) Dog** must be in good condition. If worn, it must be replaced, otherwise skipping may result. The Rigid Dog Felt Pad, if thinned or deteriorated with cleaning fluid must be replaced. The Rigid Dog Coil Spring, provided for quietness, must provide sufficient tension.

[4] **Rocker Spring** must provide sufficient tension to return Rocker to normal position after escapement trip and as it functions to return Ribbon Vibrator and Universal Bar to inactive position, sufficient tension should be provided to perform these functions without causing a drag of the Rocker in returning. Adjustment may be made with Rocker Tension Adjusting Screw, after loosening Lock Nut.

[5] **Keyboard Fulcrum Bracket** (rear end of Keylevers), if bent or deformed, the Keyboard will be uneven. Bracket may be formed forward or rearward to true, permitting of level keyboard.

[6] **Keylever Tension**, which is adjusted with Keylever Tension Spring Adjusting Screw, should be uniform across the Keyboard, except slightly less on keys controlled by the little finger, and when weighed by a 2 ounce weight, with touch control set at zero, should lift the typebar to contact position of the Sub-lever with the Universal Bar [1-7/8" from Platen on Super-Speed Models, 1-5/8" from Platen on Late Model No. 8].
1. The Space Bar Trip on Remington No. 17 is caused by contact of the Space Key Push Link Roll engaging the Escapement Arm, as the Space Bar is depressed, tripping the Escapement Rocker to disengage the Loose Dog from contact with the Starwheel tooth.

2. ADJUSTMENTS:

a. Space Bar, in normal inactive position, bottom of the Space Bar should be even with the top of the front frame [center of the Space Bar]. Adjustment is made by forming the Space Bar Up-Stop. When depressed, the top of the Space Bar should be level with the front frame corner, adjustment being made with Space Bar Down Stop Assembly [screw and nut].

b. The Space Bar Shaft should fit snug on its pivots without binding or excess end shake and should be centered properly. Shaft Pivot Screw and Nut [both sides of machine] may be adjusted to provide proper centering and fitting.

c. Push Link should be adjusted with the Push Link Adjusting Guide, to position the Space Key Push Link Roll near the front end of the Escapement Arm.

d. Space Key Push Link Roll should be positioned clear of contact with the Escapement Arm. Adjustment is made with the Push Link Eccentric.

e. The Space Bar Trip, adjusted by the Push Link Eccentric, should be set so that the Trip will take place when the Space Bar is within \( \frac{3}{16} \) of its Down Stop. If Push Link Eccentric does not afford enough adjustment, Space Key Shaft Rear Arm may be formed by mauling top edge of Arm just behind Shaft for lowering; mauling bottom edge of Arm just behind Shaft for raising.

f. Line Lock Pawl Eccentrics should be adjusted to position Space Bar Line Lock Arms in proper engagement with the Line Lock Bail when right Margin Stop locks the Key levers. Determine that both sets of Screws are tight to prevent noisy Space Bar operation.

g. To Remove Space Mechanism, place type writer on its back. Remove Frame Side Support [cross bar]; loosen Shaft Pivot Lock Nuts to disengage Shaft. Disconnect Push Link Screw and Push Link Eccentric to disengage Push Link. Disconnect Space Key Spring. Space Mechanism may be moved down, to disengage Space Bar from Space Bar Stop, and out. To replace, reverse procedure, adjusting Push Link Eccentric properly.
1. Depression of Space Bar, causes Space Keylever Rear Extension to pull Space Bar Link and outer extension of Space Bar Trip Arm forward, causing the Space Bar Trip Arm to contact and move the top of the Escapement Rocker rearward disengaging the Loose Dog from contact with the Starwheel tooth to cause the trip escapement.

2. ADJUSTMENTS:
   a. **Space Bar Trip**: The Space Bar Link Adjusting Nut controls the Space Bar trip by controlling throw of the Space Bar Trip Arm. In normal inactive position there should be approximately .005 to .010 clearance between Space Bar Trip Arm and Escapement Rocker at point of contact. If clearance is less, Space Bar Trip Arm will prevent Rocker from returning to front Rocker Limit Plate. To adjust, disconnect Space Bar Link from outer extension of Space Bar Trip Arm Frame, loosen Space Bar Link Adjusting Nut, and turning Link clockwise will move Space Bar Trip Arm closer to Escapement Rocker; counter-clockwise will move Space Bar Trip Arm away from Escapement Rocker.

   b. **Space Bar Link** should be adjusted to permit of ⅛" additional downward movement in the Space Bar after escapement trip and before Space Bar contacts the Space Bar Stop. Tighten Space Bar Link Adjusting Nut when adjustment has been made.

   c. **Space Bar Keylever** must operate freely in Keylever Comb and Keylever Segment. Space Bar Spring must have sufficient tension to return Space Bar mechanism to normal position after escapement. Space Bar Trip Arm must be free on its pivots.

   d. **Space Bar Stop Bracket** is provided with elongated slots for up and down adjustment of Stops. Adjustment of Space Bar Link requires adjustment of Space Bar Stop Bracket to permit of ⅛" additional downward movement of Space Bar after trip has taken place.

   e. **Space Bar Spring** should provide sufficient tension to return Space Bar mechanism to inactive position.

   f. **To Remove and Replace**: The Space Bar may be removed from Space Bar Levers by turning machine on its back and removing Space Bar Binding Screws. Space Bar Levers may be removed by backing out Keylever Fulcrum Rod [using follow-up rod], disconnecting Space Bar Link from Space Bar Trip Arm, levers may be dropped down and out of machine. To Replace, reverse above procedure.
1. Depression of the Space Bar causes Space Bar Adjusting Lever to contact Rocker Arm Extension, which in turn trips the Escapement Rocker causing the Trip Escapement.

2. ADJUSTMENTS:

   a. Space Bar Trip: The Space Bar Adjusting Lever controls the Space Bar trip by controlling the tripping of the Rocker Arm Extension. In normal inactive position there should be approximately .010" to .020" clearance between the end of the Space Bar Adjusting Lever and the bottom of the Rocker Arm Extension. Adjustment is made with Space Bar Adjusting Lever Adjusting Screw.

   b. Space Bar should be level and in normal position, the top of the Space Bar should be positioned about 1/8" below top of the lower bank of keys. Adjust by forming Space Bar Stops and Space Bar Levers.

   c. Space Bar Levers should be positioned properly between Keylevers and should clear all adjoining depressed Keylevers. Adjustment may be made by loosening Space Bar Screws [under Space Bar] moving Space Bar or by forming Space Levers.

   d. Space Bar Spring should provide sufficient tension to return Space Bar to normal position and to eliminate Space Bar vibration when a Keylever is depressed. Adjust by loosening Space Bar Spring Adjusting Collar Set Screw and turning collar to increase or decrease tension.

   e. To Remove Space Bar Mechanism: Disconnect Touch Adjustment Lever from Lever Collar by removing binding screws. Release tension on Space Bar Spring Adjusting Collar. Remove front frame Space Bar Stops attached to underside of front frame crossbar. Back out Space Shaft Fulcrum Screws [one on each side of frame-opposite Space Shalt]. Space Bar may now be dropped down, the right end swung toward the front slightly to disconnect Touch Adjusting Link, then Space Bar Adjusting Lever may be withdrawn from between Keylevers No. 21 and No. 22. To replace: Reverse above procedure.
1. Depression of the Space Bar pulls forward the Space Wire, which draws the lower extension of the Escapement Rocker forward, disengaging the Loose Dog from the Escapement Wheel Tooth and causing the escapement trip.

2. ADJUSTMENTS:
   a. **Space Bar Trip:** The Space Arm Collar controls the Space Bar trip by controlling the trip of the Escapement Rocker as caused by the Space Wire. To adjust, hold the lower extension of the Escapement Dog Rocker in its extreme forward position; loosen the two Space Bar Trip Adjusting Screws, pulling the Space Arm back toward the front of machine until all lost motion between the Link and Escapement Dog Rocker is taken up without straining Space Wire. Tighten the two Trip Adjusting Screws.

   b. **Space Bar** should be level with Space Lever Frame contacting Space Bar Stop. Space Bar Levers should be parallel. Space Bar Levers may be formed to parallel, if necessary, by use of Peening Pliers.

   c. **Space Bar Stops:** Space Bar Stop Bracket should be adjusted up or down to permit approximately \(\frac{1}{4}\)" downward movement of Space Bar before Space Wire contacts the Dog Rocker. After Escapement Trip has taken place, there should be approximately \(\frac{1}{4}\)" to \(\frac{1}{2}\)" further downward movement of Space Bar before it contacts the Stop. Adjust by forming Space Bar Stop Bracket up or down as may be necessary.

   d. **Space Bar Spring:** At the left end of the Space Lever Rod, an adjustable Spring Bracket is attached to the Space Bar Rod. Tension of Space Bar Spring may be increased, after loosening Spring Adjusting Screws by moving the left end of the Bracket up or down as may be necessary. Tighten Adjusting Screws when tension adjustment secured.

   e. **Space Bar Assembly:** To remove, disconnect Space Wire by backing out Space Bar Trip Adjusting Screws and moving Space Arm toward back of machine. Disconnect Space Wire from its position on Escapement Rocker Space Wire Stud. Disconnect Space Bar Spring. Remove Space Pivot Screws from outside of frame, both sides, being careful not to lose Space Bar Rod Washer. Space Bar Assembly may be removed as Space Arm is withdrawn from between Keylevers No. 25 and No. 26. To replace, reverse above procedure.

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WOODSTOCK ESCAPEMENT ACTION

Continued From Page 81

[1] Escapement trip too close to the Platen or no trip.

[2] Rocker binding on Trip Adjusting Sleeve or Space Bar Wire.

[3] Lower Universal Bar binding on Pivot or Pivot improperly seated.

[4] The Stationary Dog and Loose Dog have insufficient clearance, in which event, Dogs may be spread apart by installing thicker shim between the Stationary Dog and the Rocker Frame or the two Dogs may be pried apart slightly with a screwdriver.

e. **SHADOWING:** Older model Woodstock Typewriters are equipped with a Rocker Arm Rebound Spring with adjustable Screw located under the Top Plate rear, center of machine. Later model Woodstock Typewriters depend upon a Typebar Rebound Spring, attached to the Segment directly below the type guide. Tension may be increased by bending the top of the spring out, away from, the guide to provide greater resistance against the typebar. Increasing Keylever tension by keylever adjusting screws will cause quicker kick back of the typebar.
1. Depression of Space Bar motivates Universal Bar rearward, through connection of the Space Bar Link, causing the Trip Escapement.

2. ADJUSTMENTS: Space Bar Trip Adjustment should be made after Escapement Trip and Pick-up Adjustments have been perfected.

   a. Space Bar Trip: The Space Bar Trip Adjusting Screw, connecting the Space Bar Link to the Escapement Universal Bar, controls the tripping of the Escapement Rocker. The Space Bar should be adjusted to permit of \( \frac{1}{2} \)" downward movement before picking up the U-Bar and \( \frac{1}{8} \)" further downward travel after U-Bar Trip is completed. Adjustment is made after loosening Space Bar Trip Adjusting Screws [on each side of U-Bar] by moving Adjusting Arm up or down as may be necessary. Adjusting Arms should be positioned parallel with each other. Tighten Space Bar Trip Adjusting Screws and test U-Bar trip.

   b. Space Bar should be level and in normal position Space Levers should be parallel and both Space Bar Up-Stop Brackets should contact Up-Stop. Space Levers may be peened to parallel.

   c. Space Bar Springs should provide sufficient tension to return Space Bar to Up-Stop position after operation. Adjustment is made with Space Lever Spring Adjusting Screws.

   d. To Remove Space Bar Mechanism, release Space Bar Links from Space Keylevers at Connections. Remove Space Lever Spring Adjusting Screws. Space Levers may be disengaged from Keylever Fulcrum and Space mechanism removed. To Replace, reverse above procedure.
FOREWORD

1. It is the function of this mechanism to provide for step-by-step feeding of the ribbon across [back and forth] in front of the Platen providing a new section of ribbon for printing each character in order to maintain a uniform impression. Automatic Reverse mechanism is provided so that as the ribbon runs off a spool the direction of flow may be automatically reversed.

2. The human element is responsible for a majority of Ribbon Feed and Reverse Troubles, caused by improper installation of Ribbon Spools or improper feeding direction of the Ribbon. Today, all typewriter ribbons are 5/8 inch in width; however, Ribbon Spools are different for each make of typewriter and unless that manufacturer’s spool is used trouble will ensue.

The following contributing causes of Ribbon Trouble are listed with suggestion that they be checked before attempting mechanical adjustments:

a. Proper Spool not used. Use manufacturer’s spool for each make of machine. An Underwood Spool will not work on a Royal, etc. Fibre Spools [a wartime measure] will not work satisfactorily on typewriters and their use will cause Ribbon Feed Troubles.

b. An Underwood Ribbon will not work on any other typewriter unless the eyelets in either end of the ribbon are first removed.

c. A Remington, Royal, Smith or Woodstock Ribbon will not work on an Underwood Typewriter unless reverse eyelets are inserted at a point at least four inches in from each end of the ribbon.

d. Ribbon must be fed properly through the Ribbon Guide and must be directioned properly off the Ribbon Spool [from the front—not from the rear of spool]. See Drawing above.

e. Ribbon Spool Shafts must be free—not sluggish or binding.

f. Ribbon Spool must be properly installed on Spool Shaft.

g. Typebar Covers must clear the Ribbon Spools.
REMINGTON 1. The Spring Drum of the Remington No. 17 provides the motive power to the Ribbon Feed mechanism in typing [not while Tabulating], carriage returned to the right or carriage moved to the left by depression of the Carriage Release Lever] through the Drum Gear Mesh with the Spring Drum Pinion. The Spring Drum Pinion transmits this motion to the Pinion Shaft and the Ribbon Driving Gear Pinion which is enmeshed with the Ribbon Drive Gear. The Drive Shaft Arm of the Ribbon Drive Shaft Rod straddles the Ribbon Drive Gear Stud thereby transmitting the motion of the Ribbon Drive Gear and Spring Drum Pinion to the Ribbon Drive Shaft Rod, regardless of direction the ribbon is feeding. Horizontal movement of the Ribbon Drive Shaft Rod [RIBBON REVERSE] to engage the Left or Right Ribbon Driving Gear into mesh with the Left or Right Ribbon Spool Shaft Pinion is caused when the ribbon runs off one spool, by Ribbon Reverse Plunger dropping down [as the Ribbon Reverse Trigger moves out of the hub of the empty spool] to engage the Ribbon Reverse Cam. As the Ribbon Drive Shaft Rod rotates continuously in one direction only, in typing [carriage moving to the left] the position of the Ribbon Reverse Plunger in the Ribbon Reverse Cam forces the Ribbon Drive Shaft Rod to move to the right or left [depending upon which spool is empty] to engage the Ribbon Driving Gear on that side with the Ribbon Spool Shaft Pinion. The Ribbon Reverse Detent Plate mechanism holds the Ribbon Drive Shaft Rod engaged in that position until such time as the opposite spool unwinds causing reverse in the opposite direction.

In Tabulating or when Carriage is moved by depression of the Carriage Release Lever, the Carriage Release Blade through the Ribbon Throwing Screw [See Tabulator] and Pinion Release Bell Crank causes the Spring Drum Pinion Support Bracket to move the Spring Drum Pinion out of engagement with the Drum Gear permitting the Ribbon Feed Mechanism to remain idle.

When the Carriage is returned to the right with the Line Space Lever, the Ribbon Drive Pawl on the Pinion Shaft permits the Spring Drum Pinion to move backward with the Drum Gear without transmitting this motion to the Pinion Shaft.

2. ADJUSTMENTS: Before attempting adjustments, refer to Foreword Sheet of this Section.

_a. Ribbon Feed:_

[1] _Spring Drum Pinion:_ Determine that Spring Drum Pinion is meshing properly in Drum Gear. If the Spring Drum Pinion Support Adjusting Screw is preventing proper mesh of gears, it can be adjusted to position Pinion in Drum Gear properly. If the Pinion Release Bellcrank Link [which functions to move the Pinion out of mesh with Drum Gear in Tabulating] is preventing Spring Drum Pinion Support from proper contact with Support Adjusting Screw, adjustment may be made with ribbon Re-lease Bellcrank Eccentric. If this adjustment does not provide proper release, it will be necessary to remove the Carriage to make adjustment of the Ribbon Throw-out Screw [See Tabulator] which should be adjusted so that screw end just clears the top of lip which it operates. After adjusting, it may be necessary to readjust the Pinion Release Bellcrank Eccentric.

_2_ _Spring Drum Pinion Support Spring must be attached and provide sufficient tension to hold Spring Drum Pinion engaged in the Drum Gear.

_3_ _Spring Drum Pinion Drive Pawl Binding Screws must be tight positioning pinion for proper engagement with Drum Gear.

_4_ _Ribbon Driving Gear Pinion must be engaged properly with Ribbon Drive Gear, and Spring Drum Pinion Shaft Support Screws must be tight. Engagement of Driving Gear Pinion with Ribbon Drive Gear is made with the Spring Drum Pinion Shaft Support Screws.

_5_ _Ribbon Drive Shaft Arm must straddle Ribbon Drive Gear Stud properly [See Cover Plates].

_6_ _Ribbon Spool Shafts, right and left, must be free in their bearings and there must be .008" clearance between the top of the Ribbon Spool Shaft Space Collar and the bottom of Spool Shaft Bracket, point indicated in top drawing. Adjustment may be made, after loosening Spool Shaft Tension Spring Collar Set Screws and Ribbon Spool Shaft Pinion Set Screws. Using a .008" gauge set between the top of Ribbon Spool Shaft Space Collar and bottom of Spool Shaft Bracket, push down Ribbon Spool Shaft as you raise the Spool Shaft Pinion. Tighten Pinion Set Screws. Tighten Ribbon Spool Shaft Space Collar Set Screws, after determining that sufficient tension is provided to support the weight of full ribbon spool and winding disc.

_7_ _Ribbon Spool Shaft Pinion must mesh properly with Ribbon Driving Gear; left and right. Adjustment is made, after loosening Ribbon Driving Gear Set Screws, by positioning Ribbon Driving Gear properly. Tighten Set screws when adjustment has been made. NOTE: Ribbon Spool Shafts, left and right, are not interchangeable.

_b. Ribbon Reverse:_

[1] As the Ribbon unwinds completely from a spool, the Ribbon Reverse Tripping Lever on the Spool Shaft rises and the Ribbon Reverse Plunger drops down in position for its end to contact the Ribbon Reverse Cam on the Ribbon Drive Shaft Rod. The Cam points [left and right] must face each other on the Drive Shaft Rod with high point up on one side, down on the other. Rotation action of the Ribbon Drive Shaft Rod, with the Plunger contacting the Reverse Cam, causes horizontal movement of the Rod in the direction of the empty spool. The Detent Toggle [Ribbon Reverse Detent] will reverse its position with movement of the Rod.

_2_ _Ribbon Reverse Detent Stud must be engaged in R. H. Ribbon Driving Gear Slot properly, and Ribbon Reverse Detent Pin should be positioned to engage Ribbon Driving Gear enmesh with R. H. Ribbon Spool Shaft Pinion._
REMINGTON RIBBON FEED—Con’t. From Page 90
To adjust, loosen Plate Set Screws and R. H. and L. H. Ribbon Driving Gear Set Screw. Set Detent Toggle as indicated in lower drawing with Detent Stud engaged in Driving Gear Slot. Move Ribbon Reverse Detent Plate until R. H. Ribbon Driving Gear meshes correctly with R. H. Ribbon Spool Shaft Pinion. Check Ribbon Spool Shaft Pinion to determine that it meshes all around with the Right Hand Ribbon Driving Gear with proper fitting and minimum amount of play. Tighten Plate Set Screws, being careful that Stud is positioned in slot of Driving Gear. Tighten R. H. Ribbon Driving Gear Set Screw after sliding Drive Shaft Rod to the extreme right. Set Detent Toggle to the front as shown in upper drawing. Raise Ribbon Drive Shaft Shift Lever and set Left Ribbon Driving Gear in correct mesh with L. H. Ribbon Spool Shaft Pinion, then tighten L. H. Ribbon Spool Shaft Pinion Set Screws.
ROYAL

1. The Spring Drum of the Royal provides the motive power to the Ribbon Feed mechanism whenever the Carriage moves to the left, through the Worm Shaft Pinion engagement emmesh with the Drum Gear. The Worm Shaft Pinion consists of dual sized Pinions, a large and a small Pinion Gear firmly affixed. The Worm Shaft Pinion has free bearing on the Worm Shaft Connecting Rod, subject to the Large Pinion engagement emmesh with the Spring Drum Gear and the small Pinion seating the Pinion Case Pawl. The Pinion Case Pawl Pivot on the Pinion Case. The Pinion Case is affixed to the Worm Shaft. Positioning of the Pinion Case Pawl in the small Pinion forces the Pinion Case Pawl to turn with the Pinions, carriage moving to the left. Only when the Pinion Case is rotated does the Worm Shaft turn. When the Carriage is returned to the right, the Pinion Pawl in the Pinion Case permits the Pinion to back up with the Main Spring Drum Gear without transmitting this motion to the Pinion Case. When the Carriage is moving to the left, the Pinion Case Pawl forces the Pinion Case and the Worm Shaft to turn. The Worm Shaft is rotated clockwise, turning the Worm Gear which is engaged either with the Left Ribbon Spool [Spur] Gear when the ribbon feeds onto the Left Spool or the Idler Gear when the ribbon feeds onto the Right Spool.

The main illustration pictures the ribbon mechanism feeding the Left Ribbon Spool Shaft by positioning the Worm Gear emmesh with the Left Ribbon Spool [Spur] Gear. The lower illustration pictures the Worm Gear emmesh with the Idler Gear which causes the ribbon to feed onto the R.H. Ribbon Spool Shaft.

As the ribbon unwinds from the Right Hand Spool, as indicated in the main illustration, the Automatic Ribbon Spool Trip falls away from the Ribbon Spool Hub when the ribbon is unwound. The lower arm of the Ribbon Spool Trip [located on the underside of the Ribbon Spool], contacts the Automatic Reverse Arm in this action, pushing the Automatic Reverse Arm rearward. As will be noted in the illustration the Automatic Reverse Arm [right] is affixed to the Automatic Reverse Shaft by the Automatic Reverse Shaft Arm Set Screw. The Left Hand Automatic Reverse Arm is affixed to the left end of the Automatic Reverse Shaft in the same manner. As the Automatic Reverse Arm [right] is moved rearward by the Ribbon Spool Trip, the Left Hand Reverse Arm is moved rearward at the same time. In this movement the Automatic Reverse Roll [Right] is moved down into contact position with the Reverse Cam which is rotated by the Worm Shaft. As either end of the Cam contacts the Automatic Reverse Roll [right], the Shaft and Worm Gear is moved downward, out of engagement with the Ribbon Spool [Spur] Gear and into mesh with the Idler Gear, causing the ribbon to wind on the Right Hand Ribbon Spool.

As the ribbon unwinds from the Left Hand Spool, as indicated in the lower illustration, the Automatic Ribbon Spool Trip contacts the Automatic Reverse Arm, Left which governs the position of the lower Automatic Reverse Roll [left]. As the Reverse Arm moves rearward the Automatic Reverse Roll [left] moves into position below the Reverse Cam. As the Cam contacts the Automatic Reverse Roll [left], the Shaft and Worm Gear is moved upward, out of engagement with the Idler Gear and into mesh with the Ribbon Spool [Spur] Gear. Movement of the Worm Gear and Worm Shaft is controlled by the Reverse Arm Extension Limits.

As one spool [right or left] is always engaged in Gear mesh, both spools may be freed for manual winding of the ribbon by holding the Ribbon Feed Release Handle in neutral position [by moving the Ribbon Feed Release Handle to the left, toward the Ribbon Reverse Handle]. This action places the Worm Gear in neutral position [out of contact with both the Ribbon Spool Gear and the Idler Gear, permitting free manual movement of both ribbon spools.

2. ADJUSTMENTS: Before attempting Ribbon Feed Adjustment, check common causes of Ribbon Feed Trouble listed on the Foreword sheet of this section.

a. **Ribbon Feed:**

   [1] Gear: All Gear Set Screws must be tight and gears must mesh properly, adjustments being made after loosening Gear Set Screws by positioning Gears properly, tightening Set Screws when properly adjusted.

   [2] **Worm Shaft Pinion Assembly** consist of two united Pinions, bearing free on the Worm Shaft Connecting Rod. The outer [larger] Pinion must mesh properly in Spring Barrel Gear while the smaller, into which the Case Pinion Pawl seats, must seat the Pinion Pawl properly and Worm Shaft Spring must hold Pawl so engaged. [See center inset].

   [3] **Ribbon Spool Shafts** must be free and Ribbon Spool Shaft Tension Springs should provide just enough tension to create a slight drag on the Shaft to prevent free movement of the Ribbon. Tension adjustment is made by positioning Tension Spring Collars after loosening Collar Binding Screws. Spool Shaft Gears must be clear of bottom of Ribbon Spool Brackets. Adjustment is made after loosening Set Screws by positioning gears properly.

   [4] **Type Bar Cover [Cowl]** must provide sufficient clearance with Ribbon Spools to prevent binding. Stops located inside front edge of cover [See Cover Plates] may be formed down to provide this clearance.

b. **Ribbon Reverse:**

   [1] **Ribbon Reverse Handle**, which is connected to the Ribbon Reverse Arm, should be positioned so that when Ribbon Feed Release Handle is moved to the left, Reverse Arm will hold the Worm Shaft and Worm Gear in neutral position between the Ribbon Spool [Spur] Gear and the Idler Gear. Adjustment is made, after loosening Ribbon Reverse Handle Set Screws by adjusting position of Handle.

   [2] **Reverse Arm Extension Limits** which limit the position of Worm Gear in engagement [mesh] with Ribbon Spool [Spur] Gear and Idler Gear may be adjusted, by forming, to engage

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RIBBON FEED

UNDERWOOD 1. The Ribbon Feed on the Underwood No. 5 and No. 6 is motivated by the Escapement mechanism, through the Rocker Arm Extension contacting the Ribbon Feed Shaft Actuating Lever Stud. Movement of the Ribbon Feed Shaft Actuating Lever up and down by the Rocker Arm Extension when the Escapement is tripped [Keylevers or the Space Bar depressed, not while Tabulating or when Carriage Release Lever is depressed] actuates the Ribbon Feed Shaft to which the Ribbon Feed Pawl is attached. This up and down movement of the Ribbon Feed Pawl motivates the Ribbon Ratchet Wheel which transmits this motion to the Driving Shaft and to the Left or Right Ribbon Spool through engagement of the Left or Right Gear with the Ribbon Spool Shaft Gear.

The Ribbon Reverse Mechanism is controlled by the eyelet in either end of the Ribbon acting on the Ribbon Engaging Lever to move it around to contact and place the Ribbon Shifting Arm into engagement with the Shifting Arm Disc. Pressure of the Ribbon Shifting Arm against the Shifting Arm Disc forces the Disc outward moving the Driving Shaft to the right or left as the case may be. This action causes placement of the Driving Shaft Gear on the empty spool side to contact the Ribbon Spool Shaft Gear on that side, causing ribbon to feed on the empty spool.

2. ADJUSTMENTS: [Before attempting Ribbon Feed Adjustment, check common causes of Ribbon Feed Trouble listed on the Foreword sheet of this subject. Check also to determine that the ribbon is positioned properly in the slots of the Ribbon Engaging Levers and that eyelets are located in both ends of the Ribbon.]

a. Ribbon Feed:

[1] Ribbon Feed Shaft Actuating Lever must be properly positioned on the Ribbon Feed Shaft for engagement with the Rocker Arm Extension and Actuating Lever Collar Screw must be tight.

[2] Ribbon Feed Shaft must have a small amount of end shake. Adjustment is made with Ribbon Feed Shaft Collar [left end of Shaft] after loosening Set Screw. Shaft must be free on its bearings.

[3] Ribbon Holding Pawl must engage teeth of the Ribbon Ratchet wheel firmly and Ribbon Holding Pawl Spring must be attached and provide sufficient tension to hold Holding Pawl in engagement with Ratchet Wheel Teeth.

[4] Ribbon Feed Pawl must engage teeth of the Ribbon Ratchet Wheel properly and there must be 3-3/4 tooth spacing between the Ribbon Feed Pawl and the Ribbon Holding Pawl. Adjustment may be made by loosening Ribbon Feed Pawl Binding Screw and positioning the two Pawls, being sure that the Holding Pawl positions properly on the Ratchet Wheel. Tighten Binding Screw when adjustment is made.

[5] Ribbon Spool Shafts must be free on their bearings with a very little up and down movement. Adjustment may be made, after loosening Spool Shaft Collar Set Screws, by positioning Spool Shaft Collar to permit of this minimum play. Tighten Set Screws when adjustment has been made.

[6] Ribbon Spool Shaft Gears, located at the lower extremity of the Ribbon Spool Shafts, should be positioned flush with the bottom of the Shaft. Adjustment may be made, after loosening Spool Shaft Gear Set Screws, by positioning Gears properly. Tighten Set Screws when adjustment has been made.

[7] Ribbon Driving Shaft Gears, when set in either right or left Spool Shaft Gear position, must mesh properly without binding. Adjustment may be made, after loosening Driving Shaft Gear Set Screws, by properly positioning Driving Shaft Gears. Tighten Set Screws when adjustment has been made.

[8] Ribbon Spool Guards [Cups], which pivot on Ribbon Spool Bracket Casting, for purpose of accessibility in replacing Spool and threading Ribbon through Ribbon Engaging Lever Slot, must be free on their bearings without unnecessary up and down play. Spool Guard Springs should be tensioned properly to return Spool Guards to proper position. Set Screws for positioning Ribbon Spool Guard Bushings in the Spool Guard are located directly below the Ribbon Spool Guard, front, in the Ribbon Spool Bracket Casting.

b. Ribbon Reverse:

[1] Ribbon Spool Shaft Springs should be adjusted by forming, to provide sufficient tension to force Ribbon Shift Arm Extension into teeth of the Ribbon Shifting Disc.

[2] Ribbon Shifting Arms should be adjusted to provide a very little up-down movement as indicated in drawing. Adjustment may be made, after loosening Ribbon Shifting Arm Set Screw, by positioning Ribbon Shifting Arm Bushing. Tighten Set Screw when adjustment has been made.

[3] Ribbon Shifting Arm Locks, which work in conjunction with the Ribbon Engaging Lever, must be free on their bearings and must seat fully in Ribbon Shifting Arm Slots. Adjustment may be made, after loosening Ribbon Shifting Arm Set Screws, by positioning Ribbon Shifting Arm Locks. Tighten Set Screws when adjustment has been made.

Clearance of approximately 1/8” between Ribbon Shifting Arms and Shifting Arm Disc [except when reversing] should be maintained. Adjust by forming Ribbon Shifting Arms.

[4] Ribbon Detent Collars should clear Ribbon Detent Lever by approximately 1/8” as indicated in drawing. Adjustment may be made, after loosening Ribbon Detent Collar Set Screws, by properly positioning Ribbon Detent Collar. Tighten Set Screws when adjustment has been made.
ROYAL RIBBON FEED
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Worm Gear properly without bottoming, Reverse Arm Spring which functions to hold Worm Gear in position, may be adjusted with its bracket Set Screws, to provide sufficient tension to maintain position of the Worm Gear, but should not be excessive.

[3] Automatic Reverse Arms must operate free and Reverse Arm Springs must provide proper tension to return Automatic Reverse Arm to Stop position, after operation, and return Reverse Rolls to clearance position with Reverse Cam. Forming of the Automatic Reverse Arm where contacted by Automatic Ribbon Spool Trip, should be such as to provide proper rearward movement of the Automatic Reverse Arm. Arc forming of the Reverse Arm may be formed to provide this contact. Automatic Reverse Arms may be adjusted with Automatic Reverse Shaft Arm Set Screws to provide synchronized movement of the two arms.

[4] Automatic Reverse Rolls [left and right] must be free on their Pivots and in inactive position should clear Reverse Cam by \( \frac{1}{4} \)". The Blade [contact position with Automatic Ribbon Spool Trip] may be formed slightly to provide positioning adjustment for Reverse Roll when in engaging position with Cam. The inactive position of the Reverse Rolls is governed by Reverse Arm Fixed Stops [not adjustable] and by the Automatic Reverse Shaft Arm Set Screw on right end of Automatic Reverse Shaft, which may be adjusted by loosening Set Screws.

If the Automatic Reverse Roll [left] is not positioned properly [Set too high] or if Reverse Arm Spring or Automatic Reverse Arm Spring are disconnected or provide insufficient or too much tension, there is a possibility that extended portion of the Reverse Cam may force Worm Gear against Ribbon Spool Gear during automatic ribbon reverse causing locked ribbon mechanism and disconnecting Carriage Drawband. Check tension and condition of both springs. Reverse Arm Roll may be formed downward to provide more clearance if necessary.

[5] Automatic Ribbon Spool Trip must be free on its pivot and Spool Trip Spring must provide sufficient tension to move the upper arm of the Trip out of Ribbon Spool Hub when ribbon unwinds completely.
WOODSTOCK 1. The Lower Universal Bar [Woodstocks above 485,000] provides the motive power to the Ribbon Feed Mechanism, being actuated by the depression of the Keylevers, rocking the Ribbon Feed Tube with the Ribbon Feed Wire. Models below 485,000 motivate the Ribbon Feed Tube with the Upper Universal Bar connected to the Tube in a similar manner. As the Ribbon Feed Tube is rocked [back and forth] the Ratchet Wheel Feed Pawl [on the side engaged] moves backward and forward, moving the Ratchet Wheel which motivates the Ribbon SPOOL SHAFT. The Ratchet Wheel Holding Pawl, which governs and controls the Feed Pawl, pivots on the Top Plate. As the Lower Universal Bar is motivated exclusively by the Keylevers, machines above 485,000, or the Upper Universal Bar on machines below 485,000, there is no movement of the ribbon when the Space Bar, Tabulator Key or Carriage Release Lever is depressed.

The Ribbon Reverse is governed by the action of the Reverse Trigger which is connected to the Ribbon Reverse Wire through the Ribbon Spool Shaft. As the Ribbon completely unwinds from the spool the Ribbon Reverse Trigger drops out of its position against the spool hub, lowering the Ribbon Reverse Wire and the Reverse Wire Collar as well as the Reverse Frame which is positioned on the Reverse Wire Collar. As the Reverse Frame drops downward, the Arm of the Reverse Frame which is positioned over the Reverse Link is moved rearward by the Reverse Link. The Reverse Lever, which is a part of the Reverse Frame Assembly is moved outward, drawing with it the Ribbon Reverse Rod [which is positioned in the Ribbon Feed Tube]. This action affects the opposite Ribbon Reverse Frame which disengages the Ribbon Feed and Holding Pawl from contact with the Feed Ratchet on the full spool side.

2. ADJUSTMENTS: Before attempting Ribbon Feed adjustment, check common causes of Ribbon Feed Trouble, Foreword Sheet of this Section.

a. Ribbon Feed.

[1] The Ribbon Reverse Trigger must be positioned properly in the square opening in the Ribbon Spool—See diagram—between the ribbon and the metal hub of the Spool. It cannot operate if it is between the folds of the ribbon. With the Ribbon Spool removed, the Ribbon Reverse Trigger must stand upright, being held in that position by the tension of the Ribbon Spool Catch Spring, so as to enter square opening in Ribbon Spool when reinstalled. The Spool Catch Spring is attached to the Ribbon Spool Shaft with the Ribbon Spool Spring Binding Screw. The Catch Spring must be positioned inside the Reverse Trigger rear arm and Binding Screw must be tight. Spring may be formed for tension, if necessary. With Spool removed, and by depressing the Spool Catch Spring, the Reverse Trigger should drop away from the Shaft of its own weight.


[3] The Ribbon Feed Pawl Collar must be positioned properly on the Ribbon Feed Tube. There is a definitely positioned hole drilled in the Tube on late model machines. Earlier model machines require adjusting the position of the Collar to provide proper movement of the Feed Pawl, both as to proper stroke of the Feed Pawl as well as engaging position with the Ratchet Wheel. Tighten Feed Pawl Collar Set Screw after adjusting. It will be noted in the drawing, that Collar binding Screws of all three collars face downward, which position is uniform on the late model machines and should be achieved on older machines.

[4] Feed Pawl Assembly: The Holding Pawl and Feed Pawl, if Collar is adjusted properly, should perform their functions properly. These Pawls cannot be formed. If broken they should be replaced. The Feed Pawl fits into the forming of the Holding Pawl [on older models a rivet held the two but permitted the Feed Pawl to move the new style Holding Pawl works on all models]. Ribbon Feed Pawl Spring must be attached to the arm of the Holding Pawl. On older models the Ribbon Feed Pawl Collar should be so adjusted that when the R. H. Ribbon Feed Pawl and Holding Pawl engage the R. H. Ribbon Feed Ratchet Wheel, the L. H. Ribbon Feed and Holding Pawl will be disengaged from the L. H. Ribbon Feed Ratchet and vice versa.

[5] The Ribbon Feed Wires [left, between Keylevers Nos. 6 and 7 and right, between Keylevers Nos. 36 and 37] actuate the Ribbon Feed Tube when the Keylevers are depressed moving the Lower Universal Bar downward. Stop Nuts attaching these Ribbon Feed wires to the Lower Universal Bar, are so adjusted to provide about 1/8" clearance between adjusting nuts and lower Universal Bar in inactive position. If wire is set too tight it will cause springing of the lower Universal Bar. DO NOT FORM OR ADJUST RIBBON FEED WIRES FOR RIBBON COVER OR FEEDING ADJUSTMENT.

b. Ribbon Reverse: Before attempting adjustment, determine that Ribbon Reverse Trigger is positioned properly in Ribbon Spool.

[1] The Ribbon Spool Catch Spring is a double action spring. When the Spool is in place on the Ribbon Spool Shaft, forming of the spool depresses the Ribbon Spool Catch Spring, permitting free untensioned movement of the Ribbon Reverse Trigger. When the spool is removed, the spring tension forces the Reverse Trigger into an upright position. The Spool Catch Spring Binding Screw should be tight and the Spring formed properly to hold the Trigger upright.

[2] The Ribbon Reverse Frames [with both Spools removed] must be held up approximately 1/8" above the turned up ends of the Ribbon Reverse Links. If both Ribbon Reverse Triggers are held in upright position by tension of the Spool Catch Springs, this clearance should automatically result. If Reverse Frame has been malformed, it should be straightened to provide this uniform clearance.

When the ribbon Spool on either side is emp-
ty, the end of the Reverse Frame on that side must rest on the Ribbon Reverse Link inside the curved up end. Adjustment is made by properly positioning Ribbon Reverse Link Collar on the Ribbon Feed Tube. Tighten Collar Set Screw when adjustment has been made.

3. **Ribbon Reverse Rod [in Ribbon Feed Tube]** must operate freely. Some wartime machines required the use of Steel Feed Tube which is subject to rust and corrosion inside. In event Reverse Rod is binding, Tube should be removed, thoroughly cleansed and lightly oiled. To remove Tube, loosen all Collar Set Screws and Reverse Lever Collar Set Screws. Pull Reverse Rod out of Tube. Disengage Collars from Tube as tube is removed.

c. **To Remove and Replace:**

1. **Ribbon Feed Pawl** may be removed for replacement, by loosening Ribbon Feed Pawl Collar Set Screw, which is accessible, facing machine from rear with cover plate removed, machine raised up from the rear. Remove Feed Pawl Pivot Screw and Nut. Disengage Ribbon Feed Pawl Spring. The Feed Pawl [not the Holding Pawl] may now be moved out of its position in the Holding Pawl, and replaced, if necessary. To remove the Holding Pawl, back out Holding Pawl Pivot Screw [which attaches Holding Pawl to the Top Plate]. To replace, reverse above procedure.

2. **Ribbon Spool Shaft**: Disengage Ratchet Wheel Feed Pawl from Ratchet Wheel on side to be dis-assembled, by manually reversing position of the Feed Pawls [push feed pawls in opposite direction]. Back out Feed Ratchet Lock Nut [holding the Ratchet Wheel by inserting a screwdriver through its spokes]. Back out Ribbon Feed Ratchet Wheel [while holding Ribbon Spool Shaft] until it falls loose from its threading. Raising the Spool Shaft up, back out the Ribbon Reverse Wire Collar Nut and Reverse Wire Collar. Lift the Spool Shaft out. The Feed Ratchet Lock Nut and Ratchet Wheel will fall loose. **To Remove Spool Cup**: With mechanism removed, back out Ribbon Spool Cup Stem Nut. Lift the cup up and out of locating pin on top plate.

To Replace, insert the Ribbon Spool Shaft in its bearing in the Top Plate. Replace Ribbon Spool Cup Stem nut [if previously removed]. Replace the Ribbon Feed Ratchet Wheel, setting it loosely on the Wire-do not screw it up. Replace the Feed Ratchet Lock Nut on Wire. Replace the Ribbon Reverse Wire Collar, lifting the Shaft up high enough to permit its being replaced while the Ribbon Reverse Frame Lever is being engaged in place. Wind up the Wire collar to its permanent position. Place the Ribbon Feed Ratchet Wheel on its threaded shaft and wind clockwise until it stops, then back off about one-half turn. Hold the Ribbon Feed Ratchet Wheel in this position while running up the Ribbon Feed Ratchet Lock Nut until it contacts the Ribbon Feed Ratchet Wheel. Tighten Ratchet Lock Nut while Holding Ratchet Wheel [using screwdriver between spokes of the Ratchet Wheel]. Test Ratchet Wheel for free movement. Replace Ribbon Reverse Wire Nut, running it up to the Ribbon Reverse Wire Collar, then tighten.
L. C. SMITH  1. The Spring Drum provides the motive power to the Ribbon Feed Mechanism when the Carriage is moving to the left through the action of the Feed Pawl on the Drive Ratchet which is transmitted to the Detent Ratchet through the friction brakeband between the two. The Ribbon Driving Gear is keyed to the Detent Ratchet and turns only when the Detent Ratchet is turned, which is limited to counter-clockwise movement as viewed in the drawing by the Check Pawl which prevents the Detent Ratchet from clockwise movement. When the Carriage is moved to the right, the Feed Pawl moves with the Drum, disengaging itself from the Drive Ratchet, which is held stationary by the friction brakeband between the two ratchets, the friction being applied by the Drive Friction Spring. In order that a complete understanding of this mechanism be had, it is recommended that the reader refer to Paragraph 1, L. C. Smith, Mainespring and Drawband.

The Reducing Gear, enmesh with the Main Shaft Gear, provides the motivation to the Main Shaft only when the Carriage is moving to the left. The mechanism up to the Spool Shaft Gear is always turning in the same direction. The position of the Reverse Shaft Gear is governed by the action of a Reverse Pawl on an empty spool, through the Ribbon Reverse Bellcrank connection. As the Ribbon unwinds from a spool, the top of the Reverse Pawl (in the spool) moves out away from the Spool Shaft into an opening in the spool, which permits the lower extension of the Pawl to engage the teeth of the Reverse Shaft Gear, while the movement of the Gear lifts the Reverse Shaft and Gear upwards to contact the Spool Shaft Gear on that side. Simultaneously, the Ribbon Reverse Bellcrank connection disengages the Reverse Shaft Gear from the Spool Shaft Gear on the other side.

2. ADJUSTMENTS: Before attempting Ribbon Feed or Reverse Adjustments, check common causes of Ribbon Feed Trouble, foreword sheet of this section. Check Type Bar Cover and Cover Springs to determine that they are not binding on Ribbon mechanism. Check Main Spring Ratchet Nut for tightness. Check Reducing Gear Bracket Binding Screws to Top Plate for tightness.

   a. Ribbon Feed: All moving parts must be free and all gears must mesh properly before attempting ribbon feed adjustments.

   [1] Drive Friction Spring must have enough tension to turn ribbon spool when a slight pressure is applied to top of Ribbon Spool. Adjustment may be made by unlocking [turn counter-clockwise] the outside Ribbon Drive Friction Adjusting Nut and turning in [clockwise] the inside Ribbon Drive Friction Adjusting Nut. Care must be taken not to set tension too strong, as the Drive Friction Spring also provides braking power to the Drum when tabulating. Too much tension will slow Carriage down.

   [2] Feed Pawl and Check Pawl must have clean cut edges in order to engage the teeth in the Detent and Drive Ratchet properly. The Check Pawl engages the teeth in the Detent Ratchet while the Ribbon Feed Pawl engages the teeth in the Drive Ratchet. The Feed Pawl and the Check Pawl must engage the teeth of their respective Ratchet centrally. Feed Pawl and Check Pawl Springs must be connected properly and provide sufficient tension to position the Pawls into the Ratchet teeth.

   [3] Reducing Gear must mesh properly in Drum Driving Pinion. If necessary, on Super Speed Model, Reducing Gear Bracket may be formed to provide proper mesh. On Model No. 8 the Bracket and Reducing Gear are not adjustable and if the Reducing Gear is worn excessively it should be replaced.

   [4] Reverse Shaft Gear must mesh securely with Ribbon Shaft Gear. Proper mesh of these gears may be accomplished by forming Reverse Shaft Limits. All Gear teeth must be straight. Bent Gear teeth will cause ribbon feed trouble and should be checked before attempting other adjustments.

   [5] Ribbon Spool Shafts should be free and Spool Shaft Spring should provide sufficient tension to support a full ribbon spool. Adjustment may be made by loosening Spool Shaft Gear Set Screw and properly positioning Spool Shaft Gear:

   b. Ribbon Reverse:

   [1] Reverse Pawl should move out of Shaft position to enter spool opening when Ribbon unwinds and lower extension of Reverse Pawl should engage Reverse Shaft Gear fully causing it to move up into position engagement with Ribbon Spool Shaft Gear. Model No. 8 machines have an eccentric washer under Ribbon Spool to limit Reverse Pawl engagement in Reverse Shaft Gear, while Super-Speed Models are limited by Ribbon Spool Bracket Frame Stop which may be formed to limit Reverse Pawl top properly while lower extension engages Reverse Shaft Gear properly. Caution: Reverse Pawl should not be permitted to limit too far from shaft, otherwise top of Reverse Pawl will bind in opening in Ribbon Spool, after the reverse has been accomplished.
[1] The Ribbon Lift Push Link, through its Stud, controls the raising of the Ribbon Actuator Arm and the Ribbon Guide. The Ribbon Lift Toggle Bellcrank Eccentric may be adjusted to increase or decrease the throw of the Ribbon Lift Push Link when the throw is insufficient on a majority of the typebars. Where ribbon throw is insufficient on individual typebars, the Keylever Finger contacted by that Keylever may be formed upward to raise, downward to lower. Forming of these fingers should be kept to a minimum, otherwise a springing Universal Bar will cause trouble.

[2] Ribbon Lift Push Link Stud position in Ribbon Actuator Arm Slot is controlled by the Ribbon Control Shaft and Control Lever. With the Ribbon Control Lever set in Stencil [white] position, the Stud should be centered directly below Vertical Slot opening in Ribbon Actuator Arm Slot and when Stud is moved upward [keylever depressed] the Stud should clear both sides of the Slot. Adjustment is made, after loosening Ribbon Control Shaft Arm Set Screws by moving Ribbon Control Shaft around to properly position. Tighten Shaft Arm Set Screws when adjustment is made.

[3] Ribbon Lift Toggle Bellcrank Eccentric: With the Ribbon Shift Lever set in top [blue] position, and Shift Lock depressed, capital letters should type in the center of the top half of the ribbon. Adjustment is made with Ribbon Lift Toggle Bellcrank Eccentric, after loosening Ribbon Lift Toggle Screw. To lower ribbon, turn Eccentric toward the front of machine; to raise ribbon, turn Eccentric toward the rear of machine. Tighten Ribbon Lift Toggle Screw when adjustment is made.

[4] Ribbon Control Lever: With the Ribbon Control Lever set in top [blue] position Ribbon Control Lever Stud should seat securely in Ribbon Control Lever Detent Spring. Ribbon Control Lever Lower Extension may be formed to provide this fitting. With the Ribbon Control Lever set in Red position, Ribbon Control Lever Stud should seat securely in Ribbon Control Lever Detent Spring. Ribbon Control Lever Upper Extension may be formed to provide this fitting.

[5] Actuator Arm must be free on its pivot and Pivot Screw must be tight. Ribbon Actuator Arm Stop is provided to prevent overthrow of the Ribbon when typing on the lower half [Red] with Shift Key locked. The top of Actuator Arm, with Shift Key Locked and a Keylever depressed should just clear the bottom of the Actuator Arm Stop. Adjust by forming Actuator Arm Stop.

[6] Ribbon Guide should operate freely on Typebar Guide and on its pivot on Ribbon Actuator Arm. The Ribbon Guide should not vibrate when the Ribbon Control Lever is moved. Such movement would indicate that one or more Keylever Fingers are improperly formed; Ribbon Lift Toggle Bellcrank Eccentric improperly adjusted permitting Universal Bar to contact inactive Keyleviers or Ribbon Lift Push Link Spring Clip is binding on the Toggle Bellcrank.

[7] Ribbon Universal Bar Spring provides the tension to return Ribbon Guide to inactive position and Universal Bar to inactive position. It should be connected properly.
ROYAL 1. The Ribbon Cover [Bichrome] mechanism of the typewriter governs the position of the Ribbon Guide and the Ribbon at the printing point, synchronized with the arrival of the typebar type. On the Royal typewriter, the Ribbon Cover is activated by the Vibrator Arm Lever on the Universal Bar contacting the Vibrator Link as the Universal Bar is drawn forward by depression of a Keylever. Movement of the Bichrome Handle to stencil position, moves the Bichrome Rod and the Cam into position to raise the Vibrator Link contact point with the Vibrator Arm Lever preventing contact and thereby holding stationary the Ribbon Vibrator mechanism. Bichrome Handle in Black or Red Ribbon position causes the rod to position the Cam to permit raising the Ribbon Vibrator for the full cover of the set position. The Index Detent provides tension to the Index to hold the Cam in Bichrome Handle set position.

2. ADJUSTMENTS:

a. Ribbon Position: Test the Ribbon for position with segment in nonshift position, the top of the Ribbon should be positioned about \( \frac{1}{16} \) below top of Line Finder Scale or \( \frac{1}{8} \) above the flat top of the Type Guide, Adjustment is made by positioning Vibrator Arm Rest, after loosening Vibrator Arm Rest Screw. Test with Bichrome Handle set in Stencil position with \( / \) and - key. The Ribbon should clear the bottoms of these characters. The Ribbon Vibrator should be checked for free action (not binding on rear of Type Guide).

b. Ribbon Throw: [Determine that all screws are tight and springs properly connected before attempting adjustments].

[1] Ribbon Vibrator should be formed properly to provide clearance with Segment at point indicated in drawing and should fit properly on Type Guide without binding. Ribbon Vibrator should be free on the Cotter and the Cotter should fit snugly in cotter hole in Vibrator Arm. If Cotter hole in Vibrator Arm is elongated through wear, Vibrator Arm should be replaced as Ribbon Cover adjustment cannot be properly made, and bleeding will occur.

[2] The Ribbon Throw Adjusting Screw, which positions the Vibrator Arm Lever for contact with the Vibrator Link, should be adjusted to remove excess movement in the Vibrator mechanism but should not be adjusted for Ribbon Position. Holding a typebar against the platen, the Vibrator Arm should be contacting the Cam fully but not excessively, with the Ribbon Vibrator positioning the ribbon for full impression. Adjust Ribbon Throw Adjusting Screw to position Vibrator Arm in full contact with the Cam.

[3] Throw Adjustment: With Bichrome Handle set in Black position, tops of \( / \frac{1}{2} \) and \( / \) should print clearly. Ribbon Vibrator Arm may be formed at point indicated in drawing. To raise ribbon, form end of Vibrator Arm upward; to lower ribbon, form end of Vibrator Arm downward.

With Bichrome Handle Set in Red position, bottoms of \( / \) and \( / \) must print clearly. If Ribbon Vibrator Arm has been formed upward too high to prevent bottoms of these characters from printing, the Arm must be reformed downward sufficiently to correct. After adjusting Ribbon Throw, check Ribbon Vibrator for binding in all positions.

[4] Ribbon Vibrator Arm Spring must be connected properly and provide sufficient tension to return Ribbon Vibrator Arm to rest position and Vibrator to inactive position. Before attempting to increase tension, check Ribbon Vibrator for binding on type guide or for sluggish action due to dirt, erasures, etc.

ROYAL ESCAPEMENT ACTION

Continued from Page 77 should be set back [towards rocker] in its lowest position, unless extremely heavy action is desired. On earlier model machines equipped with front Rocker Spring alone, the Adjustable Plate should be adjusted so that Spring provides sufficient tension to return Rocker to inactive position.

3. ESCAPEMENT TROUBLES:

a. SKIPPING: Before attempting any adjustments for skipping, check all of the contributing causes listed on Foreword sheet of this Section. If all of the listed causes are rejected the trouble may be located in one of the following causes.

[1] Horizontal Clearance between Escapement Dog and the Escapement Roll exceeds \( \frac{1}{16} \). Adjustment is made by installing thinner washer between Escapement Dog and Rocker Frame.

[2] Escapement Drop is more than \( \frac{1}{32} \). See Paragraph 2[b] [2] above.


b. PILING OR CROWDING:


[4] Wheel Check Pawl binding or not clear Starwheel tooth properly. Adjustment is made with Wheel Check Pawl Pivot Screw after loosening Lock Nut. Wheel Check Pawl Spring should provide sufficient tension.
UNDERWOOD

1. The Ribbon Cover [Bichrome] mechanism of the Underwood Typewriter, governs the position of the Ribbon Guide and Ribbon in both upper and lower case positions, synchronizing the ribbon at the printing point with the arrival of the type. The same mechanism that trips the escapement rocker positions the Ribbon Guide.

The top drawing illustrates the Bichrome mechanism assembled on the Universal Bar and Lift Frame Rail. The Ribbon Actuating Lever Bracket on the Shift Rail [See lower drawing] pivots the Ribbon Actuating Lever, while the Ribbon Shift Slide is positioned in the Slot of the Shift Slide Bracket which is attached to the Universal Bar. The Ribbon Shift Slide is controlled by the Ribbon Shift Lever, moving to the right or left in the slot of the Shift Slide Bracket. Movement of the Universal Bar rearward, as a type nears the platen, controls the Ribbon Actuating Lever only when the Ribbon Shift Lever is set in red or black position.

When the 'Ribbon Shift Lever is moved to the right [Black] position, the Ribbon Shift Slide is moved to the left to position the Right Hand Actuating Lever Stud in the Right Hand Slot of the Ribbon Shift Slide. In non-shift position the R. H. Stud is positioned at the bottom of the slot. In Shift position, the Shift Rail raises the Actuating Lever but not the Ribbon Shift Slide, hence the necessity for the slot in the Ribbon Shift Slide, so that the Actuating Lever Stud may move upward while still engaged in the Slide. When a keylever is depressed, the Universal Bar is moved rearward by the cam shape of the typebar heel to cause the escapement [See Escapement] and in this movement the R. H. Stud is drawn rearward while the lower arm of the Actuating Lever is raised to position the Ribbon Guide and the ribbon in printing position.

When the Ribbon Shift Lever is moved to the Stencil [white] position, the Actuating Lever Studs are centered between the arms of the Ribbon Shift Slide, neither Stud being in a slot of the Ribbon Shift Slide. Movement of the Universal Bar rearward does not motivate the Actuating Lever Stud nor the Ribbon Guide, the Ribbon Guide remaining stationary.

When the Ribbon Shift Lever is moved to the left [Red] position, the Ribbon Shift Slide is moved to the right to engage the Left Actuating Lever Stud in the Ribbon Shift Slide Left Slot. It will be noted that the lever, the Actuating Lever than the right stud in order to provide greater movement to the Actuating Lever to position the Ribbon Guide higher so that the lower half of the ribbon may locate in printing position.

2. ADJUSTMENTS: [Remove Carriage to make Ribbon Cover parts accessible for explanation or adjustment].

a. Ribbon Position: Before attempting any Ribbon Cover adjustments, test the Ribbon Position with Carriage in normal non-shift position. The Ribbon should be approximately ⅛ above the Type Guide. This position may be had by forming Lower Ribbon Guide Actuating Lever Stop. Setting Ribbon Shift Lever in Stencil [white] position, type with the underline _____ key. If positioned properly the underline will not print.

b. Ribbon Throw: With Carriage in non-shift position, Ribbon Shift Lever set in Red position and with a keylever depressed, there should be a slight clearance between the Upper Ribbon Guide Actuating Stop and the top of the Actuating Lever. Adjustment may be made by forming Upper Ribbon Guide Actuating Stop.

With Ribbon positioned correctly as indicated in Paragraph “a” above, with Ribbon Shift Lever in Black position, type with the diagonal / and underline _____ keys. There should be no bleeding of colors [when using two colored ribbon]. Shift Carriage to capital position, with Ribbon Shift Lever in Red position, type with the underline ____ key. Underline should print clearly. The Shift Slide Bracket position may be adjusted to provide more or less ribbon, after loosening Shift Slide Bracket Screws. Moving the Ribbon Shift Slide Bracket rearward on the Universal Bar will provide more ribbon and prevents cutting off. Moving the Ribbon Shift Slide Bracket forward [towards front of machine] will provide less ribbon and prevent bleeding. In either case, if additional adjustment is necessary, the Actuating Lever or Ribbon Shift Slide may be formed.

c. Ribbon Guide must be free on its pivot and travel vertically with a minimum of side play, hugging the back of the Type Guide in both upper and lower case. The Ribbon Guide is provided with Side Guide Lugs which may be adjusted to eliminate side play on the Type Guide. [Set Ribbon Shift Lever in Stencil [white] position while adjusting Ribbon Guide.

d. Ribbon Shift Lever Detent Pin Spring, attached to the Detent Pin, must provide sufficient tension to hold pin in the notches of Type Bar Rest when Shift Lever is set in Red or Black position. Adjustment may be made, after loosening Type Bar Nest Binding Screw, by moving Nest to proper position. Detent Pin Spring may be formed if Nest adjustment does not correct the trouble.

e. Ribbon Guide Actuating Lever should be positioned centrally between the arms of the Shift Slide when Ribbon Shift Lever is set in Stencil [white] position. Ribbon Shift Lever may be formed at point indicated in lower drawing to provide this position. The Ribbon Guide Actuating Lever must be centrally located in the opening in the Universal Bar Frame and in the large hole in the Segment. Adjustment may be made, after loosening Ribbon Guide Actuating Lever Bracket Screws on Shift Rail by positioning Ribbon Guide centrally in U-Bar Frame opening. Ribbon Guide Actuating Lever may be formed to locate centrally in large Segment hole. Ribbon Guide Actuating Lever must travel upward, behind segment, with a minimum of clearance. Actuating Lever may be formed to provide this clearance.
f. **Ribbon Shift Slide**: The Actuating Lever Studs [lower drawing] must enter slots in Ribbon Shift Slide properly without movement of the Ribbon Guide when the Shift Lever is moved to various positions. Adjustment may be made, after loosening Shift Slide Bracket screws [upper drawing] by positioning Ribbon Shift Slide or Upper Ribbon Guide Actuating Stop. If this adjustment does not correct difficulty, Ribbon Shift Slide may be formed, if necessary.

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**REMINGTON ESCAPEMENT ACTION**

Continued from Page 75

The Loose Dog should move freely down and up in the guide as well as toward the Escapement Wheel tooth, when pressure of the Escapement Wheel Tooth is released. The Loose Dog Spring should provide proper tension to hold contact lip of the Loose Dog in position to engage Escapement Wheel Tooth [up]. Pressure of the Escapement Wheel against contact lip of the Loose Dog positions Loose Dog properly against its limit plate.

Clearance between the Loose Dog and the Rocker Frame Stationary Dog must be maintained at .043" to .045". Clearance between the Loose Dog and Rocker Frame Stationary Dog is controlled by the Loose Dog Guide, three sizes being manufactured for replacement purposes to secure this adjustment.

The front edge of the Loose Dog should be positioned .015" to .020" to the rear [back] of the front edge of the Escapement Wheel tooth. Adjustment is made by loosening lower Escapement Rocker Stop Screw Nut and adjusting Rocker Stop Screw. Tighten nut when adjustment has been made.

The face of the Loose Dog should position fully on the face of the Escapement Wheel Tooth. Adjustment is made by loosening Rocker Pivot Screws and Lock Nuts, and coming in on one screw, going out on the other, until face of the Loose Dog [held to its limit plate by pressure of the Escapement Wheel] is properly positioned. Pivot screws should be adjusted to provide snug fit to Rocker without binding.

[3] **Loose Dog Silencer**: The Loose Dog Silencer functions to eliminate noise by moving the Loose Dog clear of the Escapement Wheel Tooth when carriage is moved to the right. It should be adjusted to apply a minimum of tension. Adjustment is made by removing Loose Dog Silencer Stop Screw and Nut and loosening Escapement Wheel Friction Spring Collar Adjusting Screw, and adjusting the collar which is threaded. Caution: Do not tighten collar too tight as it may affect speed of carriage. Tighten Escapement Wheel Friction Spring Collar Adjusting Screw. Replace Loose Dog Silencer Stop Screw, determining that it is positioned through slot in Loose Dog Silencer. Check collar to see that rear side does not extend beyond the edge of Escapement Wheel.

Continued on Page 107
WOODSTOCK 1. The Ribbon Cover [Bichrome] mechanism of the Woodstock Typewriter, governs the position of the Ribbon Guide and Ribbon in both upper and lower case positions of the Platen, synchronizing the ribbon at the printing point with the arrival of the type.

The Ribbon Vibrator Bellcrank Stud on the Ribbon Vibrator Bellcrank functions to raise the Ribbon Vibrator and Ribbon Guide when it is contacted by the forward moving Yoke which is motivated by the Ribbon Feed Tube whenever a Keylever is depressed.

The Ribbon Shift Lever, through Shift Arm Link and Shift Rod, positions the Vibrator Yoke. When Shift Lever is set in Black position, the Yoke is moved so that the Ribbon Vibrator Stud is positioned in the bottom slot of the Yoke. In Stencil [white] position, the Yoke is moved so that the Stud is positioned in center of rear slot so that as the Yoke is drawn forward the rear edge of Yoke will not contact the Stud. In Red position, the Yoke is moved to position Stud in the top slot. The Yoke is set so positioned that in Red position the Stud immediately is motivated forward, while in Black position, there is a slight clearance provided for the Yoke to move forward before engaging the Stud in order to provide for the shorter forward movement required of the Ribbon Vibrator Bellcrank to position top half of the ribbon at the printing point.

The Ribbon Vibrator pivots on the Shift Rail Shaft Bracket and is connected to the top of the Ribbon Vibrator Yoke by Vibration Yoke Arm. As the Yoke is drawn forward by the Ribbon Feed Tube, the Vibrator is raised in each operation of a Keylever. As the Vibrator pivots on the Shift Rail Shaft it is raised whenever the Shift Key is depressed moving the Ribbon Guide and ribbon up to upper shift position.

The lower Jaw of the Position Adjusting Prongs on the Vibration Bellcrank engaging the Shift Rod Bracket Platen limits the downward movement of the Ribbon Vibrator and Ribbon Guide therefore serving as a position adjustment for the top of the ribbon [Ribbon Guide] in its relation to the bottom of the lower case type.

The Ribbon Shift Lever Bracket is formed in two parts in order that the Bracket Arm may be shortened or lengthened. This Bracket controls the engagement of the rear edge of the Yoke with the Vibrator Bellcrank Stud.

It will be noted that the Line Finder Frame is shifted with the Shift Rail through the action of the Line Finder Link, thereby providing a line of writing guide in either case position. The Line Finder Frame limits the movement of the Ribbon Guide in either case position by contact of the Ribbon Guide Stud on the Line Finder Frame Stop.

2. ADJUSTMENTS: CAUTION: Woodstocks above 580,000, the teeth of the Lower Universal Bar are formed for Individual Escapement Trip Adjustment only and must never be formed for Ribbon Throw. Woodstocks below 580,000 serial, the teeth of the Lower Universal Bar are formed to adjust individual ribbon throw to cover type. Before attempting Ribbon Cover Adjustments, determine that the Ribbon Guide is not binding. If the Shift Rail is improperly centered or loose on its pivots it will cause a bind of the Ribbon Guide [See Sub-Carriage]. NOTE: Never form the Ribbon Feed Wire for Ribbon Feed or Ribbon Cover adjustment.

a. Ribbon Position: Test for Ribbon position by setting the Ribbon Shift Lever in Stencil [white] position. Shift Carriage to Capital letters and type with the underline ______ key. If the underline prints, the ribbon is positioned too high and must be lowered. To lower ribbon to its correct position [which should be about 3/4 below line finder scale] bend the Lower Position Adjusting Prongs upward. To raise Ribbon to its correct position, bend the lower prong downward.

b. Ribbon Throw: With Ribbon Position adjusted as described above, if letters are cutting off at top [Woodstock above 580,000] loosen Shift Lever Bracket Screw and move Ribbon Vibrator Yoke forward, shortening the parts, will provide MORE RIBBON. Lengthening [spreading Ribbon Shift Lever Bracket by moving Vibrator Yoke rearward while holding Ribbon Feed Tube stationary] will provide LESS RIBBON, to prevent bleeding. Tighten Shift Lever Bracket Screw when adjustment has been made.

c. Ribbon Guide Stop: The Ribbon Guide Stop Link, which governs the extreme upward throw of the Ribbon Guide, is located on the Line Finder Frame. Move Carriage to extreme left, then loosen the Line Finder Link Screws [2]. Holding a typebar against the Platen, push the Line Finder Arm down until it contacts the pin in Ribbon Guide Stop Bellcrank; tighten screws. This adjustment prevents ribbon from over-throwing. After this adjustment has been made, check position of Line Finder in its relation to line of writing, adjusting, if necessary, by loosening the two Line Finder Top Screws and positioning Line Finder properly. Tighten screws.

d. Ribbon Vibrator Yoke Assembly is positioned by the Ribbon Shift Lever, Shift Arm Link and Shift Rod Arm Set Screws. Shift Rod Arm may be adjusted to position the Yoke properly in its relation to the Bellcrank Stud, by loosening Shift Rod Arm Set Screws. It should be determined that Shift Lever Bracket Collar Set Screws [on Ribbon Feed Tube], Line Finder Link Screws and Shift Lever Bracket Screw are tight.
REMINGTON ESCAPEMENT ACTION

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[4] Escapement Rocker Spring: Escapement Rocker Spring Tension Adjusting Screw may be adjusted to provide tension for proper return of rocker to normal position.

[5] Escapement Safety Zone: Raise a center type bar to the platen slowly by hand until escapement trips [which should be when type head is about 1/8" from platen]. When trip has taken place, return type bar toward nest slowly to determine back trip of the Escapement to complete the cycle. This return trip should take place when the type head is from 1/8" to 1/4" from the ribbon. As the complete forward and rear trip of the Escapement action is determined by the width of the escapement wheel teeth, if the return trip takes place when the type head is more than 1/8" from the ribbon, it is possible that in the increased spacing another type bar could move in and print on the same escapement causing piling or crowding. Adjustment is made by setting the Type bar Trip further away from the Platen by adjusting Trip Adjusting Sleeve [See 2a[1].
1. The Ribbon Cover (Bichrome) mechanism of L. C. Smith Typewriter being motivated by the rocking action of the Escapement Rocker involves proper adjustment of the Escapement Trip and U-Bar Pick-up before the Ribbon Cover may be properly adjusted [See Escapement].

Whenever a Typebar or the Space Bar is depressed, the lower portion of the Escapement Rocker is moved rearward and the Pull Arm is moved downward, drawing the Pull Link downward while the Ribbon Vibrator [pivoting on Bracket] is raised positioning the Ribbon Carrier and the Ribbon in printing position. Operating with the Escapement Rocker, it will be understood that whenever the Escapement Trip, U-Bar Pick-up or Rocker Limits are adjusted, it becomes necessary to adjust the Ribbon Cover also.

2. ADJUSTMENTS: [Before attempting adjustments, check the Ribbon Carrier for free movement in all positions of the Ribbon Bichrome Lever. Determine that Top Rocker Limit Screw permits a minimum of additional movement of top of Rocker when typebar is held against the Platen].

a. Ribbon Position: With Shift Key depressed and a Type Bar raised to the Platen, the Ribbon should raise sufficiently to reach the top of the Type head. Adjustment may be made with the Pull Arm Adjusting Screws as follows:

[1] To raise Ribbon: Loosen both Pull Arm Adjusting Screw Lock Nuts. Back out the lower screw slightly and go in on Upper Screw an equal amount or until the top screw just contacts the top part of the Pull Arm.

[2] To lower Ribbon: Loosen both Pull Arm Adjusting Screw Lock Nuts. Back out upper screw slightly and go in on lower screw an equal amount or until the lower screw contacts the lower part of the Pull Arm.

b. Ribbon Throw: Movement of the Ribbon Bichrome Lever positions the Fulcrum Pin Bracket for proper positioning of the pins in the Ribbon Vibrator to control the Ribbon Throw. Both fulcrum pins must enter Vibrator holes smoothly without binding. When Ribbon Bichrome Lever is moved into Stencil [white] position, Ribbon Carrier should drop down about 1/16" which insures that the Ribbon Carrier is free. If it does not drop down freely check Ribbon Carrier Slide fitting in Type Guide for bind.

c. Ribbon Carrier: Determine that there is no lost motion at point of connection of Ribbon Carrier to Vibrator. Lost motion may be eliminated by closing connecting prongs of Vibrator with pliers. Ribbon Carrier must operate freely without bind in any Ribbon Bichrome Lever position.

d. Overthrow: Vibrator Arm Limit may be formed, if necessary to prevent Ribbon from overthrowing when Bichrome Lever is set in Red position.

e. Bleeding: Check Ribbon Carrier, see Paragraph C above. With 'Ribbon' Bichrome Lever set in Black Position [using two color ribbon] if bleeding occurs on bottom of letters, underscore or diagonal, it may be corrected by forming Fulcrum Pin Bracket Stop downward [point indicated in drawing] slightly to limit Vibrator Arm sooner. Caution: Holding Typebar to Platen, there should be a slight clearance between the Stop and the Vibrator Arm.

f. Spring Tension: The Escapement Rocker Spring provides tension for the Escapement Rocker and Ribbon Throw Mechanism and should be adjusted to provide sufficient tension to return Ribbon Carrier to inactive position. All mechanism should be checked to eliminate any binds before increasing tension. A bind in any of this mechanism will be reflected in the Escapement action of the Rocker.
1. When the Set Key is depressed, the KST Set Key Stem moves Set Key Stem Crank rearward drawing with it the Top Arm of Connector, which moves downward right end of Set Lever, raising the left arm of the Set Lever to contact the Stop Set Arm lower extension causing the blade of the Stop Set Arm to contact and move rearward a predetermined Tabulator Stop.

When the Clear Key is depressed, the Tabulator Clear Key Link is drawn forward, moving the Stop Release Lever left end downward as the right end is raised to contact the Stop Clear Arm, raising its lower arm as the top arm is moved rearward to engage the Lower extension of the Stop Release Roll Bracket. The Stop Release Roll is moved forward to contact and push back into neutral position a predetermined set Tabulator Stop. The Roll on the Stop Release Bracket permits clearing all stops, when held engaged by depression of the Clear Key while the carriage is moved to the left or right.

2. ADJUSTMENTS:
   a. Set Mechanism: All Set mechanism should be free on its pivots and the KST Set Key Stem should be properly limited by Set Key Retaining Screw, without binding, before attempting adjustments.

   [1] Stop Set Arm should be positioned directly in front of the Tabulator Stop. Adjustment may be made by forming Stop Set Arm. It should be determined after forming, that the Stop Set Arm top is vertical and that it contacts only one set stop. Whenever the Tabulator Rack is adjusted [See Tabulator] Stop Set Arm should be checked to determine that it is positioned properly in relation to the Tabulator Stops in the Rack.

   Stop Set Arm in normal inactive position should clear Tabulator Stop by \( \frac{1}{4} \) point indicated in drawing. The inactive position of Stop Set Arm is governed by Set Arm Extension which rests against rear frame of the machine and may be adjusted to position Stop Set Arm.

   [2] Stop Set Arm Throw may be adjusted, by forming the Set Key Stem Crank to control the throw of the Stop Set Arm. By bending the lower part of the Set Key Stem Crank toward the rear of machine will increase the throw; by bending toward the front of machine will decrease the throw. Forming of this part should be reduced to an absolute minimum.

   b. Clear Mechanism: Determine that all parts are free on their pivots before attempting adjustments, and that Clear Key Stem Retaining Screw and nut properly limit Clear Key without binding.

   [1] Stop Release Roll: Should be adjusted so that with Clear Key depressed, Release Roll will contact set Tabulator Stop returning it to normal unset position. Tabulator Clear Key Link may be shortened to provide quicker contact with set Tabulator Stop by forming. Stop Release Roll should be adjusted so that when Clear Key is fully depressed, Stop Release Roll will rest lightly against unset Tabulator Stop.
1. This Chapter pertains to a means of providing sufficient tabulator stops for all scale positions and mechanism to permit setting and clearing the Stops from the Keyboard of the Typewriter.

When the Set Key is depressed, the Connecting Link is moved rearward, moving with it the Bellcrank and the Tabulator Set Blade which positions the Lip of the Tab Stop Set Arm Bracket to engage the top of the Tabulator Stop depressing it downward into position to be engaged by the Tabulator Stop Blade [See Tabulator].

When the Clear Key is depressed under a Set Tabulator Stop, the Clear Key Connecting Link is moved rearward pushing the Clear Blade upward to contact the bottom of the Set Tabulator Stop moving it upward into neutral position.

2. ADJUSTMENTS:

a. **Tabulator Set Mechanism:** It should be determined that Set Key Lever is free on its pivot, and that all set mechanism is free on its pivots and springs are properly connected.

   - **Tabulator Set Blade** should operate freely in the Tabulator Lower Comb and Tabulator Set Blade Adjusting Screw should be adjusted so that with Tabulator Set Bar in inactive position, set Blade Adjusting Screw will just clear the bottom of the Tabulator Set Blade.

   - **Tabulator Stop Set Arm Bracket Arm** must operate freely on its pivot and Tabulator Stop Set Arm Bracket Lip must be positioned to contact top of one Tabulator Stop centrally. Adjustment may be made, after loosening Tabulator Set Arm Bracket Screws [2] by moving Bracket to the left or right as may be necessary. When Tabulator Set Key is depressed Tabulator Stop Set Arm Bracket Lip should fully set the Tabulator Stop by the time the Tabulator Set Blade limits at Limit Point on Tabulator Blade Lower Comb. Adjustment may be made by forming Tabulator Stop Set Arm Bracket Lip. Lip should clear tops of all Tabulator Stops when in normal position.

b. **Tabulator Clear Mechanism:** It should be determined that Clear Lever is free on its pivot and that all Clear mechanism is free on its pivots and springs are properly attached and provide proper tension.

   - **Tabulator Clear Blade** should operate freely in the Tabulator Lower Comb and Clear Blade Set Screw should be adjusted so that with Clear Bar in normal position, Clear Blade Adjusting Screw just clears bottom of Tabulator Clear Blade.

   - **Tabulator Clear Blade Lip** should clear the bottom of all set Tabulator Stops by \( \frac{3}{8} \)". When Tabulator Clear Key is depressed, Lip of Tabulator Clear Blade should restore the indicated one Tabulator Stop to normal position as Tabulator Clear Blade limits on Comb. Adjustment may be made by forming Lip of Tabulator Clear Blade. Adjust for position in relation to Stop by forming Tabulator Clear Blade top.
1. Depression of the KST Keylever [Set] raises the Set Plunger, which moves the Key Set Stop Lever downward to depress a predetermined Tabulator Stop into Set position.

Depression of the KST Keylever Clear Lever moves the Clearing Plunger upward to contact a set Tabulator Stop moving it to neutral position. The Clearing Plunger top is formed diagonally, so that when the Clear Lever is held depressed, the Carriage moved to the right, all set Stops will be moved upward to neutral position.

2. ADJUSTMENTS:
   a. Set Mechanism: It should be determined that the KST Set Lever rear extension is positioned directly below and aligned to the lower extension of the Set Plunger and that the Set Lever, Set Plunger and Key Set Stop Lever are free on their pivots and that the Key Set Stop Lever Spring is properly connected.

   [1] Keyset Stop Lever top should be positioned directly above the Tabulator Stop and there should be a clearance of approximately .040" to .042" between the bottom of the Key Set Stop Lever and the top of the Tabulator Stop in neutral position. Adjustment may be made by forming the top of the Key Set Stop Lever. The Keyset Stop Lever should set the Tabulator Stop to full engaging position in the Tabulator Rack. The Set Plunger Spring should be properly connected and provide sufficient tension to return the Set Plunger to inactive position when the KST Set Lever is released.

   b. Clearing Mechanism: It should be determined that the KST Clear Lever and the Clearing Plunger operate freely and that the Plunger Spring is properly connected and supplies sufficient tension to return Clearing Plunger and Clear Lever to inactive position when released. KST Clear Lever rear extension should be positioned directly below and aligned to the lower extension of the Clearing Plunger. Rear Extension of the Clear Lever may be formed to align.

   [1] Clearing Plunger top should clear bottoms of neutral Tabulator Stops by .002" to .003" when Clear Lever is depressed. Rear extension of Clear Lever may be formed to provide this clearance.
WOODSTOCK 1. Woodstock Typewriters below 599,300 serial are equipped with the Tabulator Stop Set Key [lower] indicated in the drawing, while machines above that Serial utilize the Tabulator Stop Set Lever indicated above the Set Key, which is positioned in the front panel of the typewriter.

When the Set Key or Lever is depressed, the Tabulator Stop Set Lever is drawn down into engagement position with a predetermined Tabulator Stop, moving it downward, in Tabulator Stop Rack into engagement position.

An individual Tabulator Stop Clear Lever is not provided in the Woodstock, but in its place, the Tabulator Stop Release Lever [Universal] when moved forward, raises all set Tabulator Stops into neutral position.

During World War II, Woodstock Typewriters were constructed using alternate spaced stops instead of a stop for each spacing in order to provide additional strength between the stops to eliminate service troubles on machines used by the Armed Forces. On these machines, the Tabulator Stop Set Lever has a wide setting blade formed to contact the nearest Stop, regardless of position of the carriage.

2. ADJUSTMENTS:
   a. Keyset Mechanism:
      [1] Tabulator Stops do not derive their tension from springs, but are so formed that the rear arm of the Stop will spring and when thrown back into neutral position, the Stops rear ex-

   tension will fall back into a groove in the Tabulator Stop Shaft and remain there until reset.

   To Remove Tabulator Stop, loosen Tabulator Stop Bar Set Screw on either end, top, of the Tabulator Stop Bar. The Tabulator Stop may be removed and replaced. Tighten Tabulator Stop Bar Set Screws.

   [2] Tabulator Stop Set Lever should be free on its bearings and should return to normal position clearing tops of all Tabulator Stops by 1/24" after the Set Key has been released. Adjustment may be made, after loosening Set Lever Adjusting Screws, by positioning collar to provide proper clearance. Tighten Set Lever Adjusting Screws.

   Set Blade of Tabulator Stop Set Lever should be positioned directly over Tabulator Stop to contact only one stop. Adjustment may be made by forming Set Lever Blade.

   b. Clear Mechanism:

      [1] Tabulator Stop Release Lever should be free on its fulcrum and Tabulator Stop Release Lever Spring should be positioned to return Release Lever to normal position after use. One end of the Spring should be positioned behind Release Lever while the other end lies atop the Tabulator Stop Rack Adjusting Screw [See inset].

      [2] Tabulator Stop Rack Adjusting Screw, being eccentric, may be adjusted to raise or lower Tabulator Bar in its relation to Tabulator Stop Bracket [See Tabulator].
1. When the Set Key is depressed, Set Lever Connection moves rearward, its rear extension causing the Stop Setter Link [Set] to be drawn downward positioning the Tabulator Stop Setter into engagement position with the lower protrusion of the Tabulator Stop, the Tabulator Stop being drawn downward into set position.

When the Clear Key is depressed under a set Tabulator Stop, the Clear Keylever Connection is moved rearward moving the Stop Setter Link [Clear] upward to cause the Tabulator Stop Setter to move upward engaging a set Tabulator Stop and raising it to neutral position. It will be noted that the Tabulator Stop Setter operates to both set and clear the Tabulator Stops.

2. ADJUSTMENTS: Determine that all parts are free on their pivots and all springs are properly connected and provide sufficient tension.

a. Tabulator Stop Setter:

[1] Tabulator Stop Setter must be aligned with upper and lower protrusions of the Tabulator Stop. Adjustment may be made, after loosening Tabulator Stop Setter Binding Screw, by positioning Stop Setter. Tighten Binding Screw when adjustment is made.

[2] The Tabulator Stop Setter must be positioned centrally between a Set Tabulator Stop upper protrusion and the lower protrusion of an unset Tabulator Stop. Adjustment may be made by raising or lowering Stop Setter Link [Set] by forming Stop Setter Adjustment.

b. Tabulator Clear Mechanism: It should be determined that the Stop Setter Link [Clear] is free and that Clear Lever Connection is properly connected to the Clear Keylever and to the Clear Link Bellcrank. It will be noted that a stud on the Bellcrank Bracket acts as a stop for the Bellcrank. Bellcrank Spring should be properly connected and provide sufficient tension to return Clear Link to inactive position when the Clear Key is released.

c. To Remove Tabulator Housing, remove Tabulator Clear and Set Link Screws connecting Links to Tabulator Stop Setter. Remove both Links by disengaging from Bellcrank Connection Stud. Remove both Tabulator Bracket Screws Upper and Lower. Disconnect Stop Setter Carrier Connection. Disconnect Tabulator Adjusting Arm Connection [See Tabulator].
REMINGTON

1. When the Tabulator Bar is depressed, the Tabulator Connecting Link moves rearward and the Tabulator Bellcrank rear arm moving upward positions the Tabulator Bellcrank Adjusting Screw into contact with the Stop Blade. As the Stop Blade is moved upward into Stop Engaging position, the Friction Bail is moved upward, while its rear extension draws the Friction Screw Arm forward to cause the Tabulator Friction Arm Brass Friction Screw to contact the Starwheel. Simultaneously the Escapement Loose Dog Release contacts and moves the Escapement Loose Dog downward out of engagement position with the Starwheel tooth, permitting movement of the Carriage subject to the braking action of the Friction Screw until the Stop Blade contacts a set tabulator Stop. When the Tabulator Bar is released, the Escapement Loose Dog is permitted to contact the Escapement Wheel Tooth just prior to release of the Tabulator Stop by the Stop Blade.

2. ADJUSTMENTS: It should be determined that all parts are free and springs properly connected before attempting Tabulator Adjustments.

   a. The Tabulator Rack should be positioned so that when the Tabulator Bar is slowly depressed, Stop Blade will enter centrally between two set Tabulator Stops. Adjustment is made, after loosening Tabulator Rack Mounting Screws on either end of the Tabulator Rack, and moving [coming in on one screw while going out on the other] the Rack to the right or left until the Rack is properly positioned. This adjustment will affect Keyset and Clear Mechanism [See Keyset Mechanism].

   b. Escapement Loose Dog Release Lip should be positioned so that when the Tabulator Bar is depressed the Lip will move the Escapement Loose Dog down out of engagement with Starwheel tooth but must not limit the upward movement of the Escapement Loose Dog. Escapement Loose Dog Release may be formed at Point indicated in drawing to provide proper adjustment.

   c. Tabulator Friction Screw Arm should provide braking power to the Starwheel through pressure of its Brass Friction Screw when the Tabulator Bar is depressed. Adjustment is made with the Tabulator Friction Spring and Screw to apply pressure to the Friction Screw. Tabulator Friction Support Screw may be adjusted to position Brass Friction Screw flush with Starwheel when Tabulator Bar is depressed. In event Stop Blade binds or sticks on Tabulator Stop, friction may be relieved to eliminate difficulty by adjusting Tabulator Friction Support Screw. Brass Friction Screw may be adjusted for wear.

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1. Depression of the Tabulator Bar on the Underwood moves the Tabulator Stop Lever upward in position to contact a set Tabulator Stop. At the same time the Arm of the Tabulator Stop Lever contacts the Tabulator Brake Arm moving the Brake Shoe into position to engage the Brake Band. As the Tabulator Stop Lever is moved upward the KST Actuating Shaft Lever moves downward to engage the Tabulator Lever Arm moving it downward while the forward end of the Arm, on which the Tabulator Lever Roller pivots, is moved upward raising the Carriage Rack from engagement in the Pinion Wheel [See Rack, Pinion and Starwheel]. It will be noted that the Brake Band is provided with a loop end operating on the Brake Band Anchor with a spring attached which tends to maintain the Brake Band to the left end of the Carriage. The play in the Brake Band permits of short tabulating without braking the Carriage. On long tabulations, the play is taken up before the pressure of the Brake Shoe against the Brake Band is exerted.

2. ADJUSTMENTS: Before attempting adjustments it should be determined that all springs are properly connected and all parts operate freely.
   a. Tabulator Rack must clear Tabulator [housing] Frame by \( \frac{3}{8} \) [See Top insert]. Adjustment may be made by forming the Tabulator Rack Brackets at either end of Tabulator Rack. The Tabulator Rack must be positioned so that the Stop is located directly over the Tabulator Stop Lever. Moving Carriage to the extreme right determines that the Stop Lever is positioned directly under the first Tabulator Stop. Adjustment may be made, after loosening Tabulator Rack Screw Lock Nuts [at both ends of Tabulator Rack] by moving Tabulator Rack to the right or left as may be necessary with the Tabulator Rack Adjusting Screw. Tighten Rack Screw Lock Nuts when adjustment has been made.
   b. KST Actuating Shaft Lever must clear Tabulator Lever Arm by approximately .005" point indicated in drawing, and when the Tabulator Bar is depressed it must function to move the Tabulator Lever Arm downward in order that the Tabulator Lever Roller may lift the Carriage Rack from the Pinion Wheel with proper clearance. Carriage Rack must clear Carriage Frame when in up position [out of engagement with Pinion]. Adjustment may be made, after loosening Shaft Lever Set Screws [2] by moving KST Actuating Shaft Lever up or down as may be necessary. Tighten Set Screws when adjustment has been made.
   c. Tabulator Lever Pivot [See Rack, Pinion and Starwheel] must be adjusted to provide snug fit for the Tabulator Lever without binding. Adjustment is made, after loosening Tabulator Lever Pivot Set Screw by moving Tabulator Lever Pivot in or out, as may be necessary. Tighten Set Screw when adjustment has been made.
   d. Tabulator Brake: Tension of Tabulator Brake Arm should be sufficient to provide proper braking of Brake Band to slow down the speed of the Carriage. Adjustment may be made with Tabulator Brake Arm Tension Screw. Brake Band ends must clear the Brake Shoe, adjustment being made, after loosening Brake Band Anchor Set Screws, by positioning Brake Band Anchor. Brake Band Return Spring must be properly connected and provide sufficient tension to return Brake Band to the left, after Tabulating.

3. To Remove Tabulator Housing: Remove four [4] Tabulator Housing Screws located on back of Housing. Move Tabulator Housing out from bottom to disengage Space Lever end from Housing Slots. Move downward to disengage Brake Band from Brake Shoe.
ROYAL

1. The two mechanisms for Tabulator operation are presented in the drawing. The Friction Type Tabulator Brake, pictured in the right hand drawing, working in conjunction with the Margin Release Mechanism is used on Royals below 2,462,654. In this case, the Tabulator-Margin Release Link Lever performs the Tabulator operation of disengaging the Rack from the Pinion by raising the Tabulator Rack Lift Lever with the brake shoe positioned on the Rack frame while moving forward the Tabulator Finger to engage a set Tabulator Stop. It also performs the Margin Stop Release operation [when Margin Release Keylever is depressed] of disengaging the Center Stop from the Margin Stop to permit the Carriage to continue through the set Margin Stop [See Margin Stops and Line Lock].

The Tabulator Governor Pinion Brake mechanism, shown in the left drawing, Royals above 2,462,654 operates separately from the Margin Release Mechanism. Depression of the Tabulator Keylever, through the Tabulator Link and Lift Arm Rod, moves the lower extension of the Tabulator Rack Lift Lever forward as the Tabulator Rack Lift Lever is raised to contact the Carriage Rack Frame. As the Carriage Rack is raised from its position in the Escapement Pinion, the Brake Gear meshes with the Carriage Rack, as the Finger Lever draws the Tabulator Finger forward to enable its blade to contact a set Tabulator Stop. The Brake Gear is permitted a partial revolution before it picks up the Brake Gear Hub [for the benefit of short Tabulation] which applies braking power to the Carriage.

2. ADJUSTMENTS: It should be determined that all parts operate freely and that all springs are properly connected and provide sufficient tension to perform their functions before attempting Tabulator Adjustment.

a. **Tabulator - Royals below 2,462,654**:

   [1] Tabulator Margin Release Link Lever must be positioned as specified under Margin Stops and Line Lock Paragraph 2h[1].


b. **Tabulator - Royals above 2,462,654**:

   [1] Finger Link Lever should be positioned, after loosening two adjusting screws, so that with Tabulator Keylever fully depressed the blade of the Tabulator Finger will clear all unset Tabulator Stops by approximately $\frac{1}{8}''$.

   [2] Tabulator Link may be shortened or lengthened, after loosening Tabulator Link Adjusting Screws [or nuts] to control position of Keylever Extension limited by the Ribbon Spool Bracket simultaneous with Extension on Tabulator Finger limiting on rear of Center Stop. The Tabulator Link is also adjusted for the raising of the Carriage Rack. All three of these adjustments should be synchronized.

   [3] The Tabulator Governor Pinion Brake consisting of Tabulator Gear, Hub and Brake Spring is so constructed that the Gear is permitted a partial revolution before contacting the Hub and its brake pressure applied against the Gear to slow down the Carriage. The Brake mechanism spring seated in notched arm is adjustable to increase or decrease application of tension by the Brake hub, particularly applying to adjustment for long carriage machines.

   [4] Tabulator Rack Lift Lever must be synchronized with Brake Gear and Brake Gear must mesh into Carriage Rack without bottoming. This adjustment is controlled by Tabulator Link adjustment [See Paragraph 2h[2] above. The Lift Lever should be level-if maladjusted [malformed] it should be straightened. As it lifts the Carriage Rack as the Brake Gear meshes with the Rack, which action must be synchronized, it should not be formed unless absolutely necessary.

   [5] Tabulator Keylever must be free on its pivot and Tabulator Link must be free on its Keylever Fulcrum Connecting Rivet.

   [6] Tabulator Rack should be adjusted [by moving to left or right after loosening Rack Nuts] so that Tabulator Finger in inactive position will set a fraction to the left of a set Tabulator Stop. It should be possible to tabulate from this position, release Tabulator Key, backspace once and retabulate to same position. If Rack is improperly positioned, Tabulator Finger Blade will move a Set Tabulator Stop into neutral position.

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WOODSTOCK TABULATOR

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To Replace, holding housing in the right hand, with index finger contacting curved Connecting Arm which has a stud, place this stud in upper slot of Connecting Lever proper. Insert four screws into base of housing, fastening the base loosely to Main Frame, then replace two screws in top of housing fastening them tightly to Top Plate, then tighten four Main Housing Screws tightly. With the Connecting Link Screw positioned in a Spring Screwdriver return it to position in slotted Link entering threaded hole in the Arm. Tighten Connecting Link Screw. Replace Collar on Shaft and while holding Tabulator Set Key in upward position, tighten two collar set screws.
Tabulator

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d. **Tabulator Friction Bail**, in non-operating position must hold the Brass Friction Screw just clear of the Starwheel. Adjustment may be made by forming lower extremity of Friction Screw Arm.
e. **Tabulator Bellcrank Adjusting Screw** may be adjusted to provide proper lift to stop Blade. Care should be taken that the amount of purchase of Stop Blade on the Tabulator Stop does not prevent Stop Blade from clearing Stop quickly and positively when Tabulator Bar is released.
f. **Ribbon Throw-out Screw** operating on Pinion Release Bellcrank mechanism must be adjusted so that the Pinion Release Bellcrank Link will throw Spring Drum Pinion out of mesh with the Spring Drum Gear when tabulating. [See Ribbon Feed]. This Screw should be adjusted to just clear the arm of the Spring Drum Bracket which it operates when the Carriage Release Blade contacts the Throw-out Screw.
g. Escapement Loose Dog Release Spring, Tabulator Friction Bail Spring and Bellcrank Spring must be properly connected and provide sufficient tension for return of their respective parts to inactive position when Tabulator Bar is released.

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c. **Tabulator Brake**: The Ribbon Driving Spring Nut and Lock Nut apply tension to the Ribbon Driving Spring which applies pressure to the Brake Band between the two ratchet wheels. If Tension has been unduly increased in adjusting Ribbon Feed mechanism, friction exerted against the drum in tabulating will slow down movement of the carriage perceptibly. Adjustment is made after loosening Ribbon Driving Spring Lock Nut [outer] by adjusting Ribbon Driving Spring Nut [inner]. Tighten Lock Nut when adjustment is made. Check the Tabulator Brake Bellcrank Spring to determine that it is connected properly and is in good condition.
3. To Remove Tabulator Housing [See Keyset Mechanism].
WOODSTOCK 1. Depression of the Tabulator Key moves the Tabulator First Lever downward drawing with it the end of the Tabulator Second Lever whose pivot causes the Tabulator Second Lever Shoe to contact the Carriage Rack moving it upward out of engagement with the Pinion Wheel. In this same movement the Tabulator Brake Plate and Stop Bracket are moved into position against the Tabulator Bar. It will be noted that full depression of the Tabulator Key provides additional tension of the Tabulator Brake Spring to increase braking power of the Brake Plate against the lower facing of the Tabulator Bar. The Tabulator Stop Bracket Assembly, composed of a moving Dog and the Tabulator Stop Arm permits the Tabulator Stop to enter and become locked between the two. As the Tabulator Key is released the Tabulator Stop Arm moves back out of Stop engaging position simultaneous with the Carriage Rack returning to mesh with the Pinion Wheel.

2. ADJUSTMENTS: Determine that Sub-frame Screws are tight before attempting Tabulator Adjustments.

a. **Tabulator Stop Bar**: If Tabulator Stops are set at 10-20-30, etc., and upon depressing the Tabulator Key, the Carriage stops at 9-19-29 or at 11-21-31, the Tabulator Bar is out of position and must be moved to the right or left. Adjustment may be made, after loosening Tabulator Bar Adjusting Screw Lock Nuts on both ends of the Carriage [See Main Carriage] backing out on one Adjusting Screw while coming in with the other until the Stop Bar is properly positioned. Test and adjust position of Tabulator Bar until it is possible to tabulate to 10, where the carriage should stop, then back space and tabulate again. The Carriage should stop at 10.

b. **Tabulator Second Lever Shoe** should clear the Carriage Rack by $\frac{3}{4}$" when Tabulator Key is in non-operating position. Shoe may be raised or lowered on the Tabulator Second Lever, to raise the Carriage Rack higher or lower, after loosening Tabulator Second Lever Shoe Binding Screws.

c. **Tabulator Stop Bracket Shock Spring** and Tabulator Stop Arm Dog Spring must be properly connected and provide sufficient tension to perform their functions.

d. **Tabulator Brake**: The Tabulator Link Spring Bracket [smaller of the two lower springs] may be formed upward to increase braking power of the Tabulator Brake Plate against the facing of the Tabulator Bar.

3. **To Remove Tabulator Housing [Woodstocks 435,500 to 550,000 serial]**: The Connecting Link Stud and Connecting Link Screw are encased in the Tabulator Housing on Woodstocks in the above serial range. Facing machine from the rear, remove right and left rear cover plates. Loosen the two screws in collar which connect Collar with Shaft [located to the right of the Tabulator housing, facing machine from the rear]. Remove the two screws which fasten housing to Top Plate [these screws are located underneath Top Plate to the right and left of the housing]. Remove the four screws which fasten housing to back of Main Frame. Move housing out slightly, remove Connecting Link Screw. Move Housing to right slightly to disengage connecting Link Stud from the Link. The Housing may be removed.

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1. When Tabulator Bar is depressed, the lower extremity of the Tabulator Sub-Lever is moved rearward and the upper end of the Sub-Lever moves forward positioning the Tabulator Counter Stop into engagement position with a set Tabulator Stop. The protrusion on the lower extension of the Tabulator Sub-Lever engages the crossbar of the Tabulator Carriage Release Bellcrank which pivots in the Tabulator Housing. Continued movement rearward causes the Tabulator Carriage Release Bellcrank Mechanism to move the Carriage Release Bellcrank downward disengaging the Loose Dog from contact with the Escapement Wheel Tooth, permitting free Carriage movement to the left. In this same movement the Tabulator Brake Bellcrank engages the lower tooth of the Check Pawl against the teeth of the Detent Ratchet braking the Main Spring Drum to slow down movement of the Carriage. [See full explanation under Main-spring and Drawband, Paragraph 1].

2. ADJUSTMENTS: Before attempting adjustments determine that Main Spring Drum Bracket Screws are tight [See Mainspring and Drawband], and that all mechanism is free with springs properly connected and providing proper tension.

a. Tabulator Counter Stop must be positioned to enter between two adjoining Set Tabulator Stops without contacting either. Adjustment may be made, after loosening Tabulator Rack Binding Screws, by moving Tabulator Rack to the right or left. Tighten binding screws when adjustment is made.

b. Carriage [Wheel] Release Bellcrank: [See Rack, Pinion and Starwheel, Paragraph 2c [2]] must be formed properly to release [push down] Loose Dog from engagement with Starwheel tooth when Sub-Lever pivots. This action is performed by contact of the sub-lever lower protrusion with the Tabulator Carriage Release Bellcrank through the Adjusting Arm connection. When the Tabulator Counter Stop is all the way forward, the Tabulator Brake Bellcrank should lock the Drum Detent at the same time the Carriage Release Bellcrank disengages the Loose Dog from the Starwheel tooth. Adjustment may be made by adjusting position of the Adjusting Arm, [raising or lowering as may be necessary] after loosening Adjusting Arm Screws. Care should be taken to determine that Loose Dog engages Starwheel Tooth simultaneously with Tabulator Counter Stop releasing Tabulator Stop.

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**REMINGTON**

1. Depression of the Back Space Key elevates the Back Space Pawl tooth to engagement with the Starwheel tooth moving the Starwheel, Pinion and Rack [including Carriage] backward sufficiently to clear the Escapement Loose Dog which acts as a pawl permitting the Starwheel tooth to pass, returning instantly to tooth engaging position.

Back Space Pawls are not interchangeable. As noted in the drawing the Pica and Elite Back Space Pawls differ which is also true of the 6, 8, 9 1/4, 14 and 16 pitch Pawls. Care should be taken, in the event of a replacement, that the proper Back Space Pawl is used.

2. ADJUSTMENTS:
   a. Back Space Pawl must fully engage the Starwheel Tooth when the Back Space Lever is depressed. The Escapement Rocker Loose Dog should be positioned so that the Back Space Pawl may fully engage a Starwheel Tooth [See Escapement]. Determine that Back Space Pawl is not binding on Back Space Pawl Screw and that Pawl Spring is properly connected and provides sufficient tension to move Back Space Pawl out of Starwheel tooth engaging position when the Back Space Keylever is released.
   b. Back Space Lever Bail must operate freely on its pivots without binding, and Back Space Pawl connection Stud must be positioned in Back Space Lever Bail properly.
   c. Back Space Keylever must be free on its pivot and Keylever Spring should have sufficient tension to return Keylever to inactive position. Back Space Lever Roll must be free on its pivot.
1. When Back Space Keylever is first partially depressed, Back Space Pawl Lift Lever Arm [which just contacts the lower extension of the Back Space Pawl in non-operating position] pivots the Pawl tooth into engagement with the Rack. As the Back Space Keylever is depressed further, the Back Space Pawl Post guides the Pawl along the Slot in the Back Space Guide pushing the Carriage to the right, until the Pawl Guide Post contacts the Back Space Rack Lock moving the Rack Lock downward holding the Rack into engagement with the Pinion Wheel and Back Space Pawl. In this operation the Back Space Escapement Wheel Stop is moved in to engage the rear of a Starwheel tooth, holding the Starwheel stationary. The Pinion Pawl on the Starwheel permits the Pinion to back up with the Carriage in this operation without transmitting this motion to the Starwheel.

2. ADJUSTMENTS: Before attempting adjustments it should be determined that all parts are free on their bearings and that the Back Space Pawl Tooth is in good condition. All parts should be free on their pivots and the Back Space Pawl Spring should be properly connected and provide sufficient tension to move Back Space back into inactive position when the Back Space Keylever is released. If a tooth in the Rack is broken or deformed, the Back Space Pawl cannot engage that Rack tooth properly which would prevent proper operation of the Back Space.

a. Back Space Pawl, in inactive position, must clear Carriage Rack. Its rest position is determined by Back Space Pawl Lift Lever which should just contact lower extension of the Back Space Pawl. Adjustment may be made by forming Back Space Keylever rear end downward will move Back Space Pawl Lift Lever contact point away from Back Space Pawl; upward will move Back Space Pawl Lift Lever contact point closer to Pawl. Care should be taken that the Pawl is not raised to engagement with Rack in this forming operation.

b. Back Space Guide: With Back Space Pawl and Pawl Lift Lever in proper contact position as indicated in paragraph a, Back Space Keylever inactive, Pawl Guide Post must position in right end of Guide Slot when viewed from Rear, the Pawl being moved to this position by the tension of the Back Space Pawl Spring. If depression of the Back Space Keylever causes overthrow [back up more than one spacing], the Back Space Guide [facing machine

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UNDERWOOD

1. As the Back Space Keylever is depressed, the Pawl Carrier [which is located behind the Pawl] is drawn forward positioning the Back Space Pawl in the Carriage Rack and the Wheel Lock in position directly under tooth in the Escapement Wheel. Forward movement of the Pawl Carrier is limited by the Tab Lever Stud Eccentric and when Pawl Carrier reaches its forward limit, the Back Space Pawl is moved to the right, drawing with it the Carriage Rack and Carriage to perform the Back Spacing operation. The Pinion Pawl permits the Pinion to turn with the Rack without transmitting this motion to the Starwheel.

2. ADJUSTMENTS:

a. Back Space Pawl must operate freely on its pivot without excessive side play between the Pawl, the Pawl Carrier and Pawl support. When Back Space Pawl is moved into contact position with Rack Teeth it must engage in teeth snugly without bottoming but deep enough to insure sufficient purchase. Position of Pawl in Rack teeth may be adjusted, after loosening Eccentric Set Screw, by turning Back Space Pawl Carrier Eccentric, raising or lowering Pawl to its proper position. Tighten Eccentric Set Screw when adjustment has been made. In moving in or out of Rack teeth, Back Space Pawl must not catch or bind on Rack Teeth, which position may be provided, after loosening Eccentric Set Screw, by moving Pawl in or out with the Tabulator Lever Stud Eccentric. Tighten Eccentric Set Screw when adjustment has been made.

b. Back Space Keylever should just contact Keylever Stop when Keylever inactive. Adjustment may be made by forming Back Space Keylever Shaft Arm [position indicated in drawing].

Overthrowing: When Back Space Keylever is depressed quickly and overthrows [backs up carriage more than one space the Pawl Stop Washer should be replaced with washer of correct thickness. To replace, remove Back Space Pawl Carrier Eccentric, after loosening Eccentric Set Screw. With correct washer installed, replace Back Space Pawl Carrier Eccentric, adjusting properly. Tighten Eccentric Set Screw.

c. Wheel Lock must move in freely under Escapement Wheel Tooth with a minimum of clearance. It must pivot freely on Tabulator Lever and its right arm must position freely in Pawl Carrier Slot. Adjustment may be made by forming Wheel Lock.

d. Back Space Pawl Carrier Spring [flat], positioned on Pawl Carrier [see lower drawing] must provide sufficient tension to perform its function. Spring may be formed, if necessary.

e. Back Space Link Spring should provide sufficient tension to return Keylever to its position in Keylever Stop and to return Back Space Pawl Carrier to its normal inactive position. Adjustment may be made by forming end of spring.

f. Back Space Keylever Shaft must operate freely on its pivot without excessive end shake. Adjustment may be made with Shaft Pivot Screw.
WOODSTOCK  1. Depression of the Back Space Keylever raises the Back Space Sub-lever, the Back Space Link and the Back Space Bellcrank. The Back Space Pawl pivots on the Back Space Bellcrank and is limited on the Back Space Plate when the Back Space Keylever is inactive but as the Bellcrank is raised the Pawl is positioned upright by the Pawl Spring [the Pawl Arm limiting on the upturned limit form of the Bellcrank] and is moved horizontally pushing the Carriage to the right. The Pinion Pawl permits the Pinion to back up with the Carriage Rack in this operation without transmitting this motion to the Starwheel which is prevented from movement by the Back Lash Pawl on the Escapement Rocker.

2. ADJUSTMENTS: Before attempting Back Space Adjustments, determine that the Sub-frame Binding Screws [two located on either side of the base in the opening just below the carriage] are tight. The Back Space Bracket Screws indicated in drawing [which attach Rocker Stop Plate and Back Space Bracket to Top Plate Rocker Extension Arms on certain models] must be tight. The Back Lash Pawl on the Escapement Rocker should just slip under the teeth of the Starwheel in passing without hanging up, permitting only a little back play of the Starwheel.

It is adjusted by loosening the Back Lash Pawl Screw and moving the Pawl up or down as may be necessary, then locking the screw.


c. Adjusting Plate: The Adjusting Plate should be positioned so that in slow operation, the Back Space Pawl will stop against the end of the Plate a little after the Escapement Pinion Pawl has moved over the Pinion tooth. The Plate is held in position by two Plate Binding Screws located in adjustable slots. The Plate should be positioned to guide the Back Space Pawl into the Rack teeth, without binding or slipping off.
1. The Back Space Dog pivot stands on Dog Spring Arm and is controlled by the Dog Connection of the Dog Connection Bellcrank. When the rear extension of the Back Space Dog engages the Dog Rest the teeth end of the Dog bottoms fully [but freely] in the Dog Stop Slot providing a clearance of approximately .025" between the Dog teeth and the Pinion teeth. When the Back Space Key is depressed, the Dog is moved to the left, and as it moves from engagement with the Dog Rest the left end of the Dog is raised positioning the Dog teeth into mesh with the Pinion teeth. Further depression of the Back Space Key causes the Pinion and Starwheel to rotate clockwise [as viewed in the drawing] the Loose Dog functioning as a Pawl in permitting this reverse action. The Dog Stop is contacted by the stop forming of the Back Space Dog limiting movement to the left. When the Back Space Key is released, the Back Space Dog moves to the right [through the tension of the Back Space Dog Arm Spring and as its rear extension engages the Dog Rest the teeth end of the Dog is forced downward out of mesh with the Pinion Wheel teeth.

2. ADJUSTMENTS: Before attempting adjustments determine that the Main Spring Drum Bracket Binding Screws are tight [See Spring and Drawband] and that the face of the Loose Dog positions flush on the face of the Starwheel tooth [See Escapement]. If Loose Dog felt pads are beaten thin, or the Rocker is not centered properly on its pivots, the Loose Dog cannot position flush on the face of the Starwheel tooth which positions the Pinion Wheel for proper engagement by the teeth of the Back Space Dog. In this event insufficient or over-throw in backspacing will result.

a. Back Space Dog:

[1] In inactive position, teeth end of Back Space Dog must position fully but freely in Dog Stop Slot. This position is caused by proper contact of the rear of the Back Space Dog on the Dog Rest with the Dog Connection properly adjusted by the Bellcrank Adjusting Screw. If the Back Space Pull Link connecting the Shaft to the Dog Connection Bellcrank has been malformed [shortened] it will prevent the rear of Back Space Dog from engagement with the Dog Rest and the teeth of the Back Space Dog will be held in contact with the Pinion Wheel.

[2] If either the Dog Stop or Back Space Dog contact point with Dog Stop are burred, improper position of the Back Space Dog will cause Back Space difficulties.

[3] If Dog Rest has been deformed by maladjustment, it will affect other adjustments.


b. Back Space Shaft should be free on its pivots with a minimum of end shake. Adjustment may be made, after loosening Shaft Bracket Binding Screws by positioning Shaft Bracket.

c. Back Space Lever Adjusting Spring and Screw should be adjusted to provide sufficient tension to return Keylever to normal position when released.
ALIGNMENT

The aligning of characters on typebars—both vertically and horizontally, through comparison with the master aligning letter, capital N and lower case n, requires careful application of special tools to accomplish a mechanic-like job. The head of the Typebar from the type to the reinforcing rib is left unhardened in the manufacturing process for the benefit of aligning. Attempt should not be made to overcome faulty soldering of type by aligning or forming of typebars. In the manufacturing process, the typebar is punched flat in one operation. Later it is formed to the proper angle for its position and numbered. Special typebars are furnished by most manufacturers, for servicemen’s kits, with soft steel head for the purpose of forming the bar to fit any position from 1 to 21 and from 22 to 42. Typebars No. 21 and No. 22 are ordered special for this purpose. Three-prong pliers are generally used to form the head of the special typebar to fit its proper position in the typebar nest.

Alignment should not be attempted until all contributing factors listed below have been carefully checked and adjusted:

[a] Carriage, Sub-Carriage or Segment fitted properly and all loose play eliminated. [See Main Carriage, Sub-Carriage and Motion and Shift Mechanism].

[b] Platen fitted properly, all end shake removed, true in its entire length, firmly adhering to platen core and of proper size. [See Platen].

[c] End shake in Rack eliminated. [See Rack, Pinion and Starwheel].

[d] Paper Feed mechanism properly adjusted. [See Paper Feed].

[e] Spring Drum tension adjusted properly. [See Mainspring and Drawband].

[f] Typebars free in segment slots [not sticking]; of uniform size and shape; clear guide properly and fit snugly in segment. [See Typebars].

[g] Typebar links of proper size and shape and not binding.

[h] Sub-levers [bellcranks] formed properly to pull links and typebars without straining.

[i] Escapement Rocker fitted snug on pivots without binding. [See Escapement].

[j] Escapement Dogs positioned properly. [See Escapement].

[k] Escapement Trip set properly. [See Escapement].

[l] Universal Bar free on its pivots without excessive end shake. [See Universal Bar].

[m] Ring and Cylinder adjustment properly made, Platen parallel. [See Ring and Cylinder].

[n] On-Feet and Motion Adjustment properly made. [See Motion and Shift Mechanism].

[o] Shifting mechanism adjusted properly. [See Motion and Shift Mechanism].


[q] Type properly soldered to bar. If off more than .005" type should be resoldered on bar.

[r] Determine that Typebar Fulcrum Wire is not worn. If so, it may be removed, right end cut off slightly [approximately \( \frac{1}{8} \)" ] and repositioned to provide a new bearing surface for the bar, or replaced at very small cost.

2. ALIGNING TOOLS AND METHODS:

Drawing 1: Typebar Maulers. [Starrett] mauling typebar slightly below type head [back of bar] will lower character.

Typebar Rollers, positioned on bar as shown in drawing, to form typebar for Ring and Cylinder [fit off the Platen but on the Ring] and at the same time will lower character.

Drawing 2: Typebar Maulers [Starrett] mauling typebar slightly below typehead [front of bar] will raise character.

Typebar Rollers, positioned on bar as shown in drawing, to form typebar for Ring and Cylinder [fit off Ring but on Platen] and at the same time will raise character.

L. C. SMITH: Adjustments for both raising or lowering character is accomplished after loosening typebar binding screw by raising or lowering typebar.

Drawing 3: Typebar Offset Pliers to move a type head bodily to the right or left [after determining that full typed impression is secured, both upper and lower case].

Typebar Twisters, one holding, the other apply twisting pressure, where a typehead is crowding to the left or right but only partial impression is secured.

Drawing 4: Typebar Twisters, one holding, the other applying twisting pressure, to straighten type head.

Drawing 5: Type Cutting Pliers [Starrett with special jaws] are used to spread characters apart slightly where imperfect type is to be used. Should be used carefully to prevent beheading type. May also be used to position typeface fully on Platen.

IMPORTANT: After aligning, type should be aligned to enter type guide freely and squarely. Three prong pliers and Typebar Twisters are used for this purpose.
1. Typebars should be free in the segment slots, which may be determined by releasing Universal Bar tension [holding or locking Universal engaging the Escapement Rocker] and testing return of typebars from plate to typebar rest under their own spring tension and weight. Sluggish typebars will cause piling or crowding or duplicated impressions. If typebars are sticking in the segment slot, bar or bars should be removed and slots cleaned properly. Use of oil in segment slots is only a temporary corrective and as the oil coagulates further difficulty will ensue.

All typebars are custom fitted to segments at the factory and rarely, if ever, may a new bar replace an old one without being fitted to segment and aligned [See Paragraph 3]. Constant movement of typebars in the segment slots cause wear in the segment [not the typebar] and on old machines sloppy fitting of typebars in the segment slot, wear in the typebar segment fulcrum and wear in the keylever fulcrum cause difficulty in aligning. In such instances it is possible to move the fulcrum rods to a new position by filing off one end of the fulcrum rod. If the typebars are replaced heavily, the size of the bar at the segment bearing point will be increased to fill up the wear in the segment.

Typebars should be formed to enter guide cleanly without binding or rubbing sides of typeguide.

2.a. TO REMOVE TYPEBARS: With the exception of the L. C. Smith, all typewriters pivot their typebars in the Typebar Segment casting on a Fulcrum Pivot Wire. Fulcrum Stop Screws or Stop Plates, located at top outer edge of Segment, or Stop Plates located atop Segment retain the Fulcrum wires in the segment. When replaced determine that wires clear Stop Screws before tightening. The manufacturer's follow-up Fulcrum Wire should be used in moving the machine Fulcrum wire [after backing out Fulcrum Stop Screws or removing Fulcrum Stop Plates].

b. TO REMOVE A SINGLE TYPEBAR, insert follow-up Fulcrum wire in Fulcrum Wire slot in Segment and move machine Fulcrum Wire around until typebar to be removed jolts slightly indicating that the union of the two fulcrum wires has reached the typebar. Spread the fulcrum wires slightly and remove typebar. Typebar may be disconnected from typebar link by turning sideways slightly and disengaging. Link may be disengaged from sub-lever or bellcrank, if necessary, by unhooking.

c. TO REMOVE ALL TYPEBARS: Commencing at the left or right end of the Segment withdraw machine Fulcrum Wire slowly as you remove typebars in sequence. As the Remington and Royal Typebar Links vary in length, they should be replaced in the same typebar and sub-lever or bellcrank from which removed. This may best be accomplished by drilling a board with 42 holes, marked from No. 1 to No. 42 inclusive and as Typebar links are removed, place them in their respective hole in the board. Typebars are numbered from No. 1 to No. 42 and must be replaced in their respective positions numbering from the left slot of segment No. 1 to the right. Typebars should be strung in order on a wire for convenience in replacing. Special center typebars, No. 21 and No. 22, for the left and right, may be ordered from the manufacturer for replacement purpose by mechanic and are specially tempered to permit of forming to fit position required.

d. TYPEBAR LINKS: Both the Woodstock and Underwood Links are uniform in length and form for the respective machine with the possible exception of the two center links the hooks of which may be ground for clearance purposes. With the exception of these two the links are interchangeable. Hooks of Links No. 1 to No. 21 face right; hooks of Links No. 22 to No. 42 face left on both Typebars and Sub-Levers. Royal Links vary and are hooked into the Typebars and Sub-Levers in the following manner: Links No. 1 to No. 11 inclusive are hooked into their respective typebars with the hook of the link toward the right and hook of link to Sub-Lever facing left. Links No. 12 to No. 31 alternate, one hook facing left, one hook facing right, etc. Where hook of link to Typebar faces left, hook of link to Sub-Lever faces right and vice-versa. Links No. 32 to No. 42 are hooked into Typebars with hook facing toward left.

Remington No. 17 has ten different sizes of typebar links. Hooks of Links No. 1 to No. 21 face left on Typebars and right on bellcranks. Hooks of Links No. 22 to No. 42 face right on Typebars and left on bellcranks.

3. TO INSTALL NEW TYPEBAR, test heel of new typebar in segment slot to determine if it fits the segment slot properly. If too thick, the typebar heel [Segment Bearing Surface] should be ground or emeryed [Do not file the Segment Slot] until it fits properly. Before installing a new typebar, check it by comparison with the next adjoining typebar to determine that it is formed properly for ring and cylinder adjustment, and that the typeheads line up properly. Also determine that the two bars match. If necessary, form new typebar with Typebar Rollers to agree. If type head is too far [more than .005"] out of agreement with the old typebar type head it is preferable to resolder the type head rather than to attempt to form the bar.

4. L. C. Smith: To Remove Typebar [after removing front dash cover plate] back out and remove Typebar Hanger Screw. Disconnect Link [top of typebar assembly] connecting typebar to its sub-lever. Tap Hook of typebar head upward to remove typebar from its position on segment. To replace Typebar reverse above procedure. After replacing typebar, check the typebars to the right and left of the bar removed for alignment. Deflection caused by movement of the one typebar may necessitate realignment of the two adjoining bars.
TYPE STYLES

1. Each Typewriter manufacturer has a style of type individual to that particular make of machine, the size of the standard types however are the same and the styles are somewhat similar. Type is rolled by the manufacturer to fit the radius of the curvature of that manufacturers Platen. As the diameter of the various Platens differ, use of one manufacturer's type on another make of machine, while possible, seldom meets with success. The following Type Styles are provided to acquaint the reader with the various sizes of types used in modern typewriters:

PICA [10 Characters per inch] D. C.
   The Standard type for General purposes. 1 2 3 4 5 6 7 8 9 0

ELITE [12 Characters per inch] D. C.
   As legible as Pica but with Elite Beauty. 1 2 3 4 5 6 7 8 9 0

SMALL ELITE [12 Characters per inch] D. C.
   A Neat Style of type for personal correspondence. 1 2 3 4 5 6 7 8 9 0

ELITE [10 PITCH] 10 Characters per inch D. C.
   Most beautiful for private correspondence. 1 2 3 4 5 6 7 8 9 0

PICA STANDARD MULTIGRAPH [10 Characters per inch] D. C.
   For filling in Multigraphed letters. 1 2 3 4 5 6 7 8 9 0

ELITE STANDARD MULTIGRAPH [12 Characters per inch] D. C.
   For filling in Multigraphed letters. 1 2 3 4 5 6 7 8 9 0

MEDIUM ROMAN [10 Characters per inch—also available in 9 to the inch] D. C.
   A distinct, legible type, large and clear. 1 2 3 4 5 6

PICA GOTHIC [10 Characters per inch] S. C.
   A Style that is largely used for Billing. 1 2 3 4 5 6 7 8 9

PICA GOTHIC [10 Characters per inch] D. C.
   Beautiful and distinctive for General Correspondence. 1 2 3

ELITE GOTHIC [12 Characters per inch] D. C.
   Very attractive for Personal Correspondence. 1 2 3 4 5 6 7 8 9 0

ELITE GOTHIC [12 Characters per inch] S. C.
   A legible type suitable for Billing or Correspondence. 1 2 3 4 5 6 7 8 9

GREAT PRIMER [8 Characters per inch] D. C.
   Popular wherever great legibility is required.

MEDIUM ROMAN GOTHIC [10 Characters per inch or 9 characters per inch] S. C.
   For Tags, Labels and General Billing. 1 2 3 4 5 6 7 8

MEDIUM ROMAN GOTHIC [10 Characters per inch or 9 characters per inch] D. C.
   A popular style for Shipping Dept. or Billing. 1 2 3

EXTRA LARGE GOTHIC [8 Characters per inch] S. C.
   Legible and popular for Billing. 1 2 3 4 5 6 7
Cleansing

1. GENERAL: The flammable and explosive properties of petroleum solvents [mineral spirits] as well as possible reaction to the skin of certain individuals comprise a hazard warranting the following precautionary measures:

a. Eliminate all fires, flames and high temperatures near fluid.

b. Use Vaporproof Safety Lamps over wash racks.

c. Eliminate danger of static electricity by grounding wash rack.

d. Provide proper ventilation by withdrawing fumes through the use of a hood over wash rack piped to outside opening and provided with Safety Type Exhaust Fan.

e. CO2 Fire Extinguisher should be provided.

f. An airtight cover should be provided to be installed over tanks containing petroleum solvents when not in use.

g. A protective skin cream, insoluble in petroleum spirits but soluble in water, has been perfected for protecting the hands of individuals who clean machines in petroleum solutions. There are several types available, one being the product called Pro-Tek, a product of the DuPont Company.

A Drying Cabinet may be constructed of a wooden packing box approximately 30 inches long, 24 inches deep and 24 inches wide, by hinging a door over the open box top, turning the box on its side and installing two electric light sockets inside the top of box where Infra-Red-Ray [250-300 W] lams may be installed. The interior of box should be lined with masonite, celotex or wallboard for insulation purposes. Install a 1" hole in the bottom of the box and in top of the box for ventilation purposes.

2. MACHINE PREPARATION:

a. Remove all cover plates, cowls, etc.

b. Remove Platen, Feed Rolls; Bail Rollers, Rubber Feet, Felt Pads, rubber parts, Typebar Rest Pad and ribbon.

Blow out dust, dirt and erasures with compressed air.

3. SOLUTIONS: The following solutions have been tried and proven successful. Any such solution will cause keyboard designators to swell, if allowed to remain in the solution, therefore in submerging machine if should be placed on its back with keyboard out of the solution.

a. Mineral Spirit [Solvent] Solution: Solvent should be mixed with No. 5 white oil [thin], 1/2 pint of white oil to each gallon of solvent.

Procedure: Tilt machine on back, brushing alcohol in segment and sub-frame slots [care should be taken not to permit alcohol to contact painted surface of machine]. Allow alcohol to penetrate for about 5 minutes. Immers machine in solution for 15 minutes, agitating constantly. Use brush, scrub segment slots, typebars, sub-frame slots and accumulations of gummed substances. Rinse in solution.

Blow out machine with compressed air. Pour clean solvent, not mixed with oil, through segment and sub-frame slots. Blow out machine with compressed air, wiping surplus from machine with cloth.

b. Magnasol-Kerosene Solution: One part Magnasol, 3 to 5 parts kerosene, 5 to 7 parts water. Agitate solution frequently.


c. Oakite Solution: Four ounces of Oakite to 10 gallons water. Agitate solution.

Procedure: Immerse machine in solution for 30 minutes. Wash machine thoroughly with hot water. Blow out machine thoroughly with compressed air. Place machine in drying cabinet for 10 to 15 minutes. Immerse machine [agitating constantly] in Solvent mixed with No. 5 white oil, 1/2 pint white oil to 1 gallon Solvent. Blow out machine thoroughly with compressed air. Rinse segment slots thoroughly with pure Solvent [not mixed with oil]. Blow out machine and segment thoroughly with compressed air. Dry surplus from machine with cloth.

4. RUSTY PARTS:

a. Cyanide Solution: Add 1 to 1/2 pounds of potassium cyanide to 4 to 4 1/2 gallons of water. Stir well in a 5 to 10 gallon earthen crock. Cyanide solution should always be kept in earthen crock and covered when not in use.

Procedure: Care should be taken that extremely dirty typebars, segment and other parts are allowed to remain in solution not to exceed 10 minutes; rusty part should be allowed to remain in the solution not to exceed 15 minutes. Remove from Cyanide solution and wash thoroughly with hot water. Rinse in solvent.

Production Wash Rack Specifications

1. This type of Wash Rack is recommended for mass production and versatile cleaning purposes. It is divided into three wells, the left well to contain the Magnasol-Kerosene-Water Solution (See Cleansing). The center well with drain to the sewer to provide hot water wash-out and the right well for the Mineral Spirit [solvent] mixed with oil solution. The two end tanks are provided with a Drain and Cap in the bottom of each tank, a Drain and Cap positioned about 1" above the bottom of the tank on the end. The top drain is provided to drain off the good solution when the sediment has settled in the bottom of the tanks, while the bottom Drain permits cleaning the tank of sediment.

The Magnasol-Kerosene-Water Solution Tank has inside dimensions with sufficient capacity to immerse four standard 11" typebars at one time for soaking the required 15 minutes. The Rack is sufficiently large to accommodate adding, duplicating and other machines.

A sliding top is provided, metal covered and metal edge under edge with a 1" rim around the top front, right and rear, leaving the left end open long enough to drain the solutions back to their tanks or into the sewer. This top is used for blowing out the machines and may slide along the top of the Rack to permit use as needed.

2. SPECIFICATIONS:

   - Structure: 21/4" Wood Frame, lined with Water-tight sheet metal, each well, heavy Wood shell bracketed all around.
   - It is recommended that a hood be provided over this Wash Rack equipped with exhaust fan [safety type] to withdraw odors and fumes.
1. New as well as Rebuilt Typewriters are now modernly finished with non-glare wrinkled enamel. This finish must be sprayed on the surface. It is best dried with Infra-Red-Ray Lamps, which eliminate oven heat and heat control problems that confront the user of gas heated ovens. The drawing pictures an Infra-Red-Ray Baking Oven recommended for this purpose.

2. Preparation: The machine frame or parts to be refinished must be thoroughly cleaned and all oil and grease removed. Lacquer thinner or gasoline may be used to remove any foreign deposits on machine frame prior to painting, by wiping parts thoroughly with cloth immersed in either liquid. All rubber parts should be removed. Designators and Space Bar should be covered with metal or asbestos. Carriage should be removed.

3. Paint Specifications: Roxalin Flexible Finishes, Inc. 800 Magnolia Avenue, Elizabeth, New Jersey, manufacture Black Rincontrol No. W 203268 and Rincontroller No. 8790 which is recommended for this purpose. Mixture: To each quart of Rincontrol, add 2 fluid ounces of Rincontroller No. 8790, stirring the mixture well. The enamel is then usually ready for spray application. Viscosity adjustment, if required, should be made with Reducer No. 817 available from the same firm. Similar enamel is available from other sources also.

4. Method of Application:
   a. Complete Refinish Job:
      [1] Metal Shields may be made to cover inner mechanism of the typewriter while spraying the frame, etc. These Shields may be made with a wire handle, so that they may be inserted in the frame openings and drawn forward to the inner frame to prevent paint from spraying on the mechanism. Masking Tape may be used with heavy paper for the same purpose.
      [2] Spray a light uniform coat of enamel over surface to be refinished. The Painter will determine by trial and error method the exact amount of coat to be sprayed onto the machine—but in no event should the coating be very heavy. Allow machine to air dry in dustproof container for 30 minutes to 1 hour. Place machine in Infra-Red-Ray Baking Oven. Turn on all units. Permit baking for 30 to 45 minutes. Turn off electricity. Remove machine from oven and permit to cool.

      b. Touch-up:
      [1] Lay a strip of masking tape around the section to be refinished to protect the balance of surface while spraying.
      [2] Using 00 emery cloth, remove wrinkle finish in area bounded by masking tape. It is not necessary to remove all the paint but the old wrinkle finish should be smoothed down.
      [3] Using above specified Wrinkle Paint, thinned just sufficiently for spraying purposes, spray surface lightly one coat. Allow to dry for approximately 1 minute, then spray an additional light coat over surface, being careful to shield other parts of machine confining spray to surface involved.
      [4] Let painted surface air dry for about 30 minutes.
      [6] If shop is equipped with Infra-Red-Ray Baking Oven as pictured in drawing, only those electric units that actually focus the ray on the painted surface need to be used. If Shop is not equipped with Infra-Red-Ray Baking Oven, an electric Desk or Extension Lamp may

Continued on Page 133
1. A new innovation in Universal "Type Soldering Jigs" is presented here, which permits soldering the type on the typebar without removing the typebar from the Segment and without removal of typewriter parts. This Jig permits soldering and aligning the type for both Ring and Cylinder as well as line of writing, reducing to a minimum the time required to perform the job. It is composed of a Vise Clamp which is attached to the Type Guide by swinging the Anvil Head around to make the Vise Clamp Screw accessible. With the Jig clamped to the Type Guide and the Auxiliary Abutment Ring attached to the Jig, bring up typebar to be retyped or [if the type is loose on this bar] use next adjoining typebar, until the Typebar positions against the Auxiliary Ring. Loosen Swivel Block Screw, turning the Anvil around to face the typebar involved. Tighten Swivel Block Screw. Loosen Anvil Clamping Screw and move Anvil outward to position the face of the type flatly against Anvil face with the lower edge of Capital Character resting on upper edge of Aligning Guide of Anvil. Tighten Anvil Clamping Screw. Typebar is now positioned ready for resoldering. Position new typehead on Typebar and position the lower edge of the Capital Character resting on upper edge of Aligning Guide.

2. TO SOLDER TYPE: [It is recommended that an old deflector plate be used to cover the Platen while soldering on the machine].

   a. To Remove Typehead, heat the type head with alcohol torch until the solder loosens permitting removal of the old type head.

   b. To Clean Typebar, wipe off end of typebar to remove old soldering flux. It is suggested that the bar be emeryed at soldering point to provide a new clean surface for the new solder, wiping the bar clean.

c. To Solder: With Type positioned as indicated in Paragraph 1 above, heat typebar, placing a small amount of soldering flux on top of the type head at position on the bar until the flux runs down between the type and typebar on both sides of the bar. With solder wire positioned over type and alcohol torch heating bar and type head, move solder wire along points of contact of typehead with bar until solder fully covers void between the type and typebar. Permit solder to cool. File off any rough surfaces on back or side edges of typebar.

d. For L. C. Smith: An L. C. Smith Bracket is included with the type soldering jig pictured above, which is used in place of the Auxiliary Ring, being positioned in the Type Guide binding screw hole of the L. C. Smith.

REFINISHING AND TOUCH-UP

Continued From Page 132:

be used equipped with Infra-Red-Ray 250-300 Watt Globe. Focus reflector on spot to be refinished, at a distance not exceeding 8 inches from the spot. If the area is too large, two lamps should be utilized.

[7] Cover designators, space bar, or rubber parts in area of the lamp focus with wood, asbestos, fibreboard or tin.

[8] Turn Lamp on and allow heat of lamp to bake surface involved for a period of 45 minutes to 1 hour.

[9] Turn Lamp off and allow machine to cool.

[10] In the event the touched-up-spot is darker than uniform finish of the machine, it may be toned down slightly by the use of 000 emery applied lightly to refinished section.
The Parts Cabinet, pictured above, is designed to provide an orderly, readily accessible storage for typewriter parts, or to serve as a guide to the dealer in having such a cabinet constructed locally by a cabinet maker. It should be constructed so that the drawers are recessed four inches inside the cabinet side walls, with drawer sliding strips extending out to the front of side walls. Such construction will permit of drawers being pulled forward so that the rear compartments will clear the front of the other drawers for accessibility of parts.

The top set of drawers are designed for stockage of screws, springs, nuts, washers, feed and bail rollers, etc. The second set of drawers provide space for segments and bars and medium sized parts. The lower set of drawers provide space for Platens, Tabulator and Margin Bars, Carriage Frames and similar items.
BUSINESS PRACTICES

If the reader was engaged in the repair of typewriters and office machines in the armed forces during World War II, he is aware of the fact that salesmanship was not necessary to produce repair work for the shop. Such shops had a never-ending source of supply of machines requiring repair. Because of this condition the reader may not realize that in the commercial field the supply depends upon selling effort and quality of work performed. Commercial users, unlike many unused armed forces operators, are very critical of the calibre of mechanical work performed upon their machines. They generally stick with a mechanic with a pleasing personality who knows his business and takes little of their time to perform it. They detest calling a mechanic to repeat an adjustment job which should have been properly performed on his first call and such a recall is unprofitable to the dealer as well. All of this may sound ridiculous to the embattled typewriter repairman who figures, as a result of his experience in the armed forces, that the presence of a typewriter and office machine repairman is a welcomed and much-needed occasion. Unskilled operators and handlers of office machines in the service are the main cause of continuous flow of machines through repair shops. The same unskilled operator was not so particular as to the quality of the repair job being more or less satisfied if the machine would just work.

In commercial life the skilled stenographer or operator has little time or consideration for the mechanic. He or she wishes to have the machine repaired quickly and permanently and to their complete satisfaction notwithstanding the fact that it may be the operator's own imperfection in touch, rhythm or operation that causes the complaint. Therefore, in commercial life, to survive competition the typewriter and office machine mechanic must be highly skilled, turn out top-quality work, understand human nature (the idiosyncrasies of the operator) and must know how to “sell” service. The newcomer to this field must either be highly qualified himself or be in a position to hire a qualified mechanic. The typewriter business will not pay a profit if the boss is only the managing director—he must be a part of the staff and engage wholeheartedly in selling, servicing and assisting generally in his business.

Just prior to the war there were approximately 5000 firms engaged in selling and servicing typewriters and office machines in the United States. Many of these were individuals operating from their homes. Others were small up-town businesses with ground floor or upstairs locations. Large independent dealers or manufacturer's sales outlets comprised the balance. Of the first two groups, quality of their work ranges from exceptionally good to average or fair. In the larger accounts, competition is keen, but in the smaller commercial life of one to five machines, the field is wide open and opportunity awaits the wide-awake service canvasser and salesman. The type of work performed by your shop determines whether the customer remains your customer.

The newcomer in this field fortifies himself with the highest of skills in his service department maintains prices in conformity with the quality of work his shop performs and aggressively operates his business, he will endure.

To be successful in this industry the individual must recognize good business principles and must understand the necessity for cost and sales analysis to insure a profitable operation. He will have to be on his toes, a merchant with high quality merchandise and a sales-service policy which will be profitable to himself and satisfactory to his customers. Low [chiselung] prices, misrepresentation, unsatisfactory products or workmanship will usher him out of this business in a hurry.

To set up a shop capable of profitable operation requires an original investment of from $1000 to $2000 for equipment, tools and parts, depending upon whether the shop is located in an upstairs office or ground floor store. This investment does not includestock of machines for sale, repair loan or rental nor does it include supplies such as ribbons, carbon paper, type cleaner, etc. The successful dealer has a sufficient stock of high-class rental machines the income from which should absorb his overhead. In depression or good business times rental machines are in demand and the class of rental machine determines the demand and the length of time it remains on rent. Commercial typewriter rental rates, in normal times, average $3 per month per machine. Special student rental rates run from $5 to $10 per month.

Sales of used, reconditioned or rebuilt typewriters normally consist of half time-payment-plan and half cash sales. The new dealer must be prepared to handle time payment plan paper or have banking arrangements who will accept and carry such paper for him. Portable typewriter and standard typewriter manufacturers generally have such a plan for the benefit of their dealers in new machines. It is the general custom for dealers to handle all makes of new portable typewriters. In some localities the new standard machine franchise may be available for one of the typewriter manufacturers. In all other cases the dealer must derive his revenue from the sale and rental of reconditioned, used or rebuilt machines, supplies and service department revenue.

Maintenance and Inspection Contracts are a normal operating procedure in this industry serving as an insured service revenue. It is a practice to thoroughly overhaul a machine at a price of from $7.50 to $17.50 depending upon the age and condition of the machine before placing it under a Maintenance Contract. Maintenance and inspection contracts generally call for quarterly inspection of the machine which includes brushing out, cleaning the type and platen, oiling, adjusting and tightening the machine in the customer's office together with all intervening service calls which are made without extra charge. Such service is performed at a price of from $7.50 to $9.00 per machine per year. A customer should be using upwards of 5 machines to make such an individual contract profitable to the dealer.

Present source of supply of typewriter and office machine parts, platen recoveries, tools and equipment is confined to two supply houses. The Ames Supply Company, 564 West Randolph Street, Chicago, Illinois and Shipman-Ward Manufacturing Company, 325 North Wells Street, Chicago, Illinois. These suppliers provide catalogues listing parts for all make and models of machines as well as tools and equipment. Catalogues of both firms should be obtained and kept on hand for reference purposes.

Dealers in this business should utilize the benefits of newspaper classified advertising, telephone directory classified advertising, direct telephone solicitation, direct mail as well as canvassing office to office to build up a sales and service clientele. If one is located in a street store, clever interesting window displays should be utilized to attract passersby. A neat display room and a clean and well organized service department are trade inducements. Above all, the newcomer should realize that his is the job of making the trade acquaintances and building the clientele, therefore the more time he spends visiting offices in the vicinity of his business, the wider his business acquaintance and the more successful his business will become. The short route to failure is to wait in the store for customers to come in or for the telephone prospect to call.
MAINTENANCE AND INSPECTION CONTRACT

CUSTOMER'S NAME: ___________________________ DATE: ___________________________

ADDRESS: __________________________________ TELEPHONE NO.: ________________________

To: [Name of dealer]

You are hereby authorized to place our typewriters, as listed on reverse side of this form, under your regular Quarterly Inspection at the rate of $________ per machine per year, a total of $________ payable within 30 days from date hereof.

It is understood and agreed that you are to give said listed machines regular quarterly inspection, to include brush-out cleaning, oiling, necessary adjustments and replacement of such worn parts as are needed [ribbons and rubber parts excluded] to keep said machines in good working condition, provided this work can be accomplished in our office with the exception of calls made necessary by misuse, accident or fire. No charge will be made for service calls between regular inspections.

ACCEPTED: ___________________________

SIGNED: ___________________________ [Customer's Name]: ___________________________

[Your firm name]: ___________________________

BY: ___________________________

[Your firm name]: ___________________________

BY: ___________________________

RENTAL AGREEMENT

[Your firm name]: ___________________________ Date: ___________________________ 194

[Your address]: ___________________________

Please deliver to: ___________________________ [Customer's Name]: ___________________________

Address: ___________________________

City and State: ___________________________

[Quantity]: ___________ [Make]: ___________ Typewriter[s], Serial Numbers as follows:

for the use of which I [or We] agree to pay a rental of $________ per _______ payable in advance at your office on the ______ day of each month until I [or We] notify you in writing of my [or Our] wish to discontinue this agreement. I [or We] agree to become responsible for the safe keeping of said typewriter[s], including loss by theft or fire, and to surrender said typewriter[s] to any authorized agent of your company, upon demand, at the termination of the rental agreement, or in case of default in payment of rent in advance. You are to be notified in writing by myself [or Us] of any change in address or telephone number. I [or We] agree not to remove the above mentioned property from the address given above nor to transfer or assign this contract to any party without written consent of your company.

REFERENCE: ___________________________

ADDRESS: ___________________________

TELEPHONE: ___________________________

SIGNED: ___________________________ [Customer’s Name]: ___________________________

ADDRESS: ___________________________

TELEPHONE: ___________________________
### BUSINESS FORMS

#### IN ORDER

**YOUR FIRM'S NAME**  
**YOUR FIRM'S ADDRESS**  
**DATE**

**ADDRESS**  
**DATE**  
**Junior**  
**Salesman**

<table>
<thead>
<tr>
<th>TRAIL</th>
<th>LOAN</th>
<th>RENTAL</th>
<th>EXCHANGE</th>
<th>OVERHAUL</th>
<th>RETURN [SALES]</th>
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<tbody>
<tr>
<td>Make</td>
<td></td>
<td>Model</td>
<td>Serial</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- TABLE
- BASE
- PAD
- COVER
- MISC

**RECEIVING DEPARTMENT**  
**YOUR'S FIRM'S NAME**  
**DATE RECD**

**BROUGHT IN BY**

**RECD BY**

**By**

---

#### CUSTOMER'S ORDER NO. **DATED** **DATE**

#### OUT ORDER

**YOUR FIRM'S NAME**  
**ADDRESS**

**CHARGE TO**

**ADDRESS**  
**SHIP TO**  
**ADDRESS**  
**SHIP OR DELIVERY [DATE]**  
**SHIP VIA**

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<tr>
<th>TRAIL</th>
<th>SALE</th>
<th>RENT</th>
<th>LOAN</th>
<th>REPAIR LOAN</th>
<th>EXCHANGE</th>
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<tr>
<td>QUANTITY</td>
<td>MODEL</td>
<td>SERIAL</td>
<td>MAKE</td>
<td>TYPE</td>
<td>KEYBOARD</td>
</tr>
</tbody>
</table>

**ABOVE DESCRIBED PROPERTY RETURNABLE ON DEMAND UNLESS CONTRACTED FOR**

**RECEIVED**

**By**

**DATE DELIVERED**

**By**
REPAIR ESTIMATE

CUSTOMER'S NAME: ___________________________ DATE: 194

ADDRESS: ________________________________________

We wish to submit to you an estimate of $_________ for:

machine No. ____________________________

If this meets with your approval, please sign below, returning estimate to us. A duplicate copy is provided for your records. Work will begin when signed estimate is received.

_________________________ [Your firm name] ____________________________

CUSTOMER'S ACCEPTANCE: ____________________________

BY: ____________________________

I [or we] hereby accept and agree to the terms of the above estimate of $_________ for work described above to be performed on our machine ____________________________ [Make] ____________________________, Serial No. ____________________________

SIGNED: ____________________________ [Customer's Name] ____________________________

BY: ____________________________

REPAIR ORDER

NO. __________

YOUR FIRM'S NAME

NAME: ____________________________

YOUR FIRM'S NAME

ADDRESS: ____________________________

STREET: ____________________________

CITY: ____________________________ STATE: ____________________________

DATE CALL REC'D: ____________________________

TIME: ____________________________

BY: ____________________________

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<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Quantity</th>
<th>Price</th>
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</table>

MECHANIC'S RECORD

MODELS: ____________________________

SERIAL: ____________________________

DATE REPAIRED: ____________________________

TIME SPENT: ____________________________

IN GUARANTEE: YES □ NO □

MECHANIC MUST FILL IN ABOVE

BY MECHANIC: ____________________________

C. O. D. YES □ NO □ AMOUNT: ____________________________

REPAIRED ARE SATISFACTORY

SIGN HERE

CUSTOMER: ____________________________

RECEIVED FROM: ____________________________ FOR PARTS AND REPAIRS

CUSTOMER'S RECEIPT

YOUR FIRM'S NAME

BY: ____________________________
<table>
<thead>
<tr>
<th>TROUBLE</th>
<th>CAUSE</th>
<th>APPLIES TO</th>
<th>MANUAL REFERENCE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACK SPACE</td>
<td>1. Back Space Pav Teeth worn or broken</td>
<td>BACK SPACE</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Improper mesh of Back Space Pav in Rack</td>
<td>BACK SPACE</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Loose Leaf not positioned properly on Starved Tooth</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Pinion Pav binding</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Back Link Pav or Escapement Wheel Stop not positioned</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Back Space Pav Spring disconnected or improper tension</td>
<td>BACK SPACE</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Back Space Pav Octagon or Screw worn, dulled or broken, casting item</td>
<td>BACK SPACE</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Main Spring or Escapement Bracket Loose</td>
<td>MAINSPRING</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Sub-frame Loose</td>
<td>BACK SPACE</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Back Spaces Rocker, Sub-Leaf or Link deflected</td>
<td>BACK SPACE</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Wheel Leaf not positioned properly under Starved Tooth</td>
<td>BACK SPACE</td>
<td>120</td>
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<tr>
<td></td>
<td>12. Back Space Key Lever Spring broken or disengaged</td>
<td>BACK SPACE</td>
<td>120</td>
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<tr>
<td></td>
<td>13. Back Space Brake Spring broken or disengaged</td>
<td>BACK SPACE</td>
<td>120</td>
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</tr>
<tr>
<td></td>
<td>14. Machine equipped with wrong pitch Back Space Pav.</td>
<td>MAINSPRING</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>CAPITAL LETTERS</td>
<td>1. Operator using Shift Key incorrectly.</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Equipment Key Cap (or Shift Key) binding on frame or Shift Lock Key</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Sub-frame binding, not making full throw.</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Sub-carriage not seating properly.</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Shift Leaf bent or loose</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
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<tr>
<td></td>
<td>6. Segment Sliding mechanism not making full throw.</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Segment leaf in Rack</td>
<td>ROCKER</td>
<td>32</td>
<td></td>
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<tr>
<td></td>
<td>8. Escapement or Shift Balance Springs</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Motion adjustment required.</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>CARRIAGE</td>
<td>1. Rack Lever binding, Rack not engaged in Pinion.</td>
<td>RACK PIN, AND STARWHEEL</td>
<td>64 - 67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Broken Loose Dog on Escapement Wheel Stop</td>
<td>RACK PIN, AND STARWHEEL</td>
<td>64 - 67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Escapement Rocker disconnected or removed</td>
<td>RACK PIN, AND STARWHEEL</td>
<td>64 - 67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Pinion Pav binding, not seating in Pinion or Pavl Spring broken or disengaged</td>
<td>RACK PIN, AND STARWHEEL</td>
<td>64 - 67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Tension Release Bar binding, Lower Dog disengaged</td>
<td>RACK PIN, AND STARWHEEL</td>
<td>64 - 67</td>
<td></td>
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<tr>
<td></td>
<td>6. Tabulator Keylevers sticking in Comb.</td>
<td>TABULATOR</td>
<td>114</td>
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</tr>
<tr>
<td></td>
<td>1. Drawbridge broken or disconnected.</td>
<td>DRAWBRIDGE</td>
<td>54 - 63</td>
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</tr>
<tr>
<td></td>
<td>2. Main spring broken or relaxed.</td>
<td>DRAWBRIDGE</td>
<td>54 - 63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Main Pinion improperly located.</td>
<td>DRAWBRIDGE</td>
<td>54 - 63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Lock notch incorrectly located</td>
<td>DRAWBRIDGE</td>
<td>54 - 63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Pinion Rocker binding</td>
<td>DRAWBRIDGE</td>
<td>54 - 63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Starwheel binding</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Back Space Pav或Breakage in Rack.</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
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<tr>
<td></td>
<td>8. Starwheel binding</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Paper Strip binding</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
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<tr>
<td></td>
<td>10. Tensioner strip in guide.</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Ribbon Speed Cap Covers binding Carriages.</td>
<td>ESCAPEMENT ACTION</td>
<td>71</td>
<td></td>
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### Won't Escape, Blinding or Stirring.

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<td>21. Escapement Rocker spring disconnected or insufficient tension.</td>
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<td>34-63</td>
</tr>
<tr>
<td></td>
<td>22. Carriage Rails or Warming.</td>
<td>MAINSPRING AND DRAWBAND</td>
<td>34-63</td>
</tr>
<tr>
<td></td>
<td>23. Insufficient clearance between Loose and Stationary Dows.</td>
<td>MAINSPRING AND DRAWBAND</td>
<td>34-63</td>
</tr>
</tbody>
</table>

### IMPRESSION

**Imprinting Paper or Ink.**

<table>
<thead>
<tr>
<th>TROUBLE</th>
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<th>MANUAL REFERENCE</th>
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</thead>
<tbody>
<tr>
<td><strong>IMPRESSIONS IMPERFECT</strong></td>
<td>1. Typebar on Platen-out Abutment Ring.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>2. Typebar improperly aligned to typebar.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>3. Most Carriage loose in rails.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>4. Plates printed, chilled, inflated or improperly fitted.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>5. Plates not properly engaged on abutment ring.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>6. Individual typebar not aligned to Abutment Ring and Typebar.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>7. End shock in Sub-carriage.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>8. End shock in Segment Typebar Shift Model.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
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<tr>
<td></td>
<td>9. On-foot adjustment incorrect.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>10. Motion adjustment incorrect.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>11. Typebar sticking in guide.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>12. Typebars sticking in segment slot.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>13. Loosen type on Bar.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>14. Worn or bunched type face.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
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<td></td>
<td>15. Plates not concentric.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>16. Plates ground down too small diameter.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>17. Plates Loose on Cores.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>18. See Causes of Slipping.</td>
<td>MAIN CARRIAGE</td>
<td>6-10</td>
</tr>
</tbody>
</table>

### KEYBOARD NOT LEVEL.

<table>
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<tbody>
<tr>
<td><strong>LINE SPACING IRREGULAR.</strong></td>
<td>1. Loose Sub-frame or Keykeeper Bracket.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
<tr>
<td></td>
<td>2. Worn Keykeeper Stop pad.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
<tr>
<td></td>
<td>3. Insulated or worn Typebar.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
<tr>
<td></td>
<td>4. Keyseed sticking in Keykeeper Comb.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
</tbody>
</table>

### ALIGNMENT

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</thead>
<tbody>
<tr>
<td><strong>LINE SPACING IRREGULAR.</strong></td>
<td>1. Gummy Plates and/or Feed Roller.</td>
<td>PAPER FEED</td>
<td>43-48</td>
</tr>
<tr>
<td></td>
<td>2. Backstop release engaged.</td>
<td>LINE SPACING LEVER</td>
<td>50-53</td>
</tr>
<tr>
<td></td>
<td>3. Plates not concentric.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
<tr>
<td></td>
<td>4. Plates loose on Core.</td>
<td>PLATE</td>
<td>28-31</td>
</tr>
<tr>
<td></td>
<td>5. Variable slipping.</td>
<td>LINE SPACING LEVER</td>
<td>50-53</td>
</tr>
</tbody>
</table>