

BELL SYSTEM PRACTICES
Teletypewriter and Manual
Telegraph Station and P.B.X.
Installation and Maintenance

SECTION P36.610
Issue 3, February, 1939
AT&T Co Standard

TELETYPEWRITER—TYPING UNIT

15 TYPE

REQUIREMENTS AND PROCEDURES

1. GENERAL

1.01 This section outlines the apparatus requirements and adjusting procedures for the maintenance of typing units of 15 type teletypewriters. It is reissued to add or revise the requirements and procedures marked with an asterisk (*) in the Table of Contents, 1.03.

1.02 The following general requirements and procedures shall be followed in the application of the requirements and procedures listed herein.

(a) Requirements are arranged in the sequence that should be followed when complete readjustment is made. As this is seldom necessary, it should be kept in mind when making a single readjustment that related adjustments should be checked.

(b) Springs which do not meet the requirements specified and for which no adjustment is provided shall be replaced by new springs.

(c) In ordering replacement parts always refer to the Ordering Information for the part name and number, as the designations used herein are in some cases abbreviated to save space and may differ from that used in the Ordering Information.

(d) After changing the adjustment of any part, check adjustments of related parts which may possibly have been disturbed.

(e) Dimensions and spring tension requirements shall be checked with appropriate gauges and scales unless otherwise specified in the requirement. In checking spring tensions the following Teletype scales shall be

used as the tension values specified herein (including gram equivalents) are the values indicated by these scales when used in the position described.

<u>When Max. Tens. Specified is</u>	<u>Teletype Scale to be Used</u>
Up to 8 ozs.....	138-55M
Above 8 ozs. up to 32 ozs.....	138-58M
Above 32 ozs. up to 64 ozs.....	82711M
Above 4 lbs. up to 12 lbs.....	4841M
Above 12 lbs. up to 25 lbs.....	2727M

(f) Before attempting to readjust any part which is held by clamping screws, mounting screws or lock-nuts, be sure to loosen locking device. After adjustment is completed be sure to reset the locking device.

(g) If any part is dismantled to facilitate checking or making an adjustment, be sure to reassemble the dismantled part after the checking or readjustment is completed taking care to keep locating shims in proper place.

(h) Fixed pivot points are noted in figures by solid back circles.

(i) Contact points shall fall wholly within the circumference of the opposing contact except contacts having same diameter whose centers shall not be out of alignment more than 25% of their diameter.

1.03 Table of Contents	Paragraphs
*GENERAL	1.01 to 1.03
CLEANING	2.01
*LUBRICATION	3.01
REQUIREMENTS AND PROCEDURES	4.01 to 4.186
Carriage Mechanism	
Carriage Guide Screws	4.144
*Carriage Return Clutch Spring and Teeth	4.140 and 4.135
Carriage Return Function Lever Spring	4.138
*Carriage Return Latch Bar and Latch..	4.131 and 4.132
*Carriage Return Operating Lever Spring	4.139
Carriage Return Reset Bar Spring	4.137
Carriage Return Spring	4.150
*Carriage Support and Pull Bar Bail Plunger Rollers	4.29

Dashpot Lever Spring	4.141
*Dashpot Vent Screw	4.176
*Lock Bar Latch and Spring	4.133 and 4.134
*Lock Bar Shoulder	4.136
Function Bail Mechanism	
*Bail Cam Unit Friction Clutch	4.175
*Function Bail Blade	4.89
Function Bail Spring	4.43
Function Lever Bail	4.37 to 4.39
Function Lever Springs	4.86 and 4.87
Line Feed Mechanism	
*Line Feed Check Screw	4.105 to 4.107
Line Feed Check Lever Spring	4.108
Line Feed Detent Lever Spring	4.103
Line Feed Pawl and Spring	4.100, 4.101 and 4.104
*Line Feed Push Bar Spring	4.102
Single-Double L. F. Detent and Spring	4.98 and 4.99
*Sprocket Line Feed	4.185
Main Shaft Mechanism	
*Main Shaft Clutch Teeth and Spring	4.31, 4.33 and 4.34
Clutch Throw-out Lever Spring	4.32
Selector Cams	4.30
*Selector Clutch	4.174
Motor Stop Mechanism	
Inner Motor Stop Pawl	4.68
Motor Stop Contact Springs	4.157 to 4.160
Motor Stop Contact Lever Spring	4.75
Motor Stop Function Lever Spring	4.76
*Motor Stop Lever and Spring	4.70 and 4.74
Motor Stop Lever Eccentric	4.69
*Motor Stop Pawls and Spring	4.71 and 4.73
Motor Stop Release Lever Eccentric	4.72
Shift-Blank-Stop Mechanical Motor Stop	4.181
Upper Case "H" Contact Assembly	4.182
Platen Roll and Paper Mechanism	
Paper Chute Spring	4.114
Paper Finger Shaft Spring	4.116
Paper Finger Shaft Stop Arm	4.115
Paper Guides	4.119
Paper Spindle Drag Spring	4.151
Paper Straightener Rod and Spring ..	4.117 and 4.118
Platen Friction Assembly	4.152
Platen Shaft	4.97
Platen Unit	4.82
Pressure Roller Release Cam	4.111

	Paragraphs
Pressure Roller Release Lever Shafts	4.113
Pressure Roller Release Shaft and Arm	4.110 and 4.109
Pressure Roller Tension Spring	4.112
Ribbon Mechanism	
Ribbon Feed Shaft	4.06
Ribbon Feed Pawl Spring	4.04
Ribbon Feed Shaft Detent and Spring	4.07 and 4.08
*Ribbon Lockout Bar	4.170 and 4.171
*Ribbon Lockout Bar Detent Spring ..	4.25 and 4.26
*Ribbon Oscillator Lever	4.21 and 4.169
Ribbon Oscillator Lever Spring	4.22
Ribbon Reverse Bail Spring	4.19
Ribbon Reverse Pawls and Springs ..	4.17 and 4.18
Ribbon Reverse Shafts	4.15 and 4.16
Ribbon Shift Lever Spring	4.23
Ribbon Spool Cups and Shafts	4.11 and 4.13
*Vertical Ribbon Feed Shafts	4.10
Vertical Ribbon Feed Shaft Springs	4.14
Vertical Ribbon Feed Shaft Gears	4.09 and 4.12
Range Finder Mechanism	
Stop Lever and Spring	4.77 and 4.79
Trip Latch Spring	4.78
Armature Trip-off Screw	4.80
* Selecting Mechanism—Holding Magnet Type	
*Armature Lever and Spring	4.46, 4.55 and 4.57
*Locking Lever and Spring	4.51 and 4.52
*Locking Wedge	4.50
*Selector Arm and Spring.....	4.48, 4.58 and 4.59
*Selector Arm Stop Detent Spring	4.53
*Selector Armature	4.47
*Selector Lever Spring	4.54
*Selector Magnet Bracket	4.56
*Selector Swords	4.49
Sword Separator Plate Leaf Springs	4.45
Selecting Mechanism—Pull Magnet Type	
Armature Locking Lever Spring	4.67
Armature Locking Wedge	4.66
Magnet Bracket	4.81
No. 1 Sword Arms	4.65
Selector Armature and Spring	4.61 and 4.64
Selector Lever Springs	4.60
*Selector Swords	4.62 and 4.63
Sword Separator Plate Leaf Springs	4.45

Send-Receive-Break Mechanism	
Blank Function Lever Spring	4.155
*Intermediate Lever and Spring	4.161 to 4.163
*Send-Receive Reset Lever Adjusting	
Screws	4.164 and 4.165
*Send-Receive Reset Lever Down Stop Screw	4.166
*Send-Receive "T" Lever and Friction	
Washer	4.158 and 4.156
Universal Function Lever Spring	4.154
Shift Mechanism	
Figures and Letters Stop Screws	4.84 and 4.85
Letters and Figures Push Bar Springs	4.96
Platen Balance Spring	4.92
Platen Shift Stop Post	4.83
Shift Detent and Spring	4.93 and 4.94
*Shift Stop Post	4.91
*Unshift on Space Cut-out Lever	4.90
Signal Bell Mechanism	
Function Lever Spring	4.130
Hammer Arm Extension and Spring	4.124 and 4.127
*Latch Bar and Latch	4.125 and 4.126
Operating Lever Spring	4.128
Reset Bar Spring	4.129
*Remote Signal Bell Contacts	4.183
Spacing Mechanism	
Blank Printing and Spacing Cut-out Function	
Lever Spring	4.88
Left and Right Margins	4.167 and 4.168
Margin Bell and Bell Pawl Spring ..	4.24 and 4.173
Margin Bell Hammer and Spring ..	4.122 and 4.123
Rear Spacing Escapement Pawl	4.120
*Right Margin Adjusting Screw Arm Spring ..	4.28
*Spacing Clutch	4.172
Spacing Escapement Pawl Spring	4.121
Spacing Rack	4.146
Spacing Shaft Gear	4.35
*Spacing Stop Lever and Spring	4.142 and 4.143
*Tabulator	4.184
Transfer Mechanism	
Code Bar Bell Cranks	4.145
*Locking Function Lever Spring	4.148
Selector Vanes	4.41 and 4.42
Sixth Vane Detent Lever Spring	4.149
Sixth Vane Extension and Spring	4.40 and 4.95
Typing Mechanism	
*Alignment of Type	4.180

	Paragraphs
*Bail Cam Unit Friction Clutch	4.175
Printing Bail Spring	4.44
*Pull Bars	4.27 and 4.36
*Pull Bar Bail	4.01 and 4.05
Pull Bar Bail Plunger Guide Roller	4.02
Pull Bar Springs	4.03
Type Bars	4.177 to 4.179
*Type Bar Backstop and Guide	4.20 and 4.147
*Orientation Range and Distortion Tolerance	4.186

2. CLEANING

2.01 If necessary, typing units shall be cleaned in accordance with general Section, P30.010, covering Cleaning Teletypewriter Apparatus.

3. LUBRICATION

3.01 Typing units shall be lubricated in accordance with Section P36.601 covering Lubrication of 15 Type Teletypewriters.

4. REQUIREMENTS AND PROCEDURES

Note: Type bar carriage should be removed when making adjustments 4.01 to 4.33 inclusive. To do this operate manual carriage return lockbar and move carriage to extreme right position, grasp draw strap with right hand so as to prevent spring drum from unwinding, unhook draw strap from carriage and hook it over margin bell clapper stop post, then move right margin adjusting screw arm to rear and slide carriage off to right.

4.01 **Pull bar bail** shall be within .010" of being parallel to stripper plate when the bail is held forward in a position adjacent to stripper plate, and the bail plunger shall be within .002" of being parallel to the flanged guide roller as in Fig. 1. Gauge by eye.

(a) To adjust, reposition plunger guide roller bracket to left or right until bail is within .010" or touches stripper plate at both ends when bail is in extreme forward position, and shift bracket up or down until plunger and roller are parallel.

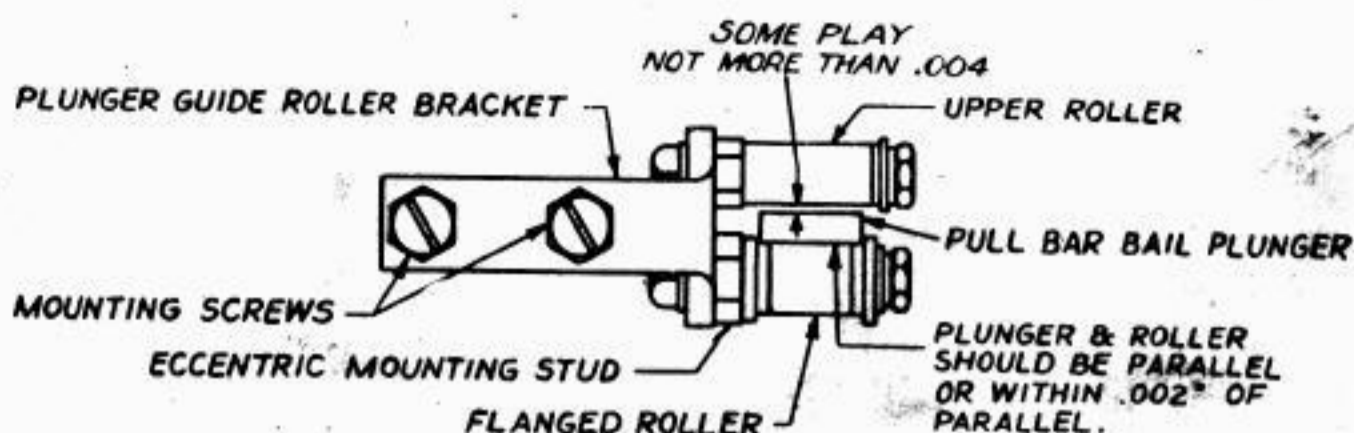


Fig. 1.

4.02 **Pull bar bail plunger guide rollers** shall rotate freely and upper roller shall clear plunger by not more than .004" as in Fig. 1 throughout plunger travel. Gauge by eye.

(a) To adjust reposition eccentric mounting stud of the flanged roller.

Note: Remove type bar segment assembly for 4.03 and 4.04 by removing type bar backstop, ribbon carrier and type bar segment mounting screws and then with the pull bars held out of engagement with their guide with a string or wire under the bars, slide assembly forward.

4.03 **Pull bar springs** shall have tension of Min. 2-1/2 ozs. (70 gms.), Max. 3-1/2 ozs. (100^g gms.) measured as in Fig. 2.

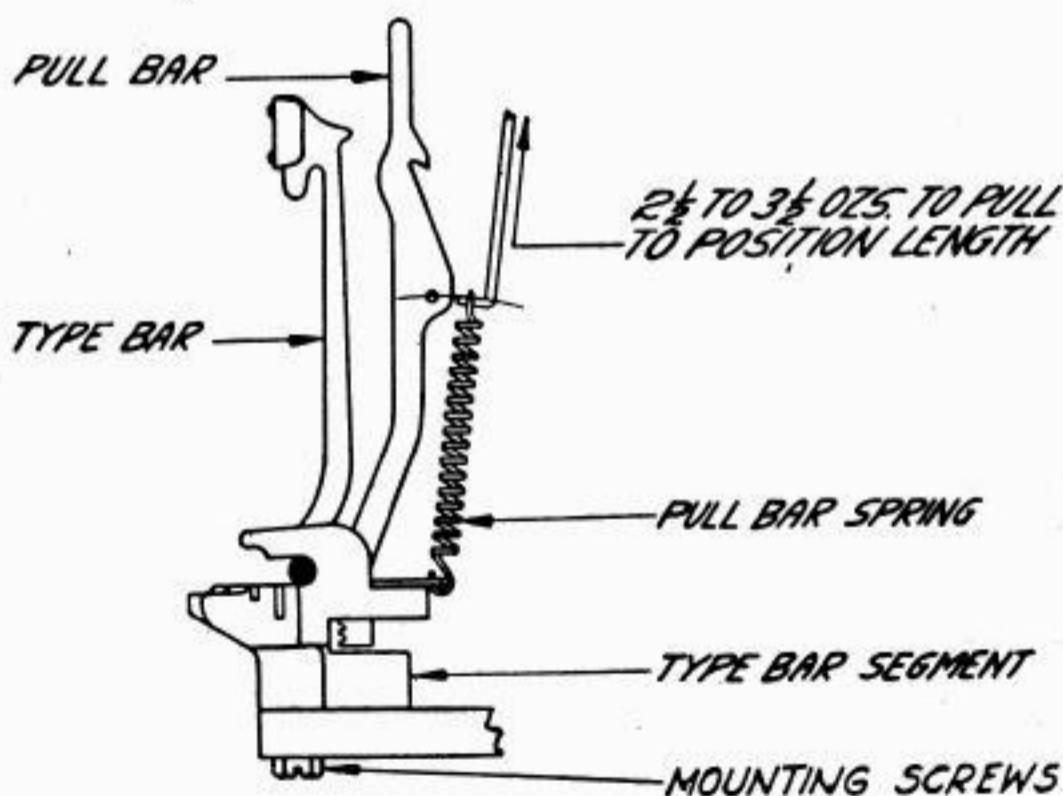


Fig. 2.

4.04 **Ribbon feed pawl spring** shall have a tension of Min. 2-1/4 ozs. (65 gms.), Max. 3-1/4 ozs. (90 gms.) measured as in Fig. 3 when pull bar bail is in extreme rear position and type carriage is held in normal position.

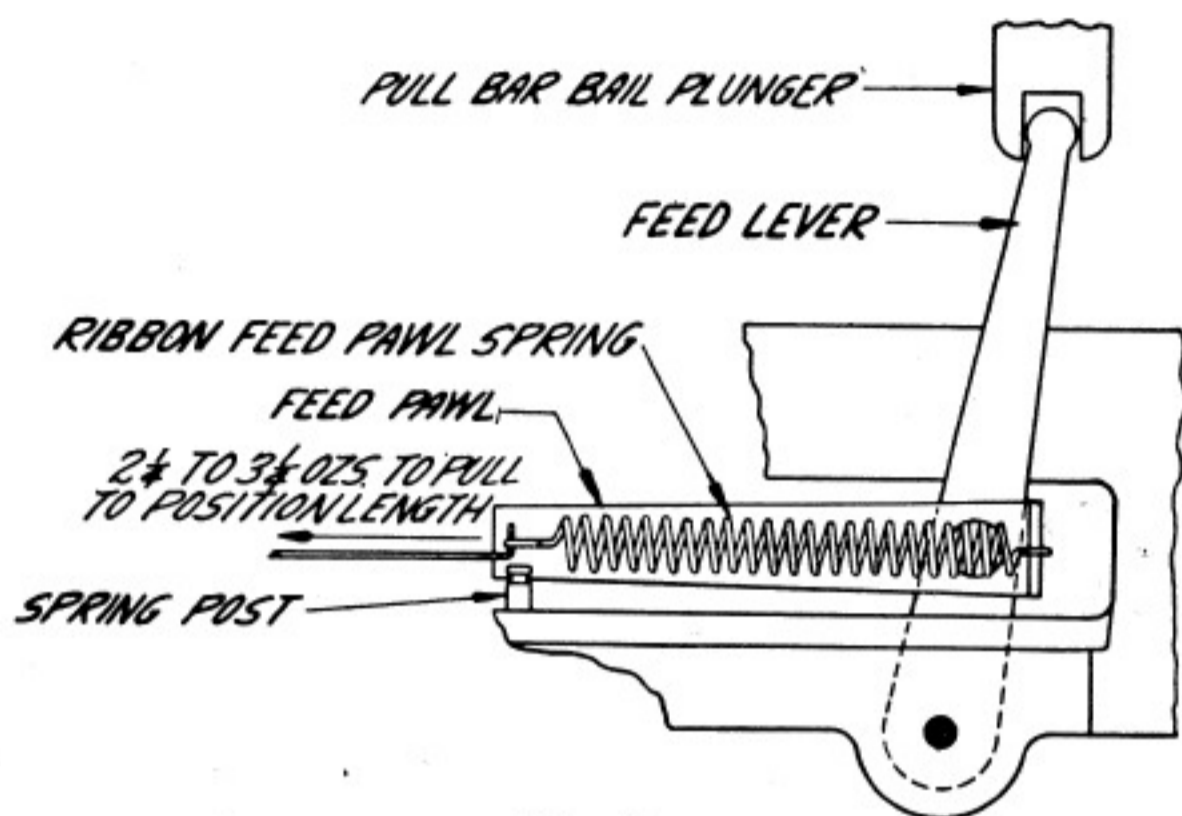


Fig. 3.

Note: Reassemble type bar segment assembly, backstop and ribbon carrier, being careful to get ribbon lockout bar and detent spring and ribbon oscillator lever in proper slots.

Note: Bell crank mounting plate assembly should be removed when making adjustments 4.05 to 4.26 inclusive. Be careful not to bend upper ends of bell cranks.

4.05 **Pull bar bail** shall clear hump on pull bars (except blank pull bar) by Min. .008", Max. .020" as in Fig. 4 when code bars are to right, and pull bar play is taken up to make clearance a minimum.

Note: Shift code bars to left and check clearance to hump on blank pull bar.

(a) To adjust, reposition code bar mounting plate.

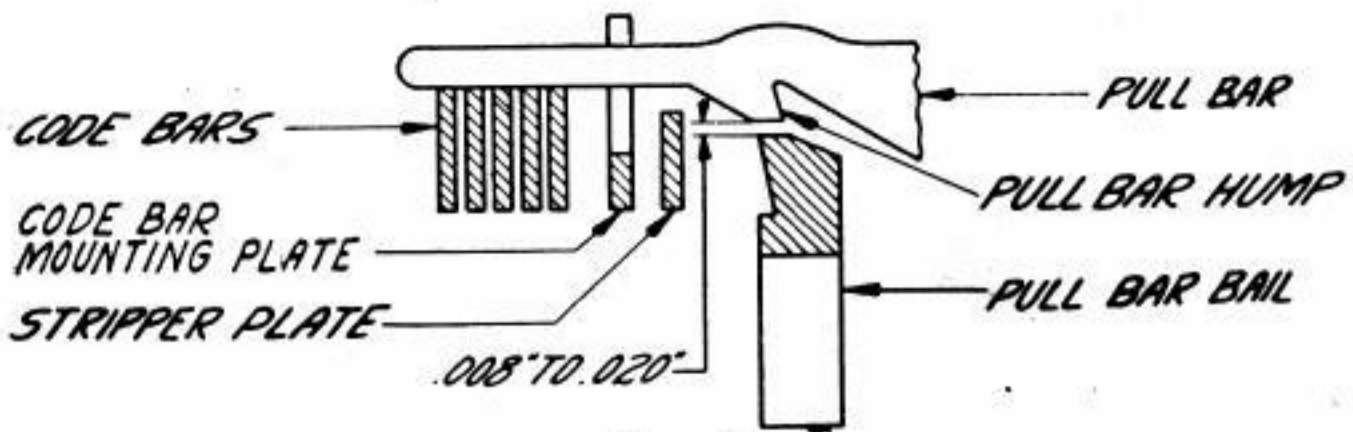


Fig. 4.

4.06 **Ribbon feed shaft** ends shall be flush with inner edge of the teeth on the engaged vertical feed shaft gear (see Figs. 5 and 6) when ribbon feed shaft is in its extreme right and left positions. Gauge by eye.

(a) To adjust, move both ribbon spool brackets up as far as elongated holes will permit and tighten bracket mounting screws with bracket vertical (at right angles to casting); place ribbon feed shaft in left position and loosen ribbon feed shaft right bearing plate clamp nuts; holding the left vertical feed shaft gear in engagement with the ribbon feed shaft gear, reposition right bearing plate and tighten bearing plate clamp nuts. Move ribbon feed shaft to right position and position left bearing plate in same manner.

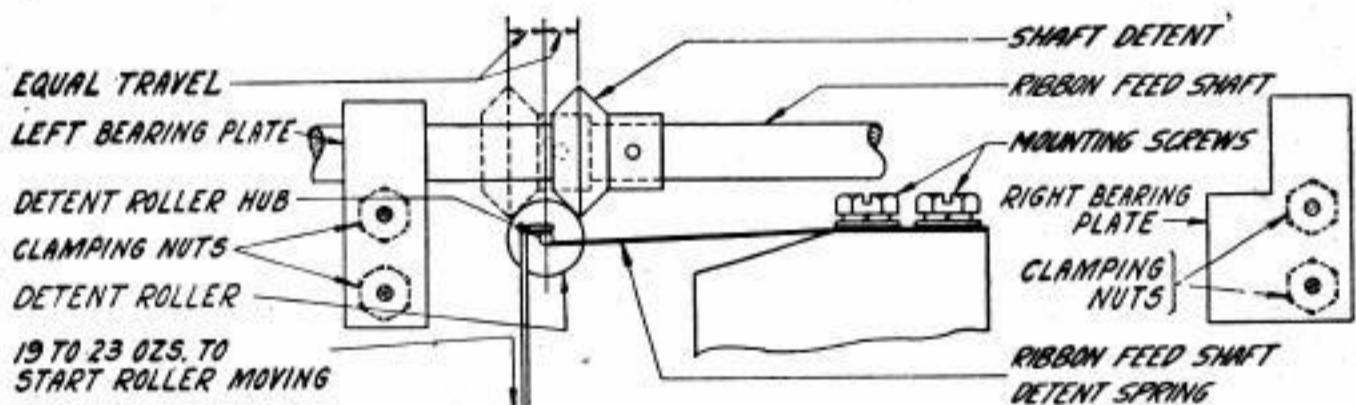


Fig. 5.

4.07 **Ribbon feed shaft detent** shall travel equally either side of its detent roller as in Fig. 5 when shaft is moved from extreme left to extreme right or vice versa. Gauge by eye.

(a) To adjust, reposition detent spring. When tightening detent spring mounting screws make sure mid-plane of roller passes approximately through shaft center line.

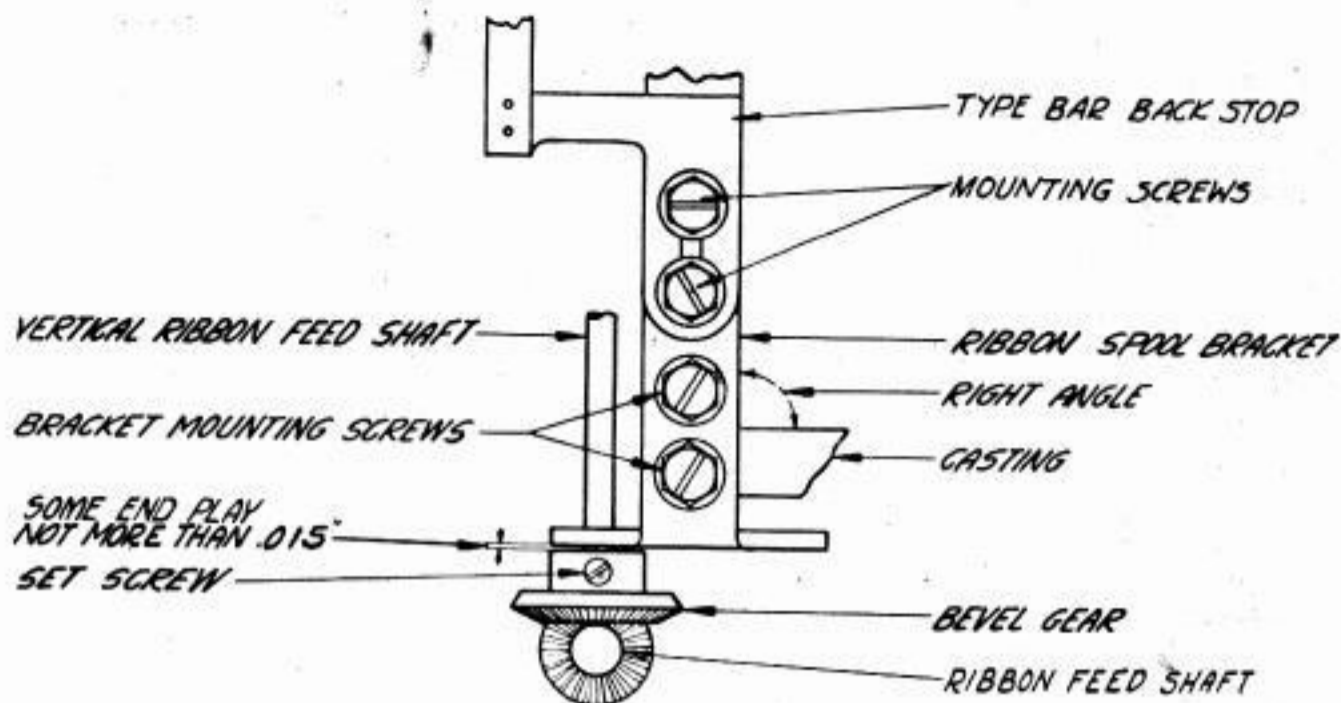


Fig. 6.

4.08 **Ribbon feed shaft detent spring** shall have a tension of Min. 19 ozs. (540 gms.), Max. 23 ozs. (650 gms.) measured as in Fig. 5 when (1) ribbon feed shaft is in left position and (2) when shaft is in right position. These two readings shall be within 2 ozs. (56 gms.) of each other.

(a) To adjust tension, bend spring; to equalize two readings reposition detent spring and recheck 4.07.

4.09 **Vertical ribbon feed shaft bevel gears** shall be flush with lower end of the shafts as gauged by eye. See Fig. 6.

(a) To adjust, reposition bevel gears making sure that set screws bear against flats on shafts when tightened.

4.10 **Vertical ribbon feed shafts** shall be vertical and have end play not to exceed .015" as in Fig. 6, gauged by eye and feel, when the bevel gears are in engagement with the associated ribbon feed shaft gear.

Note: When checking, take up ribbon feed shaft bearing play in a direction to make the end play of the vertical shaft a maximum.

(a) To adjust, reposition ribbon spool bracket.

4.11 **Ribbon spool shafts** shall have end play, not to exceed .006" as in Fig. 7. Gauge by eye and feel.

(a) To adjust, reposition vertical ribbon feed shaft spur gears making sure set screws bear against flats on shafts when tightened.

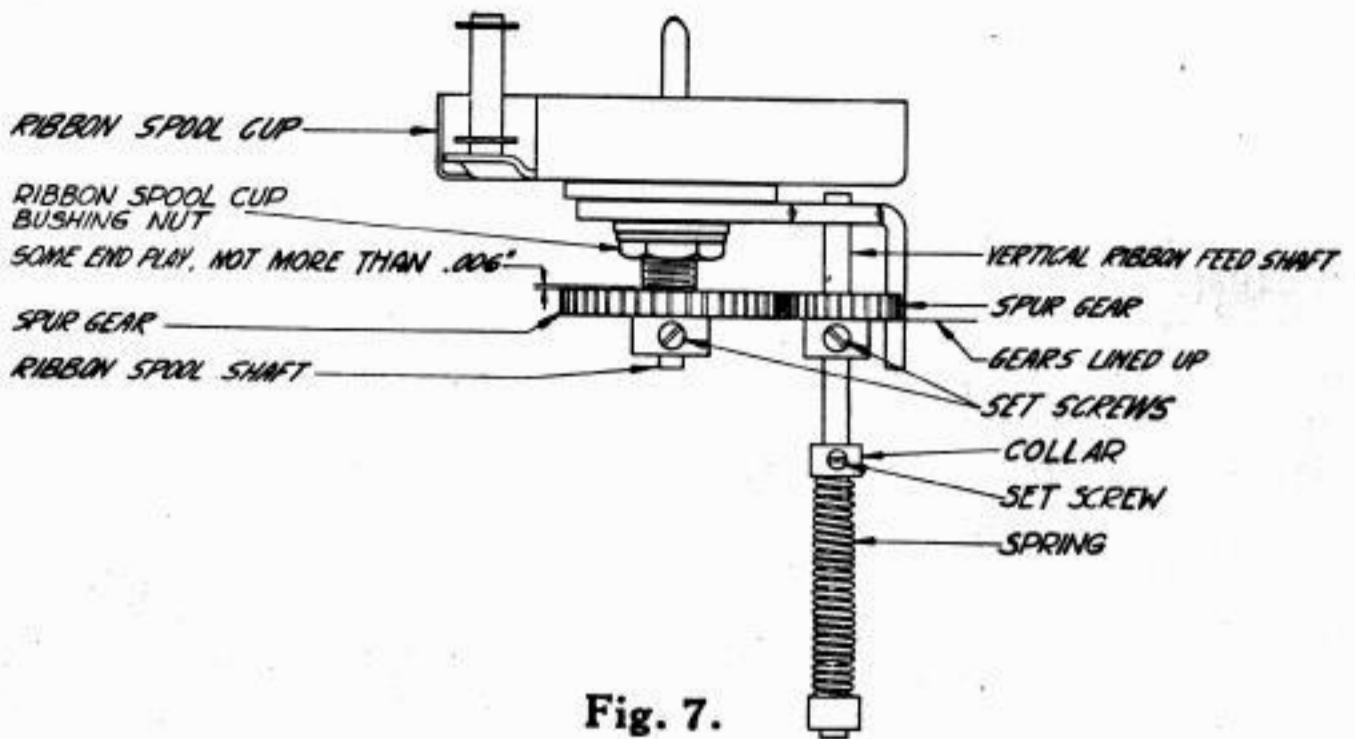


Fig. 7.

4.12 **Vertical ribbon feed shaft spur gears** shall line up with ribbon spool shaft spur gears as in Fig. 7. Gauge by eye.

(a) To adjust, reposition vertical feed shaft spur gears, making sure set screws bear against flats on shaft when tightened.

4.13 **Ribbon spool cups** shall be positioned so that (1) their ribbon roller bearing pins are Min. 3/4", Max. 7/8" in front of a line through the ribbon spool shaft centers as in Fig. 8, and (2) there is no bind between the gears on the ribbon spool shaft and the vertical ribbon feed shaft. Gauge by eye and feel.

(a) To adjust, reposition ribbon spool cups taking up play between cup bushings and brackets so as to make play between gears a maximum. (See Fig. 7)

4.14 **Vertical ribbon feed shaft springs** shall exert a pressure of Min. 2-1/2 ozs. (70 gms.), Max. 3 1/2 ozs. (100 gms.) measured as in Fig. 8, when associated horizontal and vertical ribbon feed shaft bevel gears are disengaged.

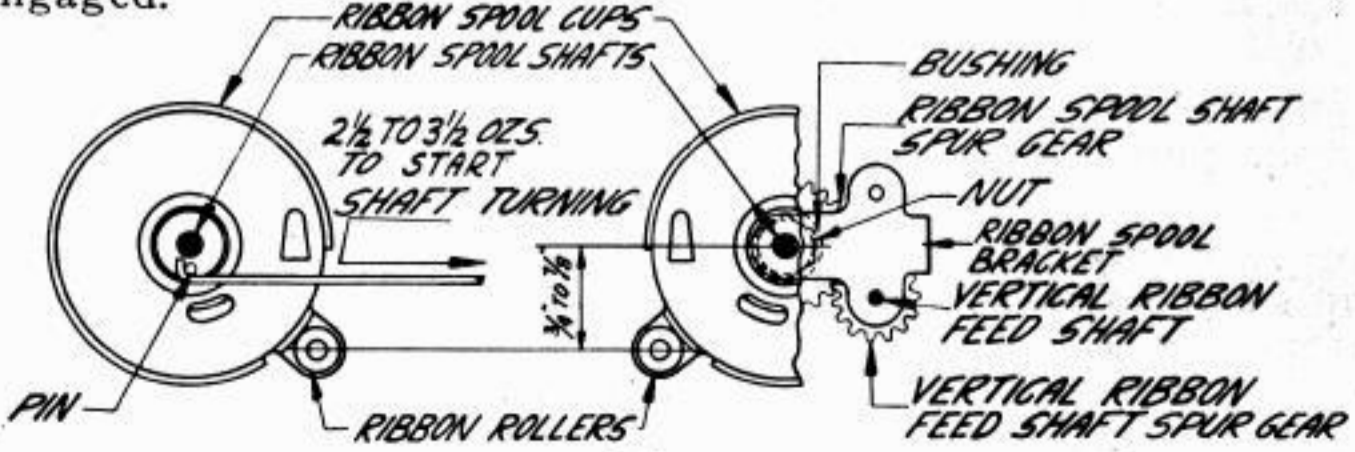


Fig. 8.

(a) To adjust, reposition adjusting collar on vertical feed shaft. See Fig. 7.

4.15 **Ribbon reverse shafts** shall rotate freely and clear ribbon spool cup by Min. .040", Max. .060" as in Fig. 9 when the associated ribbon reverse arm is held against the ribbon spool bracket.

(a) To adjust, reposition ribbon reverse arm and check 4.16 and 4.17.

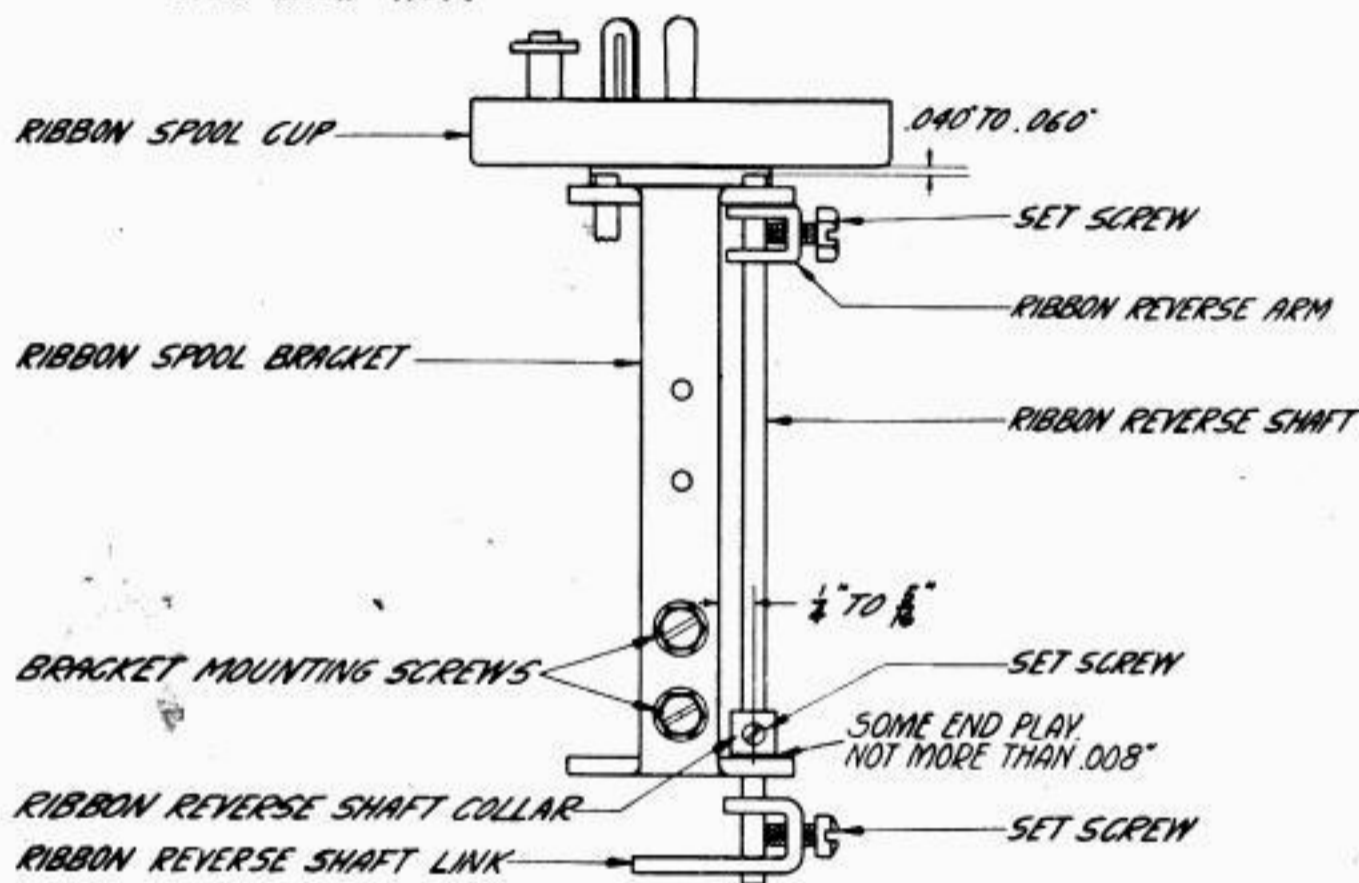


Fig. 9.

4.16 **Ribbon reverse shafts** shall have end play, not to exceed .008" as in Fig. 9 when ribbon reverse arm is held against the ribbon spool bracket. Gauge by eye and feel.

(a) To adjust, reposition ribbon reverse shaft collars, making sure that there will be from 1/4" to 5/16" between set screw center and ribbon spool bracket edge as in Fig. 9, when tightening set screws.

4.17 **Ribbon reverse pawls** shall clear ribbon reverse bail by Min. .015", Max. .040" as in Fig. 10 when pull bar bail is in its extreme rear position and associated ribbon reverse arm is against its stop washer.

Note: Take up play in bail so as to make clearance a minimum when checking .015" clearance, and a maximum when checking .040" clearance.

(a) To adjust, loosen ribbon reverse shaft link set screw, reposition the link and tighten set screw, making sure that link does not bind at the shoulder screws.

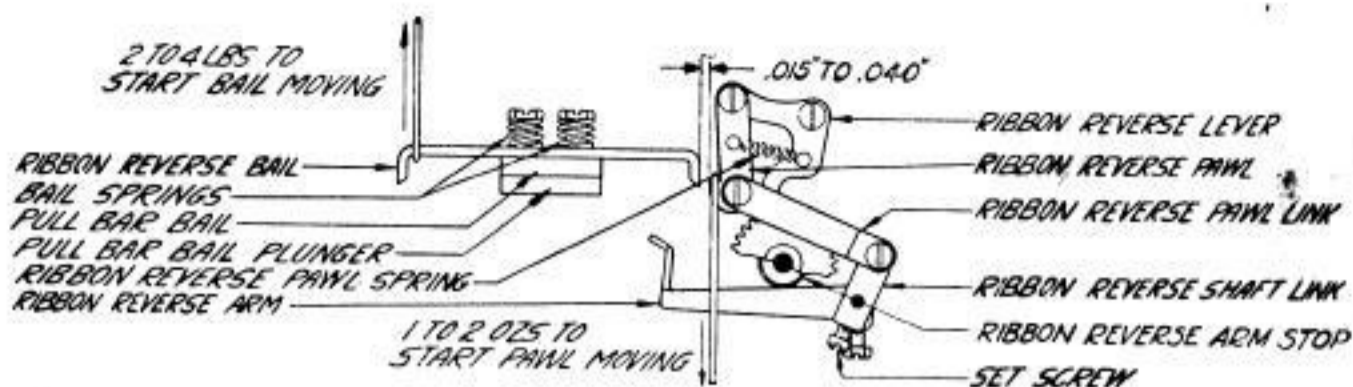


Fig. 10.

4.18 **Ribbon reverse pawl springs** shall have a tension of Min. 1 oz. (28 gms.), Max. 2 ozs. (56 gms.) measured as in Fig. 10 when associated ribbon feed shaft bevel gears are engaged, pull bar bail is in extreme forward position, and carriage is held so ribbon spool cups are down.

4.19 **Ribbon reverse bail springs** shall exert a pressure of Min. 2 lbs., Max. 4 lbs. measured as in Fig. 10 when carriage is held so ribbon spool cups are down.

Note: Gauge right and left springs in turn by applying gauge at right and left end of bail in turn.

4.20 **Typebar backstop** shall clear the center and two end pull bars by at least .010" when type bars are held in the guide and pull bar bail is in its extreme rear position; end type bars shall rest against the rear edge of the backstop, and be within .010" of touching the front edge. Gauge by eye.

(a) To adjust, reposition typebar backstop.

4.21 **Ribbon oscillator lever** (Fig. 11) shall be free in its slot when its spring is unhooked, gauge by feel.

(a) To adjust, reposition ribbon shift lever bracket (Fig. 12).

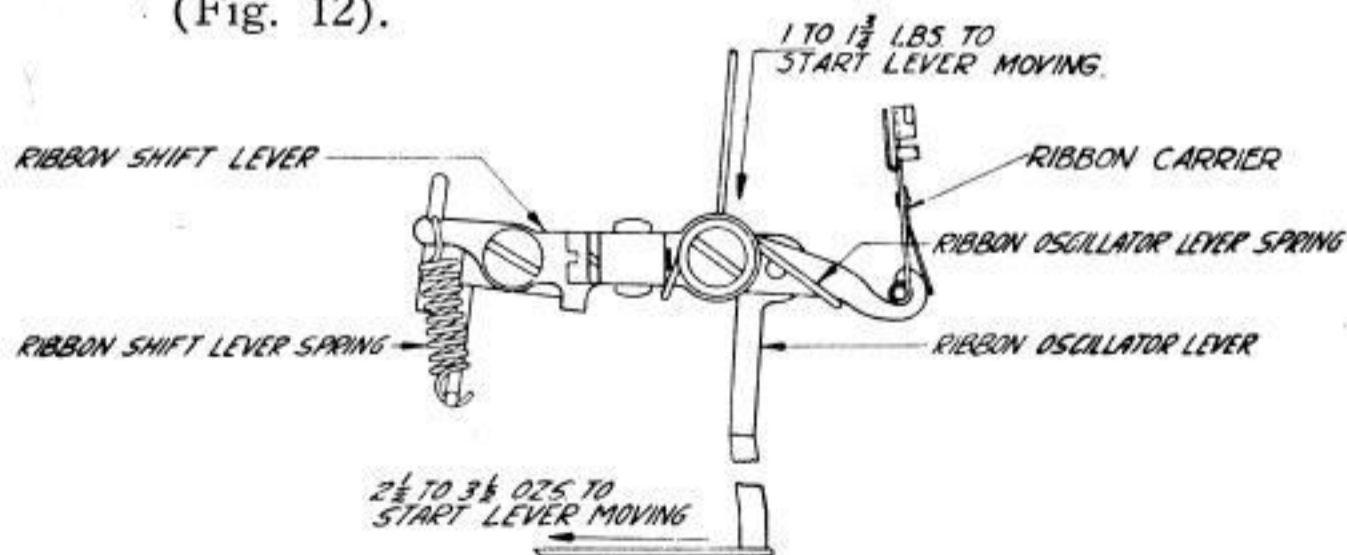


Fig. 11.

4.22 **Ribbon oscillator lever spring** shall have a tension of Min. 2-1/2 ozs. (70 gms.), Max. 3-1/2 ozs. (100 gms.) measured as in Fig. 11 when ribbon shift lever spring is removed.

4.23 **Ribbon shift lever spring** shall have a tension of Min. 1 lb. (455 gms.) Max. 1-3/4 lbs. (795 gms.) measured as in Fig. 11 when ribbon oscillator spring is unhooked from the lever.

4.24 **Margin bell pawl spring** shall have a tension of Min. 1/2 oz. (14 gms.), Max. 1-1/2 ozs. (40 gms.) measured as in Fig. 12.

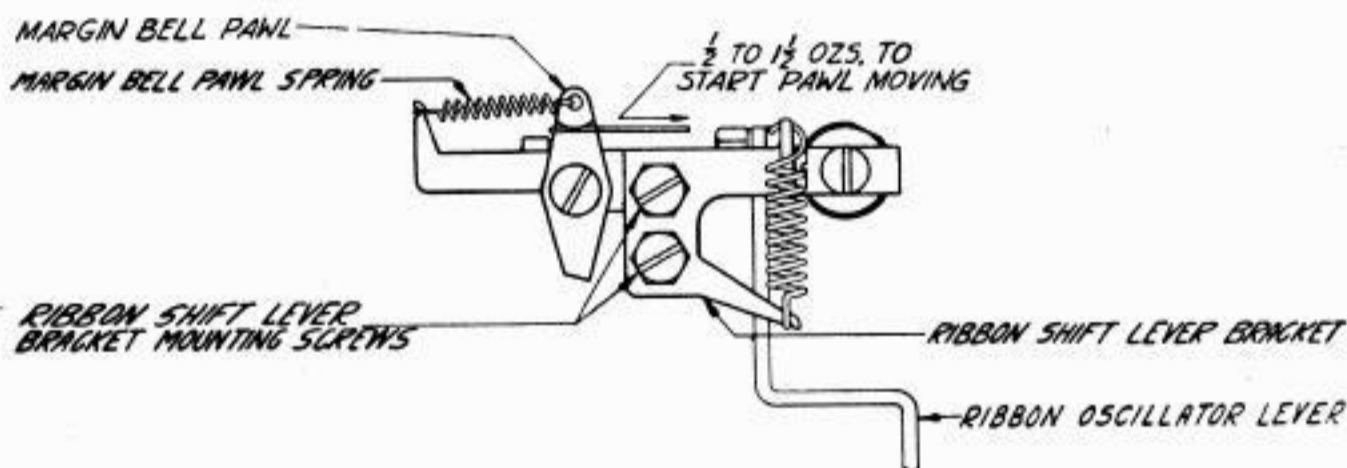


Fig. 12.

4.25 **Ribbon lockout bar detent spring**, on typing units equipped with non-adjustable ribbon lockout bar, shall have a tension of Min. 16 ozs. (455 gms.), Max. 32 ozs. (905 gms.) measured as in Fig. 13 when ribbon oscillator extension is held clear of lockout bar and latter is pushed in.

(a) To adjust, bend detent spring.

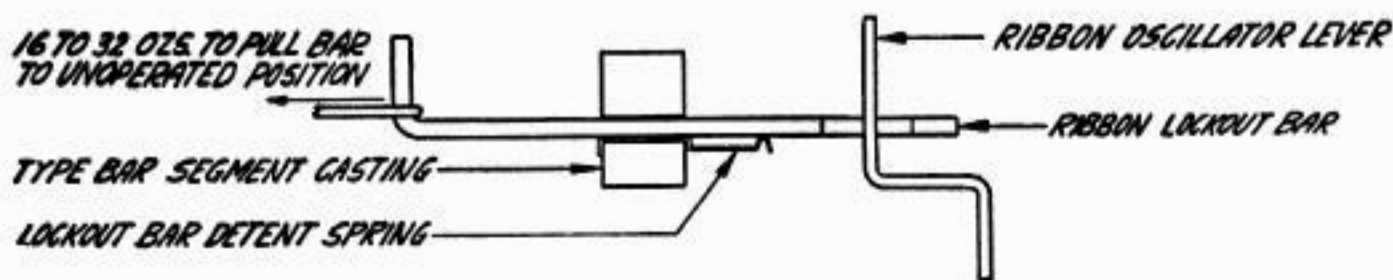


Fig. 13.

4.26 **Ribbon lockout bar detent spring**, on units equipped with adjustable ribbon lockout bar, shall have a tension of Min. 1-1/4 lbs., Max. 2-1/4 lbs., measured as in Fig. 14 as detent spring disengages from lockout bar notch when lockout bar is in its unoperated position.

(a) To adjust, bend detent spring.

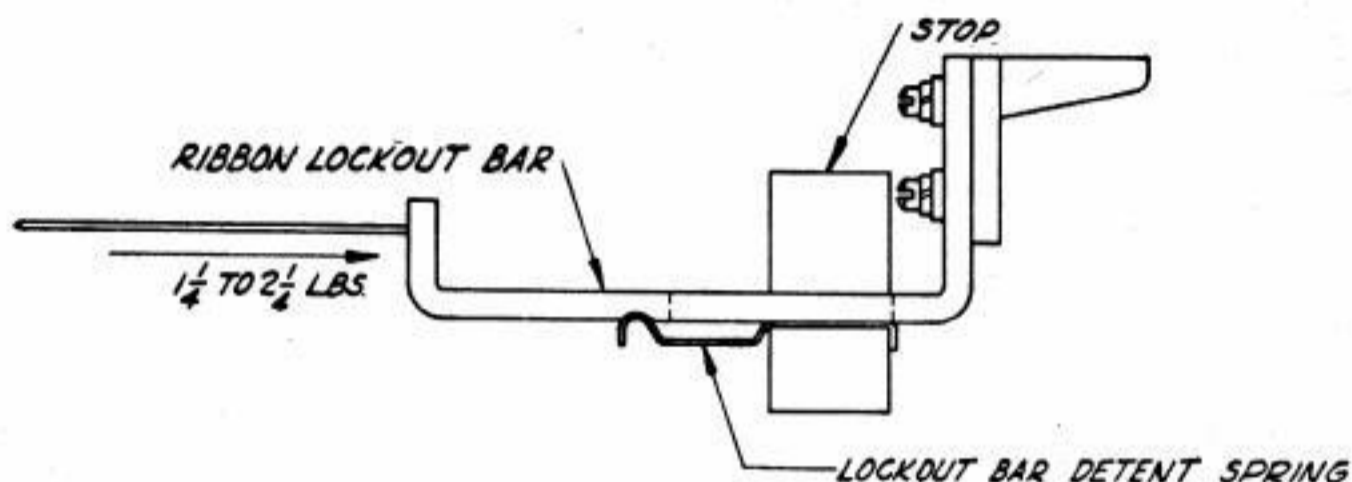


Fig. 14.

Note: Reassemble bell crank assembly (see Figure 15) on typebar carriage. First position eccentric bushings which mount bell cranks to mounting plate so that bell cranks are in their lowest position with respect to codebars. Insert right mounting screw and tighten until bell crank mounting plate is held friction tight. Then rotate the mounting plate clockwise engaging bell cranks with their respective codebars, insert left mounting screw and tighten both screws.

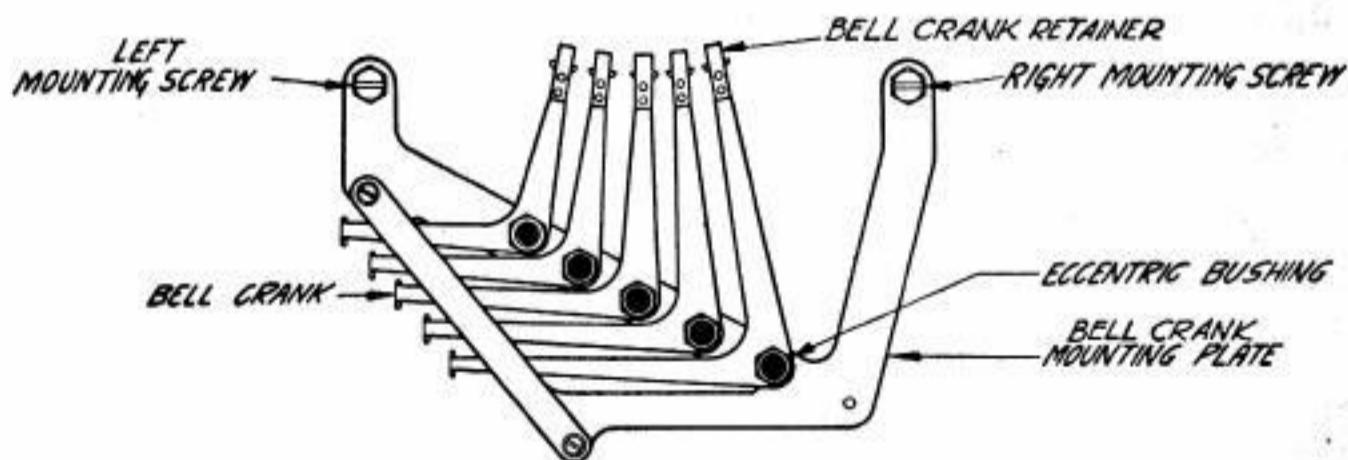


Fig. 15.

4.27 **Pull Bars:** On units equipped with three piece pull bar spring bracket, the extreme right and left end pull bars and fourth from right end and third from left end pull bars shall have play, not to exceed .004", between spring bracket and type bar as in Fig. 16 when pull bar bail is in extreme rear position and corresponding type bar is raised to type bar guide.

- (a) To adjust, reposition right and left sections of pull bar spring bracket.

Note: If pull bars between those mentioned above bind against spring bracket when their typebars are moved to typebar guide by hand, readjust spring bracket so all these pull bars are free and so that the end pull bar and at least one other pull bar of each group have .004" play.

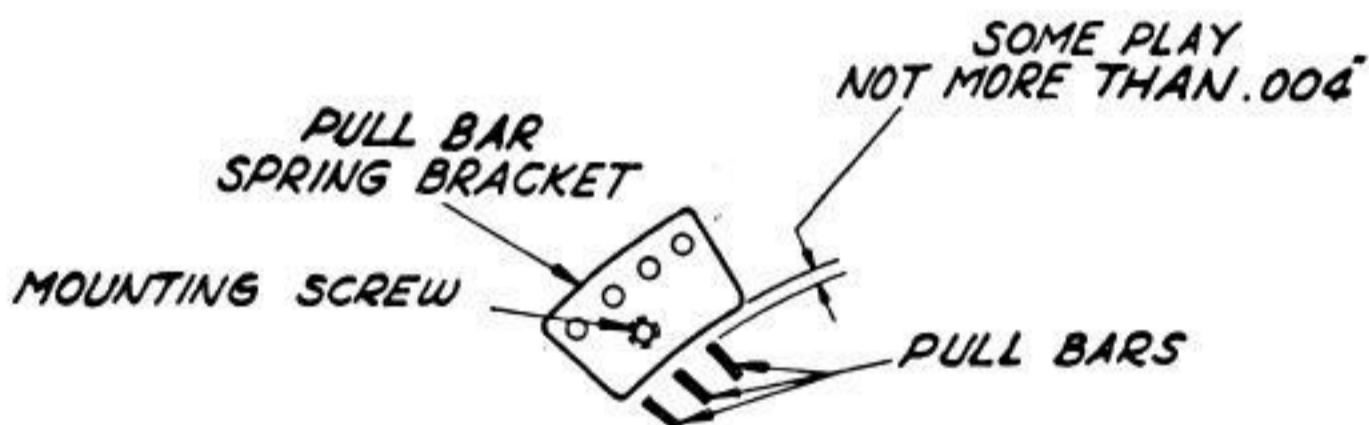


Fig. 16.

4.28 **Right margin adjusting screw arm spring** shall have a tension of Min. 2 lbs., Max. 4 lbs. measured as in Fig. 17.

- (a) To adjust, bend detent spring.

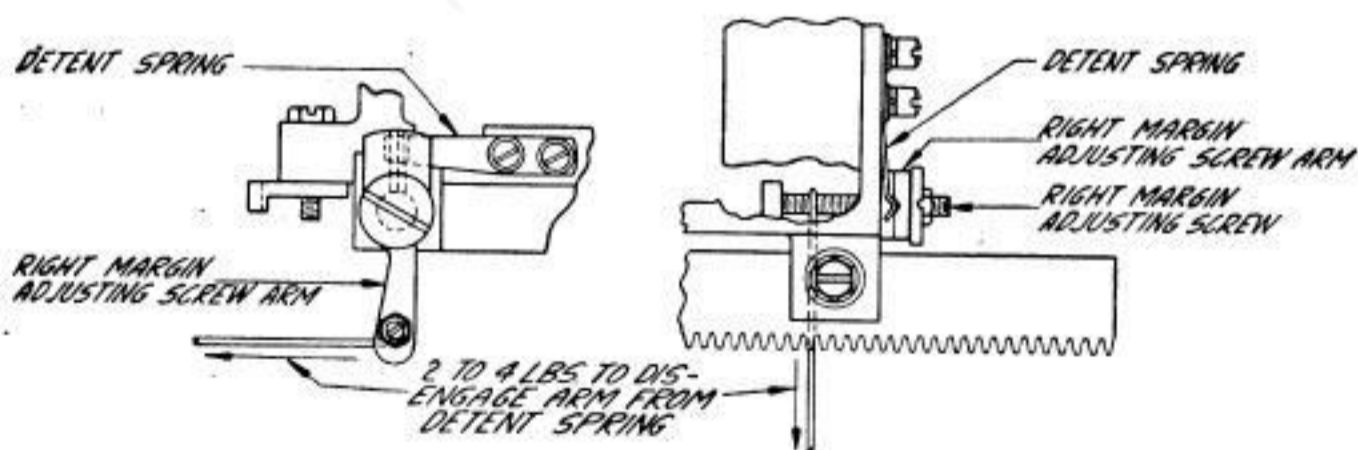


Fig. 17.

4.29 **Carriage support rollers and the pull bar bail plunger roller** which engage the printing bail blades shall rotate freely without end play.

(a) To adjust, loosen lock nuts and reposition cone nut being careful not to loosen nuts enough to allow balls to drop out.

Caution: Never place typing unit with front side down as this would damage some of its parts.

4.30 **Selector cams** shall line up with their respective selector levers as gauged by eye.

(a) To adjust, reposition main shaft in its bearings.

4.31 **Main shaft clutch teeth** shall clear each other by Min. .010", Max. .020" as in Fig. 18 when clutch is fully cammed out of engagement.

(a) To adjust, reposition clutch throwout lever pivot screws making sure that the throwout lever is free in its bearing, without perceptible end play when pivot screw lock nuts are tightened.

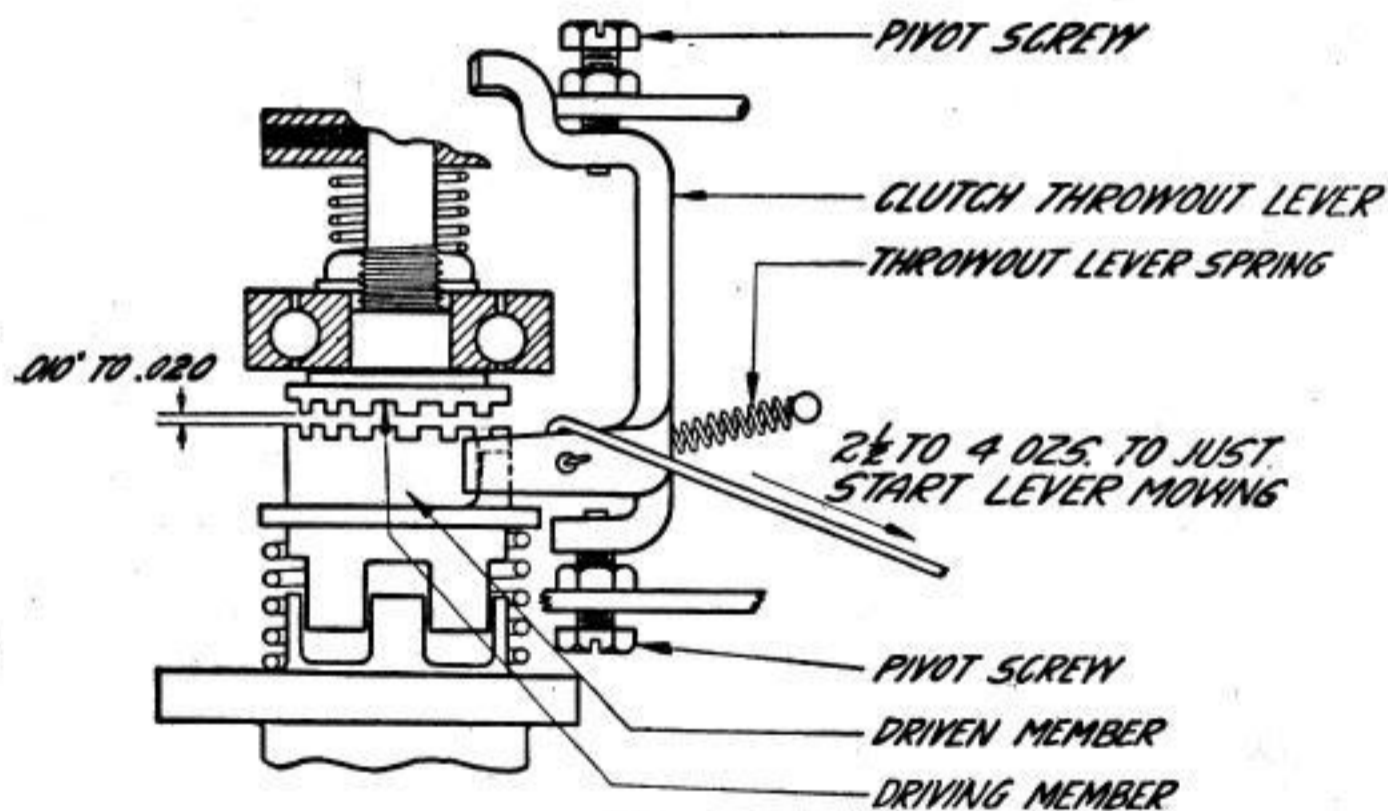


Fig. 18.

Note: Place typing unit on left side.

4.32 **Clutch throw-out lever spring** shall have a tension of Min. 2-1/2 ozs. (70 gms.), Max. 4 ozs. (115 gms.) measured at right angles to the throw-out lever as in Fig. 18 when clutch teeth are fully disengaged.

Note: Place typing unit on right side.

4.33 **Main Shaft Clutch Spring:** A pull of 26 ozs. (735 gms.) applied to driven member as in Fig. 19 shall separate clutch teeth when tips of teeth are resting against each other and when low part of printing bail cam is toward bottom of typing unit. A pull of 22 ozs. (625 gms.) similarly applied will not separate the clutch teeth.

4.34 **Clutch driven member,** after being pulled manually to position of extreme disengagement, shall start and slide until it engages with or touches the driving member teeth when the clutch spring is opposed by a force of not less than 10 ozs. (285 gms.).

(a) To gauge, pull driven member to operated position with 26 oz. tension as in 4.33, gradually reduce tension and permit driven member to slide until it touches driving member. The gauge reading should not go below 10 ozs.

(b) To adjust, clean and lubricate clutch. If sliding surfaces of driven member and bushing on which it slides are not smooth and polished, replace these parts or return typing unit to shop for replacement.

Note: Failure to receive first character after a period of idleness may be caused by sticking of main shaft clutch parts. If trouble of this nature is reported it may be checked for by observing typing of first character received directly from associated keyboard after main shaft of typing unit has been at rest for at least 10 minutes, power disconnected. If parts are in accordance with above this difficulty may be eliminated by replacing printing and function bail cam follower rollers with No. 91175M cam follower roller assemblies (roller bearing cam followers).

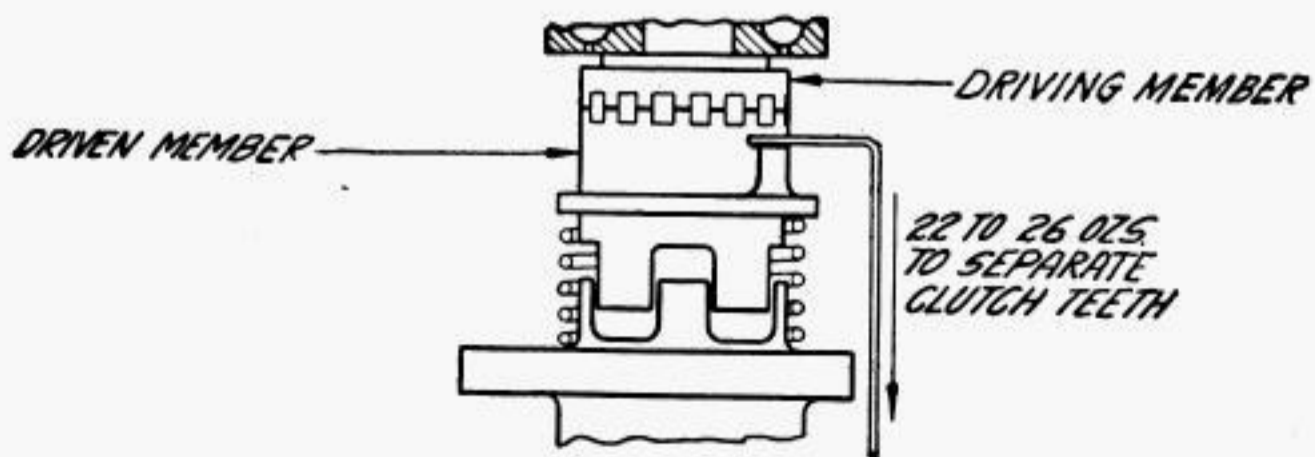


Fig. 19.

Note Place typing unit in its normal upright position.

4.35 **Spacing shaft gear** and main shaft spacing gear shall engage with minimum backlash without bind at the closest point in a complete revolution of the spacing shaft gear, gauged by eye and feel, when the carriage return operating lever spring is unhooked from its bearing bracket.

(a) To adjust, loosen spacing shaft gear bearing bracket eccentric screw, reposition spacing shaft bracket and then position eccentric snugly against bracket. See Fig. 20.

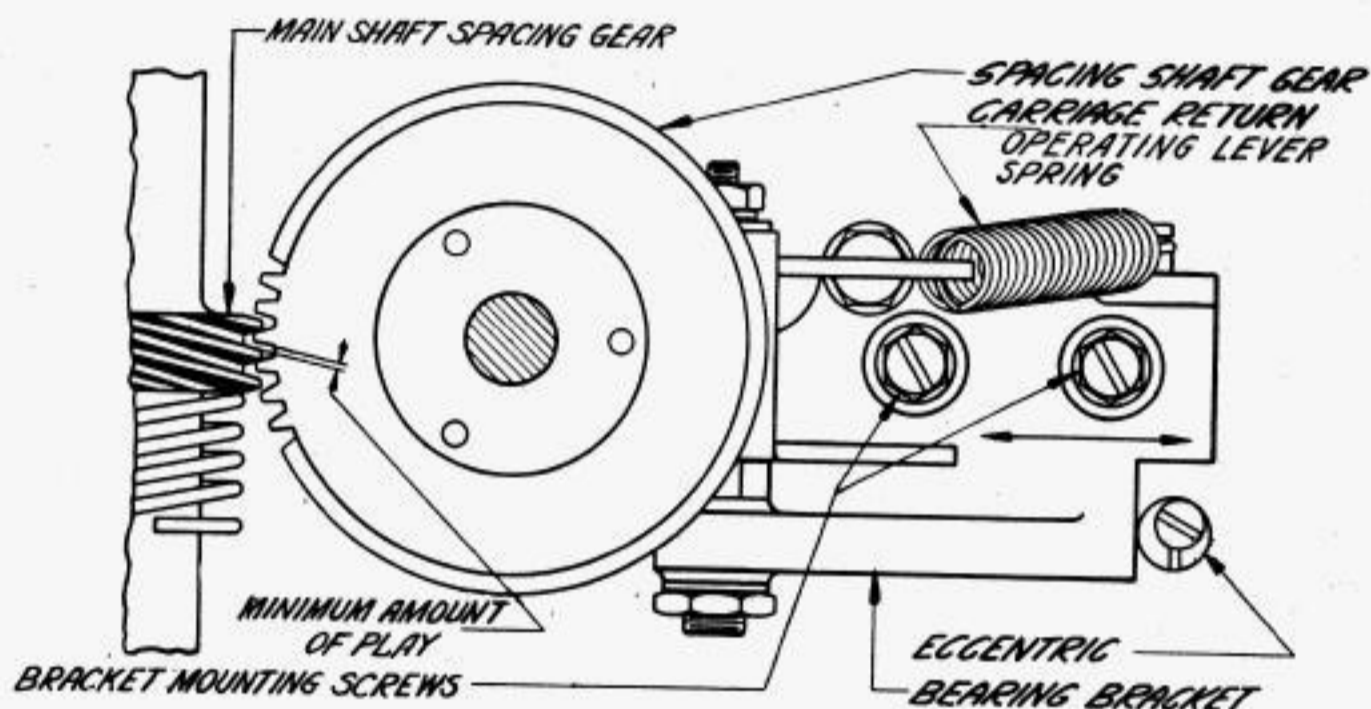


Fig. 20.

Note: Reassemble type bar carriage on typing unit as follows:

With platen in "figures" position, printing bail in rear-most position, and carriage right margin adjusting screw arm moved to rear so it is approximately 45° from vertical, rest left front carriage support roller on right end of front carriage track, making sure carriage guide screw engages slot in carriage track. Move carriage slowly to left until rear carriage support roller rests on upper track, operate manual carriage return lock bar and then force pull bar bail to extreme rear position by pushing on right pull bar bail roller with right thumb. Move carriage further to left, making sure that the bell cranks engage their respective vanes and that right front carriage support roller and guide screw properly engage front carriage track. After carriage has been moved far enough to left to permit right margin adjusting screw to clear spacing stop lever, restore the screw arm to its normal vertical

position and then shift carriage to a position where draw strap can be attached. Grasp draw strap with right hand so as to prevent spring drum from unwinding, unhook strap from margin bell clapper stop post and hook it over its post on carriage, move carriage to right until slack in strap is taken up and then allow carriage to restore to its extreme left position.

4.36 **Pull bars** shall clear code bars by Min. .010", Max. .050" as in Fig. 21 when main shaft is rotated until printing bail is in extreme rear position and play in pull bars is taken up toward the code bars.

Note: Check with carriage at both extreme right and left positions.

(a) To adjust, reposition printing bail adjusting screw.

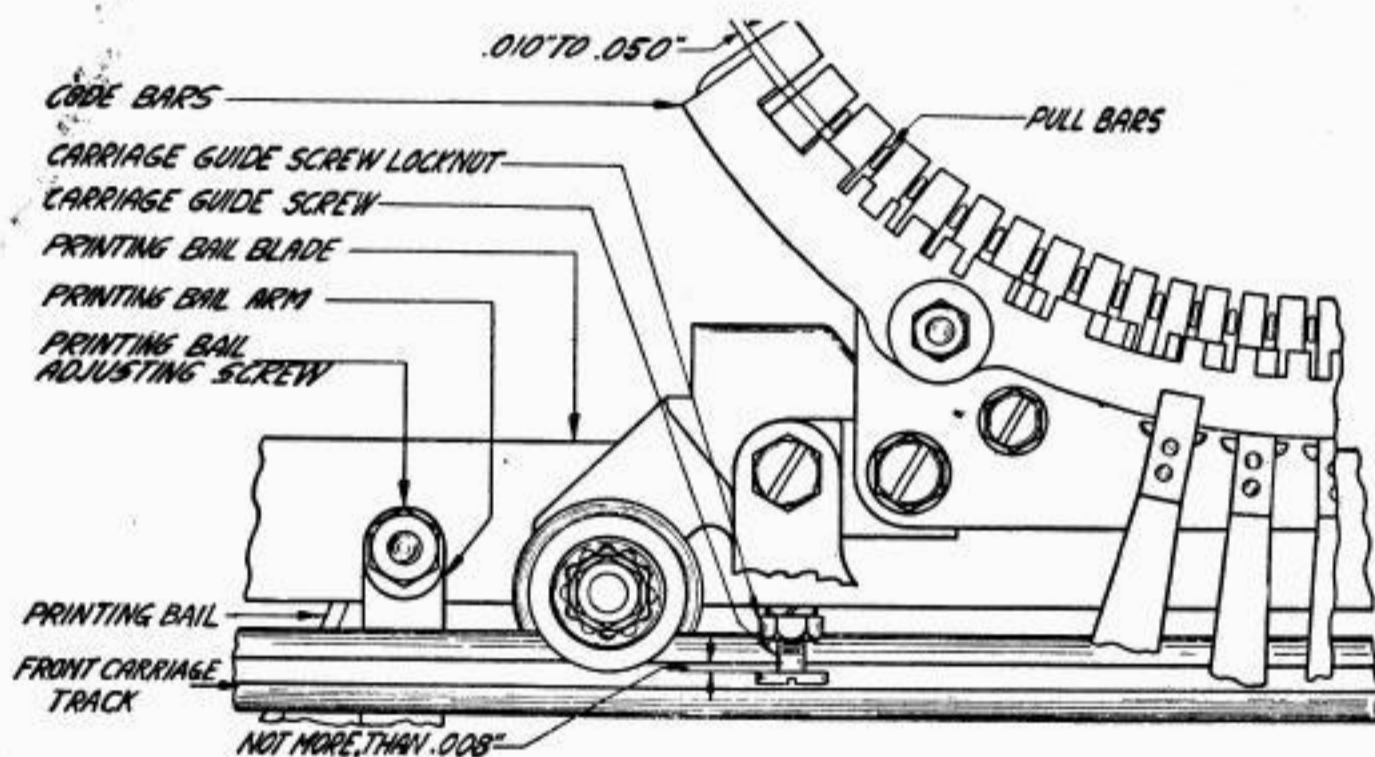


Fig. 21.

Note: Remove type bar carriage (see note above 4.01).

4.37 **Function Lever Bail:** Front edge of function levers shall clear rear edge of No. 1 vane by Min. .040", Max. .060" as in Fig. 22 when vane is held midway between marking and spacing positions and main shaft is rotated until printing bail is in rearmost position.

Note: On typing units equipped with one piece function lever bail, this clearance should be checked for and adjusted after 4.38 and 4.39 have been checked for and adjusted.

(a) To adjust one piece bail, remove or add shims under bail at mounting screws; to adjust two piece bail, reposition bail toward front or rear of teletypewriter.

Note: If clearance on one piece bail is readjusted recheck 4.38 and 4.39.

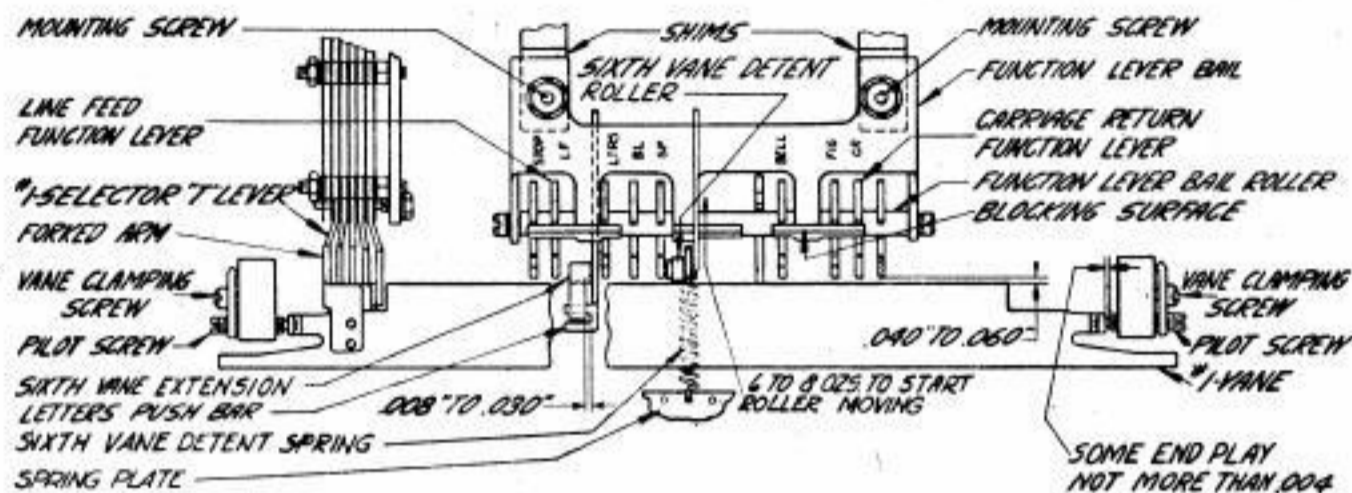


Fig. 22.

4.38 Function lever bail shall be blocked by selected function lever and the front edge of the bail's right blocking surface shall be flush within .005" of the top front edge of carriage return function lever's rear prong, gauged by eye, when carriage return combination is set up and main shaft is rotated until carriage return function lever is drawn completely into selection with vanes.

(a) To adjust one piece bail, reposition right end of function lever bail; to adjust two piece bail, reposition right end of blocking plate. See Fig. 23.

Note: If necessary to readjust one piece bail recheck 4.37 after checking 4.39.

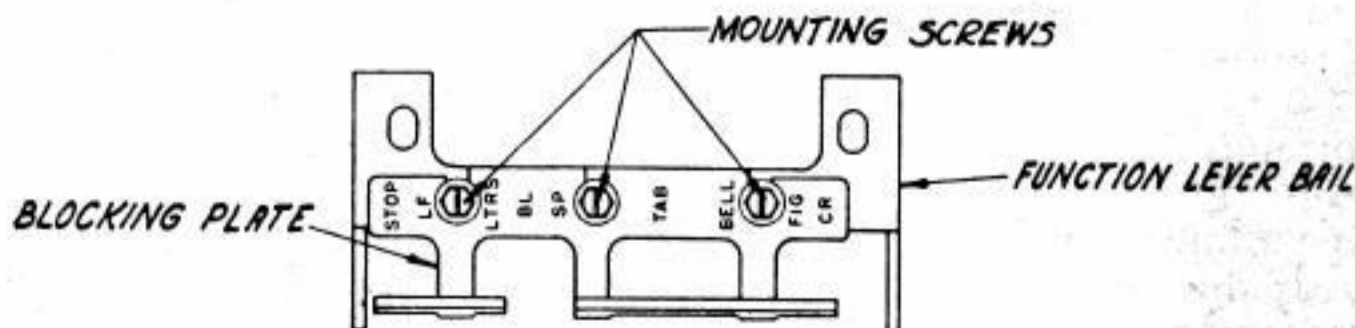


Fig. 23.

4.39 Function lever bail shall be blocked by selected function lever and the front edge of the bail's left blocking surface shall be flush within .005" of the top front edge of the line feed function lever's rear prong, gauged by eye, when line feed push bar is removed, line feed combination is set up, and main shaft is rotated until the line feed function lever is drawn completely into selection with vanes.

(a) To adjust one piece bail, rotate left end of function lever bail around right mounting screw. To adjust two piece bail, rotate left end of blocking plate around right mounting screw.

Note: If necessary to readjust one piece bail recheck 4.37, if necessary to readjust two piece bail recheck 4.38.

4.40 **Sixth vane extension spring**, on units so equipped shall exert a pressure of Min. $\frac{3}{4}$ ozs. (21 gms.), Max. $1\frac{1}{4}$ ozs. (35 gms.) measured as in Fig. 24 as extension starts to move away from vane when vane is removed from typing unit and held in a horizontal position with extension extending upward.

Note: Check this tension in opposite direction also.

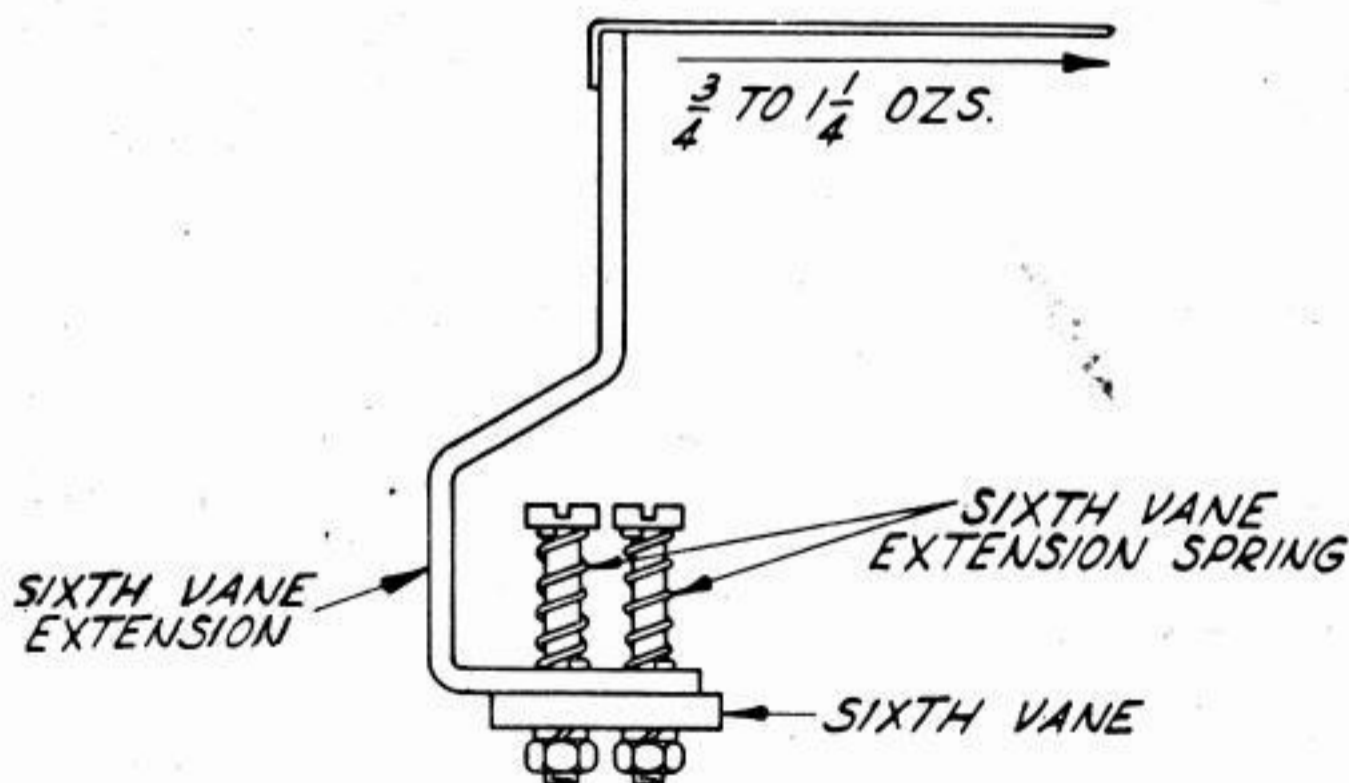


Fig. 24.

4.41 **Selector vanes** shall be free of bind and have end play not to exceed .004", and except sixth (see 4.42), shall be positioned so that their forked arm lines up with

corresponding "T" lever, gauged by eye, when printing bail is in extreme rear position. See Fig. 22.

(a) To adjust, reposition vane pivot screws.

4.42 Sixth vane shall be free of bind and have end play not to exceed .004", gauged by eye, and shall be positioned so that right (closed) end of "letters" push bar slot clears sixth vane extension (flat spring) by Min. .008", Max. .030" as in Fig. 22 when play in vane and its extension is taken up to right.

Note: Extension on old style sixth vanes is a flat spring formed of spring steel, that on new style is formed steel mounted by means of shoulder screws and coil compression springs as in Fig. 24.

(a) To adjust, reposition vane pivot screws.

4.43 **Function bail spring** shall have a tension of Min. 2 lbs., Max. 3 lbs. measured as in Fig. 25 when bail is in extreme rear position.

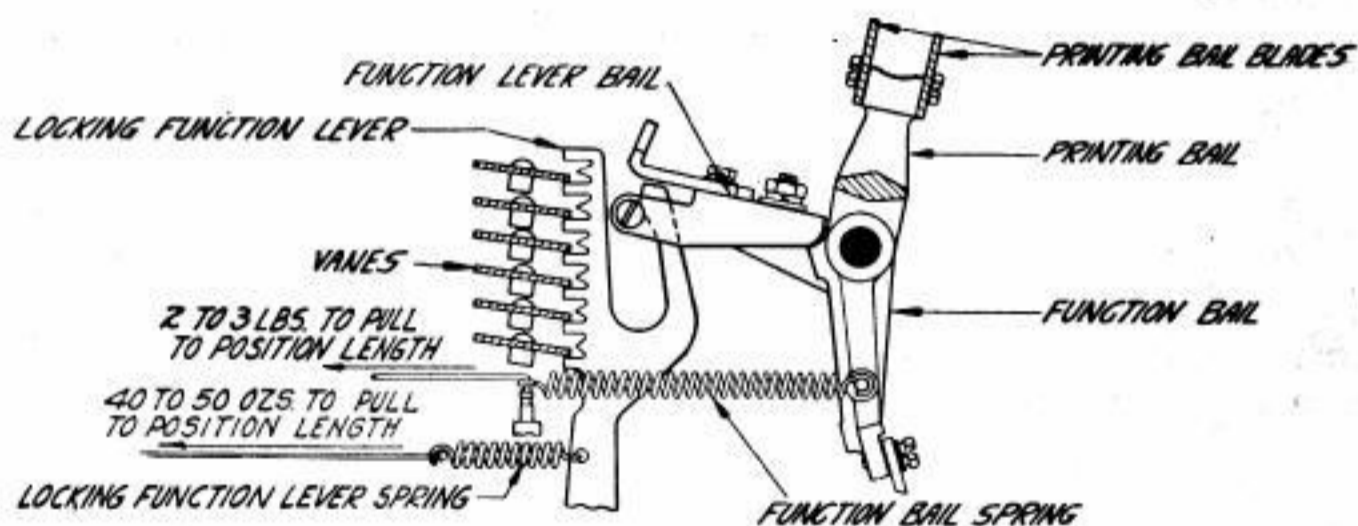


Fig. 25.

See note page 26

4.44 **Printing bail spring** shall have a tension of Min. 7-1/2 lbs., Max. 8-1/2 lbs. measured as in Fig. 26 when bail is in extreme rear position.

Note: When making multiple copies, somewhat greater spring tension may be required in order to obtain good impressions on carbon copies.

(a) To adjust, reposition spring adjusting lever.

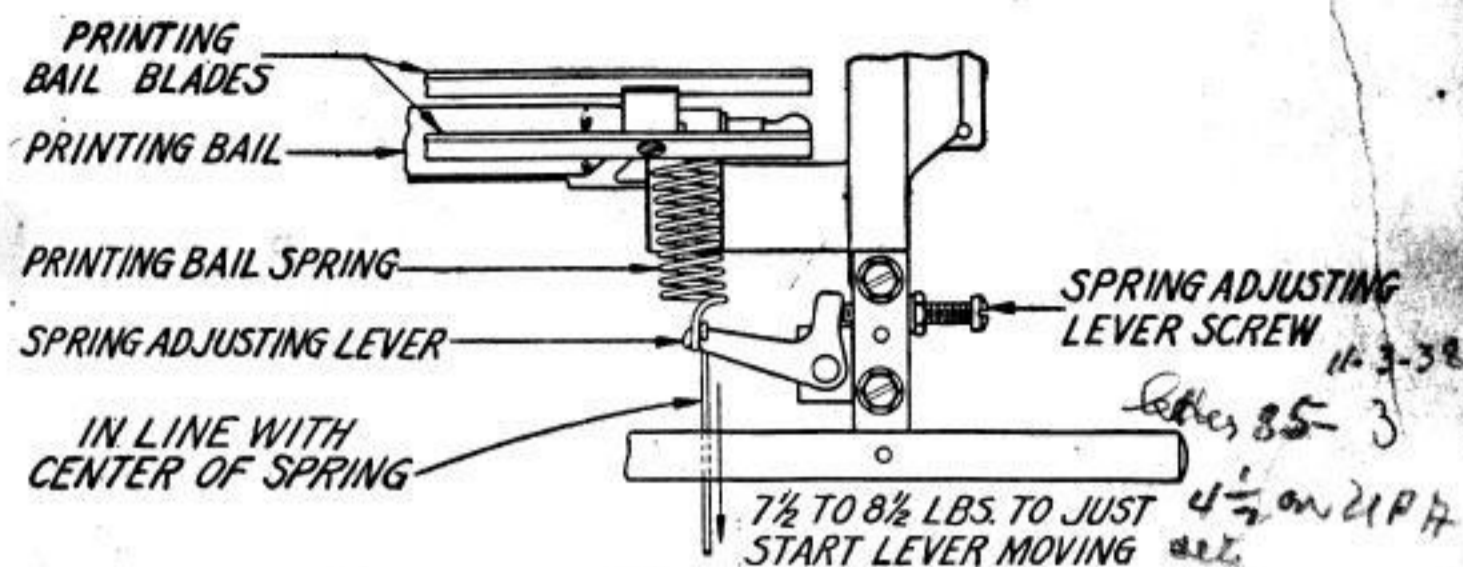


Fig. 26.

Note: Place unit on right side and remove range finder assembly.

4.45 **Sword separator plate leaf springs**, except those of front and rear plates, shall press lightly against their respective swords.

Note: If necessary to check, remove separator plates and check to see that leaf spring end is Min. .045", Max. .055" away from plane of plate as gauged by eye.

(a) To adjust, bend leaf spring at narrow portion.

Note: Requirements 4.46 to 4.59 inclusive apply only to typing units equipped with holding type selector magnets.

4.46 **Armature lever** shall have a minimum amount of end play without bind as gauged by eye and feel when armature lever and selector arm springs are unhooked. See Fig. 27.

(a) To adjust, reposition top armature lever pivot screw.

4.47 **Selector armature** when in its operated position shall touch both magnet cores at approximately midpoint of curved face of polepieces and the center of the armature as gauged by eye when holding a bright background behind magnet and armature assembly.

(a) To adjust, remove selector magnet bracket from typing unit and reposition magnet core assembly.

Note: With proper adjustment, at least 3-1/2 lbs., applied at right angles to armature edge midway between cores, should be required to pull armature away from cores when .020 ampere is flowing to the magnet coils. (Coils in series shunted by 5000 ohm resistance.) This electrical check need not be made for .060 ampere operation (coils in parallel).

4.48 **Selector arm** (top surface) shall clear armature lever (bottom surface) by Min. .008", Max. .016" and have a minimum amount of end play without bind as gauged by eye and feel when armature lever, selector arm and selector arm stop detent springs are unhooked. See Fig. 27.

(a) To adjust, reposition bottom selector arm pivot screw for clearance, then top screw for end play.

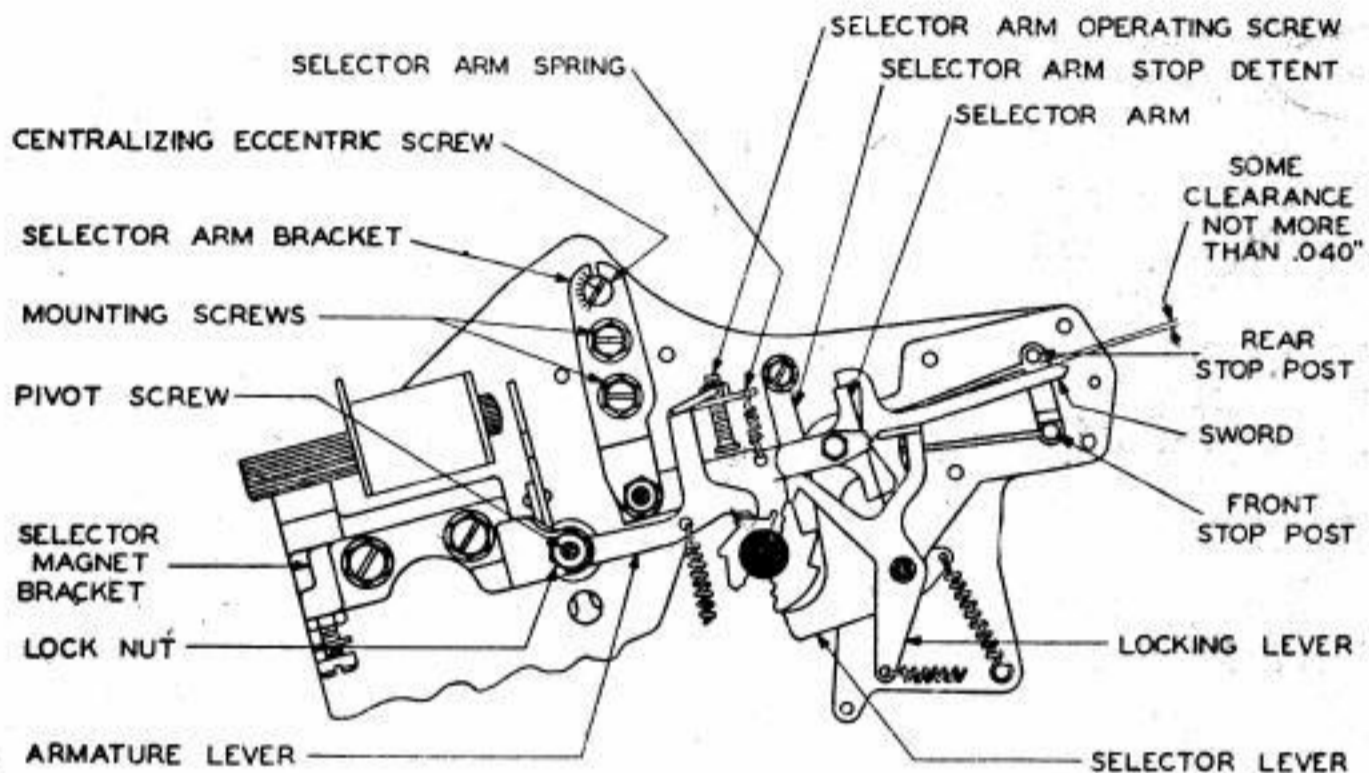


Fig. 27.

4.49 **Selector swords** shall clear both left and right stop posts by not more than .040" as in Fig. 27 after (1) removing locking lever and selector arm springs, (2) placing associated selector lever on peak of its cam, (3) placing the sword arm against the armature extension end and (4) moving the armature slowly from its unoperated or operated position to a point where the extension arm just clears the sword arm. When checking clearance to right stop post unhook armature lever spring from spring arm.

Note: Use No. 1 sword in gauging and adjusting then check remaining swords.

(a) To adjust; loosen selector arm bracket mounting screws slightly until bracket is held friction tight; equalize clearance between swords and stop posts by turning centralizing eccentric, making sure that the selector arm stop detent does not interfere and that the eccentric indicating line is adjacent to scale on

bracket; and then move bracket closer or further away from swords by inserting the 90783M wrench in one of the two holes provided and turning wrench.

4.50 **Locking wedge** shall clear locking lever by Min. .006" Max. .010" as in Fig. 28 when lever is resting on the long high part of its cam and end of wedge is held in line with lever.

(a) To adjust, reposition locking wedge.

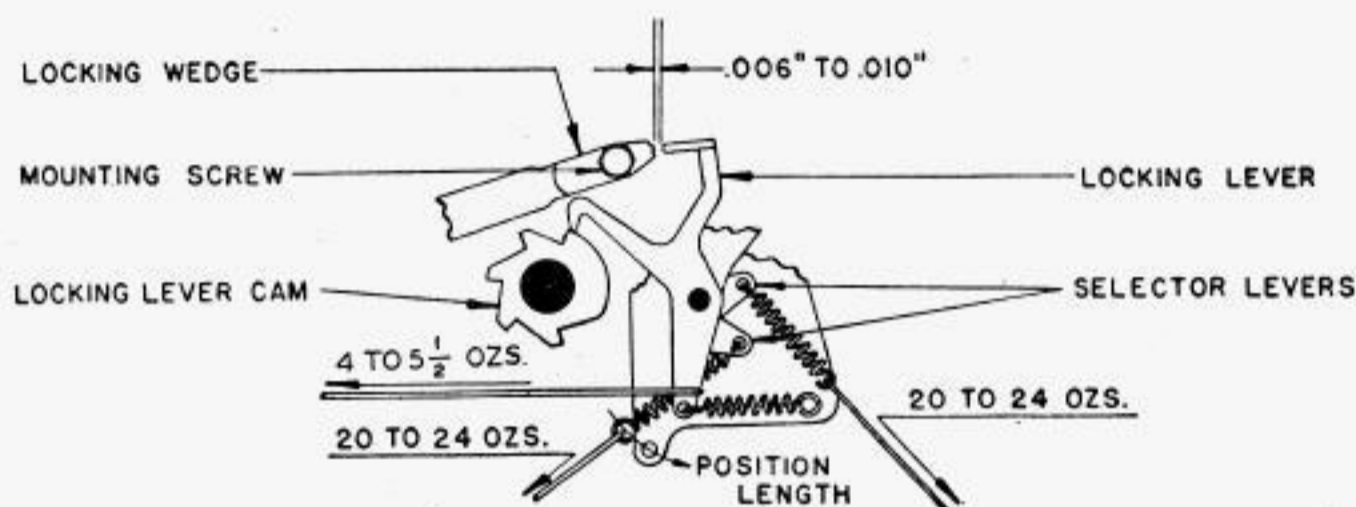


Fig. 28.

4.51 **Locking lever spring** shall have a tension of Min. 4 ozs. (115 gms.), Max. 5-1/2 ozs. (155 gms.) measured as in Fig. 28 when lever starts to move from high part of its cam.

4.52 **Locking lever** shall clear sides of locking wedge by equal amounts within .003" as gauged by eye when armature lever is in its operated and unoperated positions. See Fig. 29.

Note: Make sure that selector arm operating screw does not interfere with selector arm.

(a) To adjust, reposition selector arm stop detent eccentric post.

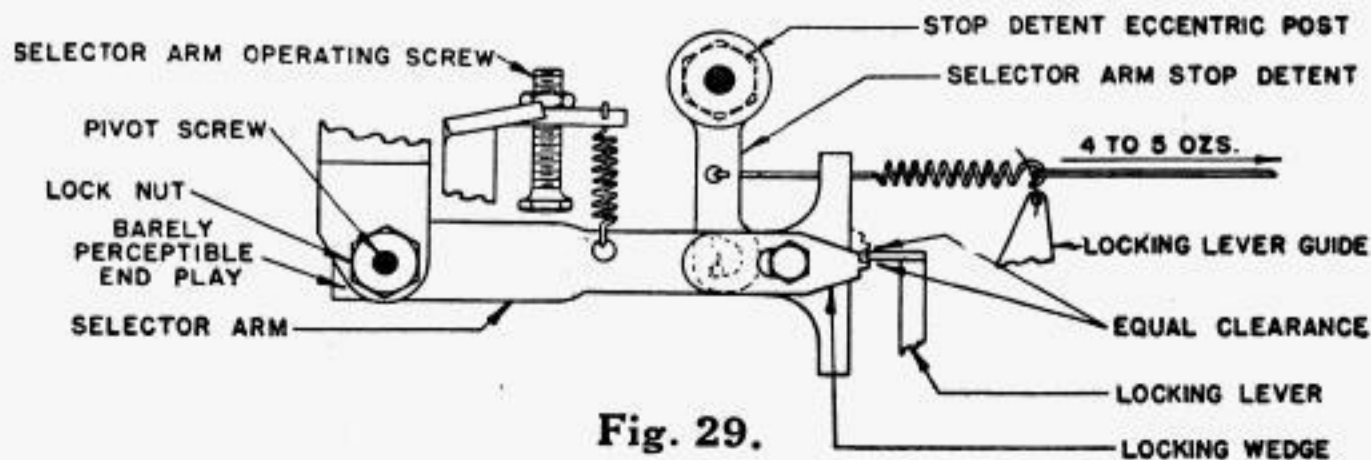


Fig. 29.

4.53 **Selector arm stop detent spring** shall have a tension of Min. 4 ozs. (115 gms.), Max. 5 ozs. (140 gms.) measured as in Fig. 29 when stretched to position length.

4.54 **Selector lever springs** shall have a tension of Min. 20 ozs. (565 gms.), Max. 24 ozs. (680 gms.) measured as in Fig. 28 when selector levers are in unoperated position. Selector vanes, except 6th, shall (1) move from marking (down) to spacing (up) position when a pull of Min. 4 ozs. (115 gms.), Max. 6 ozs. (170 gms.) is applied to the left front edge of vane, as in Fig 34, when main bail is in extreme rear position and swords are in marking position (toward lower stop post); and (2) start and return to their marking position when pull is reduced to 1-1/2 ozs. (40 gms.)

(a) To adjust, check vanes for bind and end play (4.40); replace selector lever spring if necessary.

4.55 **Armature lever** shall clear its cam by Min. .060", Max. .065" as in Fig. 30 when locking lever has just dropped off high part of cam, the cam is held back against the locking lever and the selector arm is held in its operated position by the locking lever.

(a) To adjust, loosen selector magnet bracket and selector magnet bracket adjusting arm until held friction tight, then reposition selector magnet bracket by inserting and turning 90783M wrench in hole above adjusting arm end.

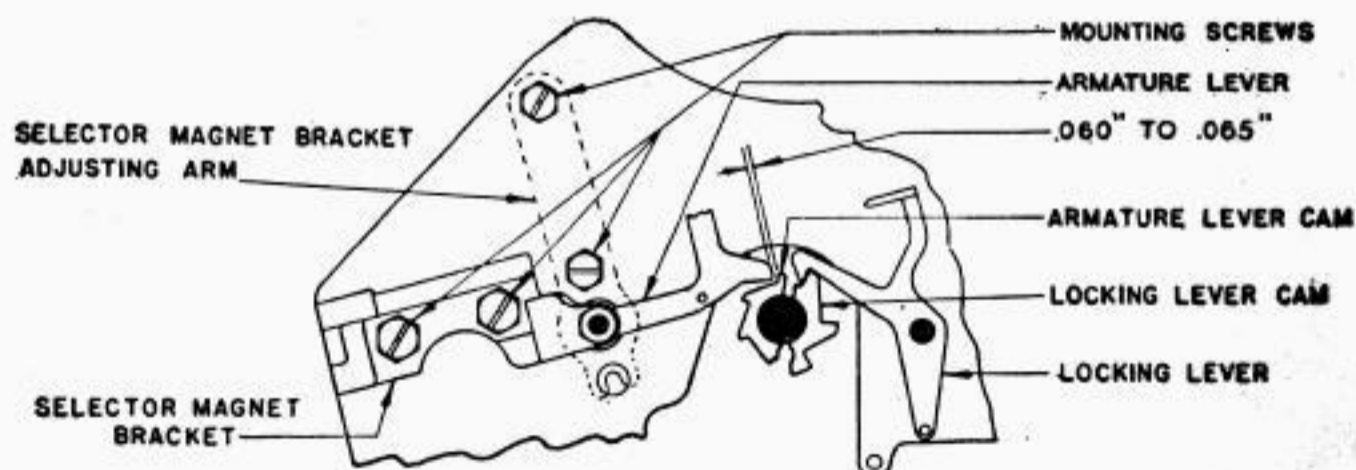


Fig. 30.

4.56 **Selector Magnet Bracket:** Clearance between selector arm and its operating screw (see Fig. 27) shall be .004" to .006" greater when armature lever is on a peak of its cam than when opposite an indent, the magnet being energized.

(a) To adjust, reposition selector magnet bracket by means of its adjusting screw, turning the screw clockwise to decrease the difference and counter-clockwise to increase the difference.

Note: In order to check this requirement it may be necessary to increase the clearance between the selector arm and its operating screw when the armature lever is on the peak of its cam to at least .006" by backing off the operating screw.

4.57 **Armature lever spring** shall have a tension of Min. 13 ozs. (370 gms.), Max. 15 ozs. (425 gms.) measured as in Fig. 31 when the armature lever is on a high part of cam.

(a) To adjust, reposition spring arm.

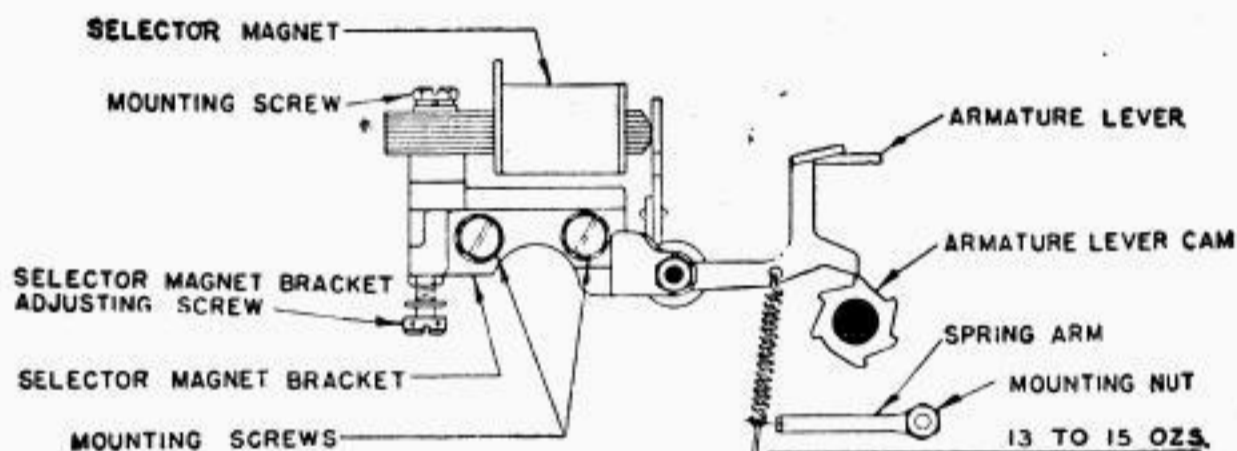


Fig. 31.

4.58 **Selector arm** shall clear its operating screw by Min. .003", Max. .006" as in Fig. 32 when magnet is energized and armature lever is between peaks of its cam.

(a) To adjust, reposition selector arm operating screw.

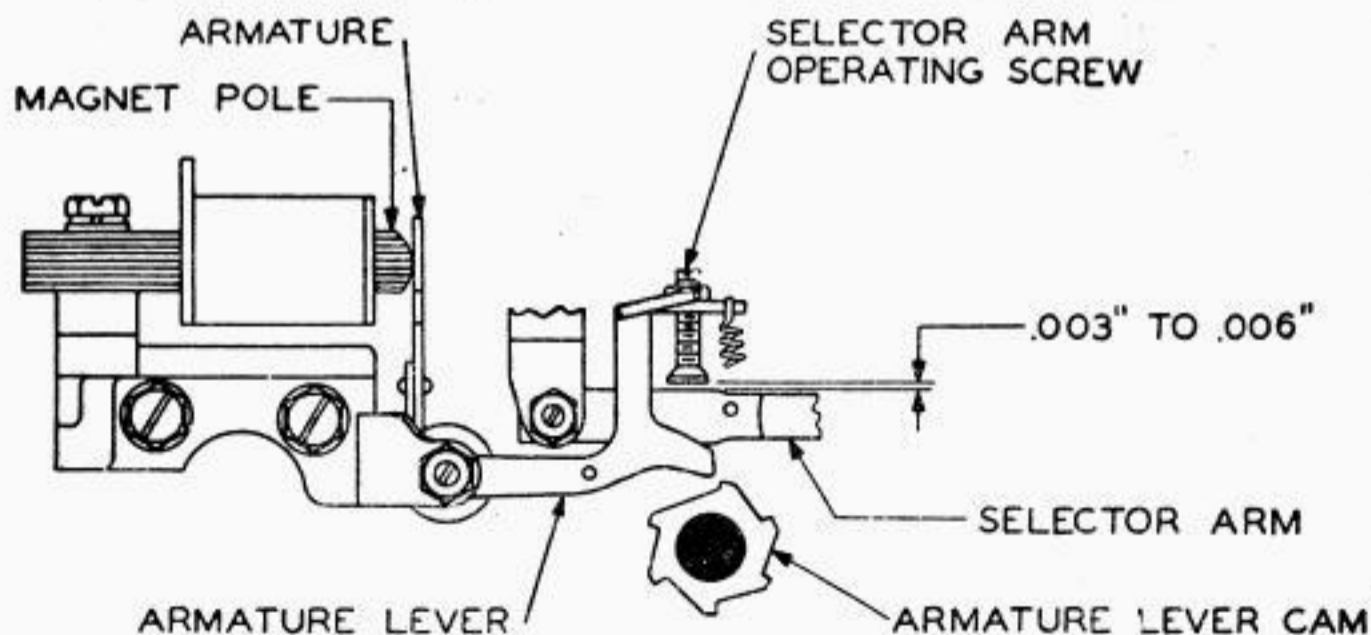


Fig. 32.

4.59 **Selector arm spring** shall have a tension of Min. 1-1/4 ozs. (35 gms.), Max. 1-3/4 ozs. (50 gms.) measured as in Fig. 33 when armature lever on a high part of its cam and selector arm stop detent spring is unhooked.

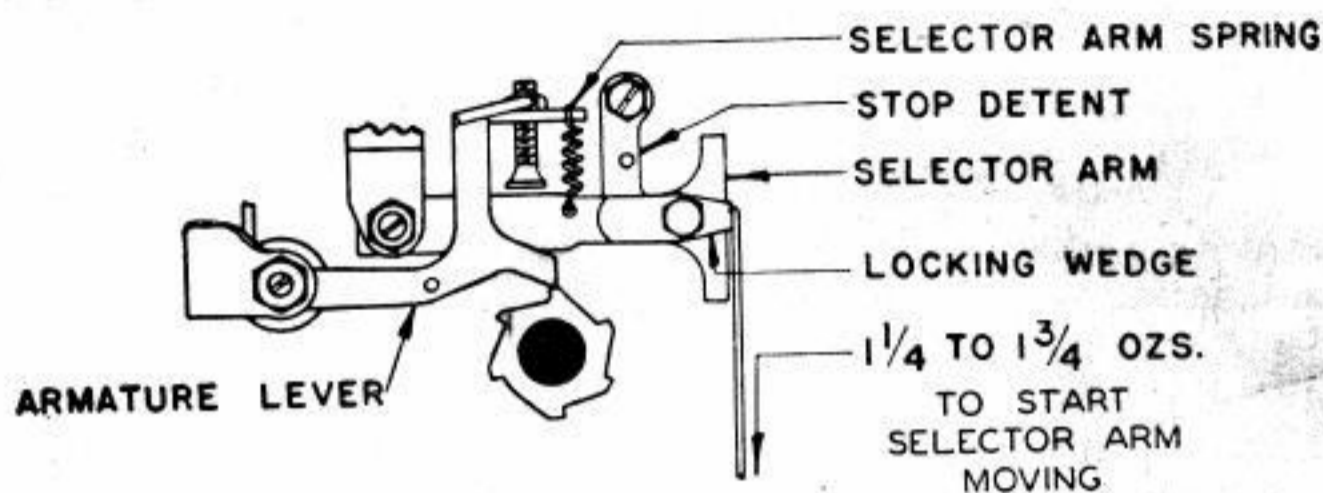


Fig. 33.

Note: Requirements 4.60 to 4.76 inclusive apply only to typing units equipped with pull type selector magnets.

4.60 **Selector lever springs** shall have a tension of Min. 20 ozs. (565 gms.), Max. 24 ozs. (680 gms.) when selector levers are in unoperated position and springs are unhooked from mounting post and stretched to position length. Selector vanes, except 6th, shall (1) move from marking (down) to spacing (up) position when a pull of Min. 4 ozs. (115 gms.), Max. 6 ozs. (170 gms.) is applied to the left front edge of vane as in Fig. 34 when main bail is in extreme rear position and swords are in marking position (toward lower stop post); and (2) start and return to their marking position when pull is reduced to 1-1/2 ozs. (40 gms.)

(a) To adjust, check vanes for bind and end play (4.40); replace selector lever spring if necessary.

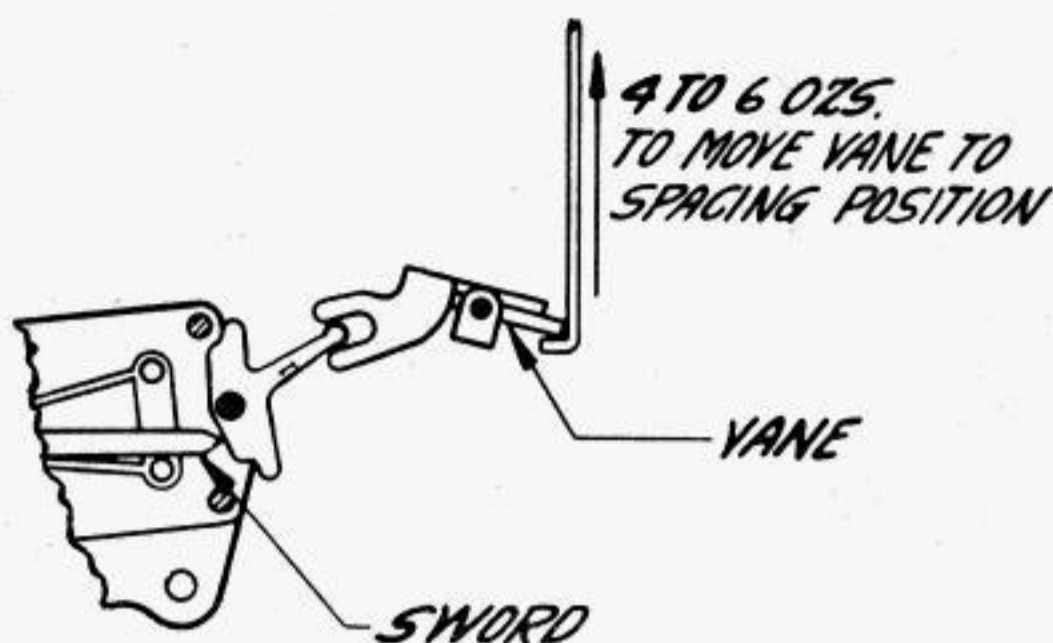


Fig. 34.

4.61 **Selector armature** shall have a minimum amount of end play without bind in its bearings, gauged by eye and feel, and its locking wedge shall clear No. 1 sword by not more than .008" as in Fig. 35 when the No. 1 selector lever rests on peak of its cam, the No. 1 sword front arm is held against outer separator plate without bending latter and the armature end play taken up so as to reduce clearance to minimum.

(a) To adjust, reposition armature bearing pivot screws, outer screw for clearance, inner screw for end play noting that 1/4 turn of screw is equivalent to approximately .006" adjustment.

Note: In replacing armature bracket make sure armature spring clears bracket and its mounting screw.

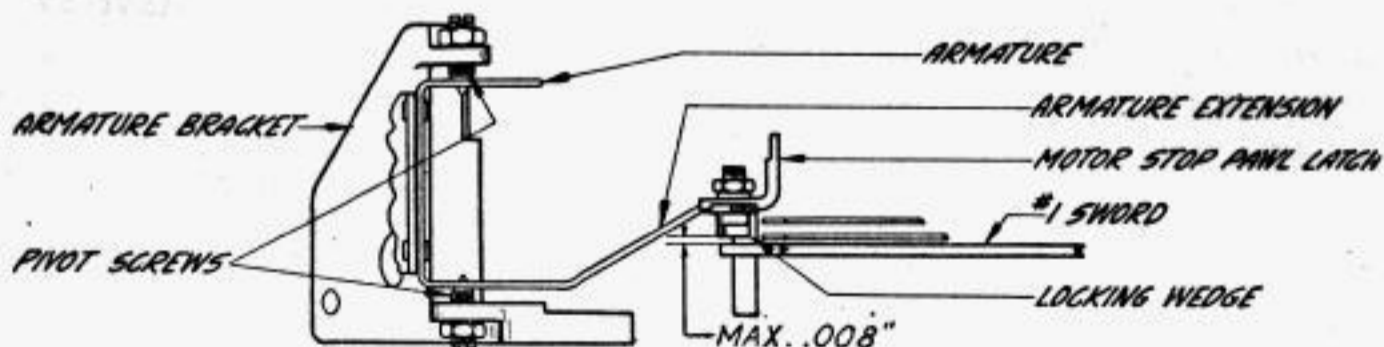


Fig. 35.

4.62 **Selector Swords.** No. 1 sword's centerline shall intersect the armature pivot screw centerline, gauged by eye, when the swords are held centrally located between the stop posts with 72581M gauge pins as in Fig. 36.

(a) To adjust, unhook lock lever spring; loosen magnet and armature bracket mounting screws and bracket link screw (see Fig. 37); back off armature stop screw and nut; move armature bracket eccentric out of way; take out two motor stop lever bracket mounting screws (see Fig. 40) and lift out bracket on units so equipped; rotate cam sleeve until No. 1 selector lever rests on peak of its cam; place armature so its extensions are between sword arms and insert 72581M gauge pins between posts and swords as in Fig. 36; place 73370M locating gauge over end of No. 1 sword so legs of gauge are against ends of sword arms; move armature bracket to position which will bring end of armature extension flush against flat surface between legs of gauge; then holding bracket in this position tighten link screw and armature bracket mounting screws.

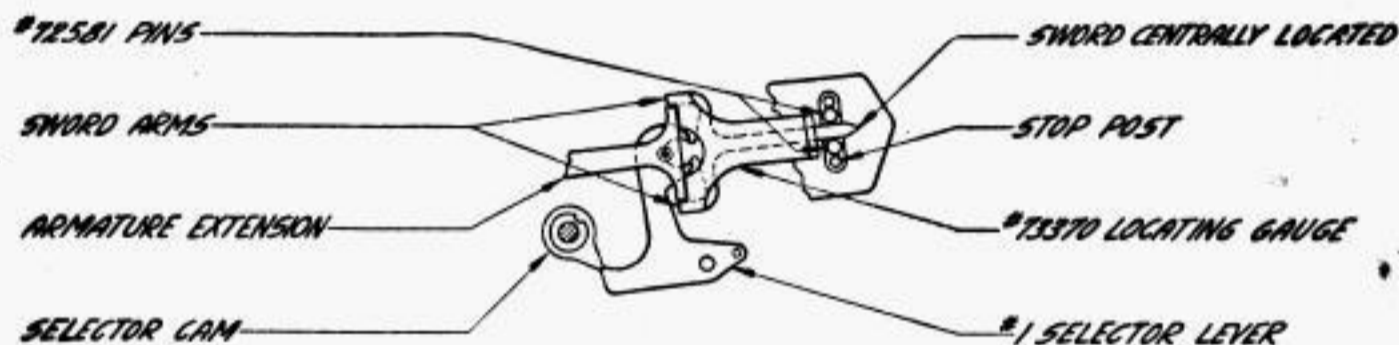


Fig. 36.

4.63 Selector swords shall clear both the right and left stop posts by not more than .040" as in Fig. 37 after (1) placing the associated selector lever on peak of its cam, (2) placing the sword arm against the armature extension end and (3) moving the armature slowly from its unoperated or operated position to a point where its extension arm just clears the sword arm. When checking clearance to right stop post unhook armature spring from its adjusting screw.

Note: Use No. 1 sword as a guide in gauging and adjusting, then check remaining swords.

(a) To adjust, reposition armature bracket, backward to increase clearance and forward to decrease clearance, tighten mounting screws and then move eccentric stop against bracket and tighten its screw.

Note: Eccentric stop is provided so that armature bracket can be removed and reassembled without changing its adjustment, provided it is held against the stop while clamping screws are tightened and provided link screw is not loosened.

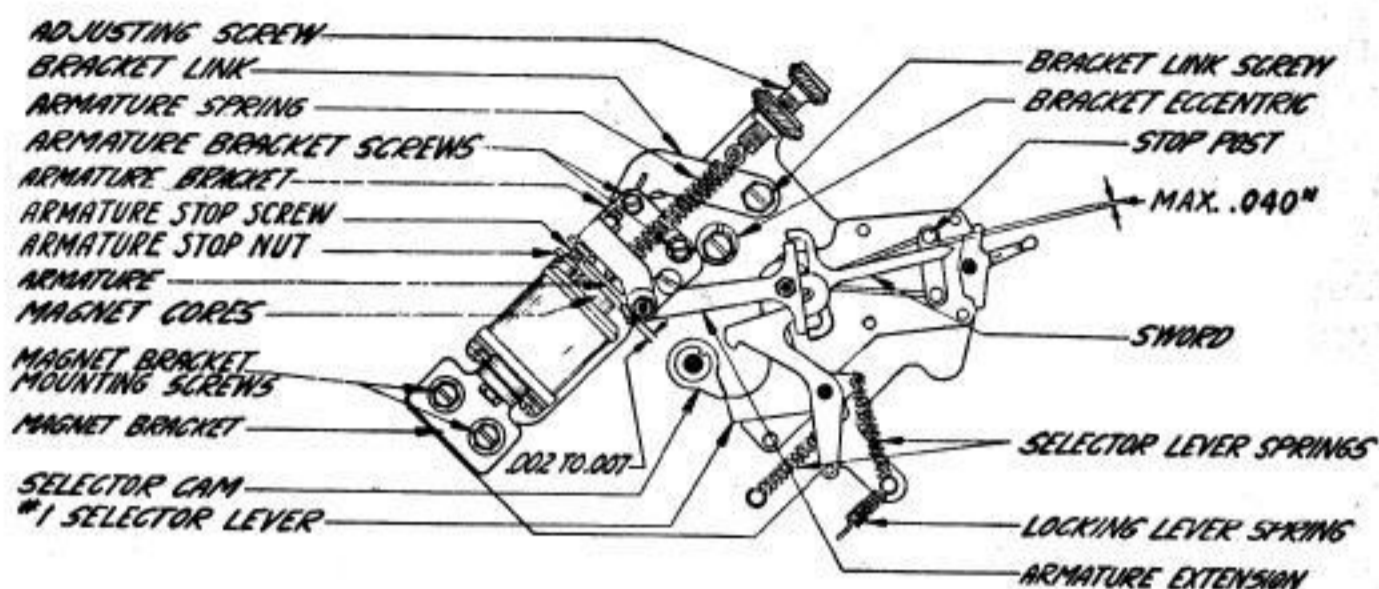


Fig. 37.

4.64 **Selector armature spring** shall have a tension of Min. 6 ozs. (170 gms.), Max. 6-3/8 ozs. (180 gms.) with armature released when spring is stretched to position length.

(a) To adjust, reposition selector armature spring adjusting screw.

4.65 **No. 1 sword arms** (right and left) shall clear the associated armature extension lug by Min. ^{.040}.040", Max. .042" when the end of the opposite arm is against its armature extension lug and the No. 1 selector lever is on high part of its cam as in Fig. 38.

(a) To adjust right arm clearance, reposition armature stop screw with armature released. To adjust left arm clearance, reposition armature stop nut with armature operated. Pinch stop nut if necessary to make it tight on its screw.

Note: If necessary to change clearance of one arm, recheck clearance of other arm.

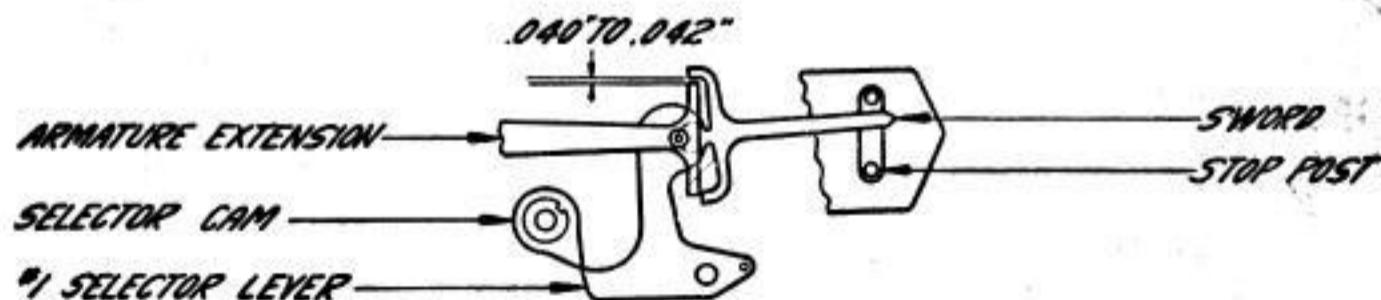


Fig. 38.

4.66 **Armature locking wedge** shall clear the locking lever by Min. .008", Max. .012" as in Fig. 39 when locking lever is resting on long high part of cam.

(a) To adjust, reposition locking wedge in its slot in the armature extension. Set motor stop pawl latch, on units so equipped, so that latch shoulder is against the front surface of the armature extension (see Fig. 40) when tightening locking wedge clamping nut.

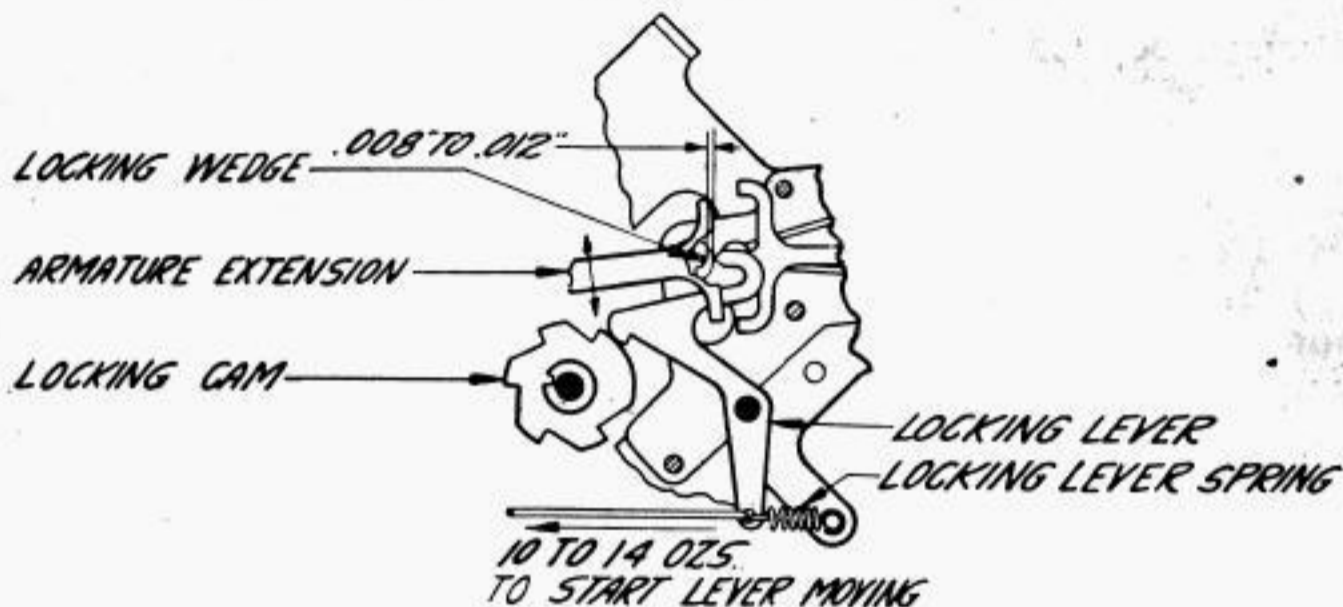


Fig. 39.

4.67 **Armature locking lever spring** shall have a tension of Min. 10 ozs. (285 gms.), Max. 14 ozs. (395 gms.) measured as in Fig. 39 when locking lever is on long high part of cam.

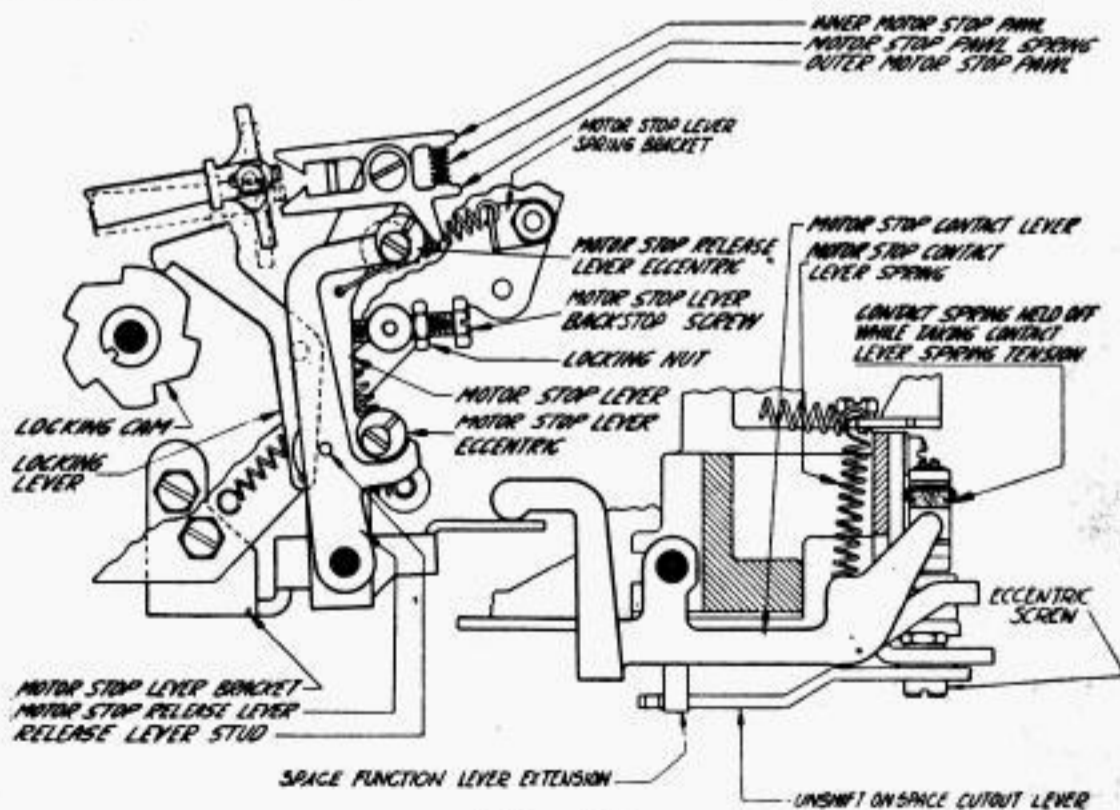


Fig. 40.

Note: Adjustments 4.68 to 4.75 inclusive apply only to typing units equipped with the automatic motor stop mechanism.

4.68 **Inner motor stop pawl** latching surface shall over-travel the rearmost surface of the motor stop pawl latch Min. .010", Max. .025" as in Fig. 41, when (1) platen is in "figures" position, (2) "Motor Stop" combination is set up, (3) main shaft is rotated slowly until motor stop function lever is completely selected, and (4) armature is in operated position.

(a) To adjust, reposition motor stop lever bracket keeping motor stop pawl backstop clear of the inner pawl. See Fig. 40.

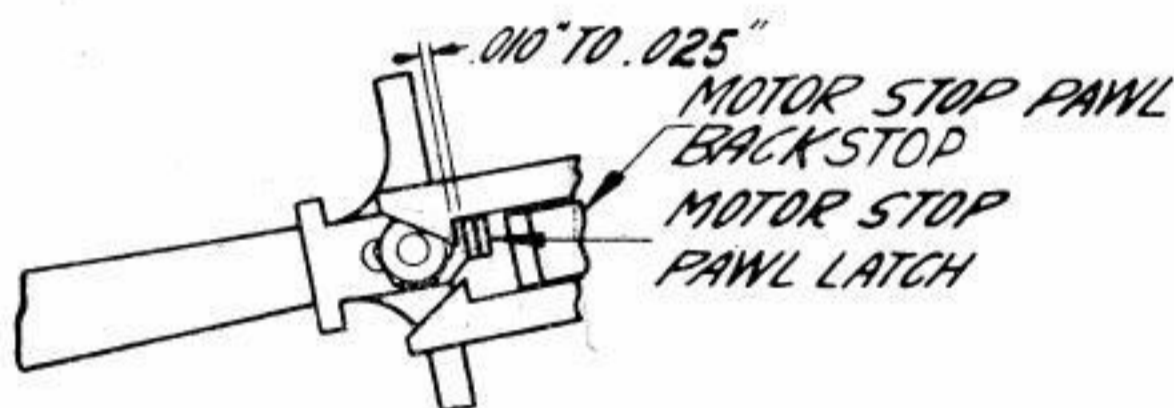


Fig. 41.

4.69 **Motor stop lever eccentric** shall be in contact with lower arm of the motor stop release lever when (1) main shaft is rotated until printing bail is in extreme rear position and locking lever is on high part of cam, (2) armature is in operated position, (3) inner motor stop pawl is engaged with pawl latch and (4) motor stop release lever stud is touching the locking lever. Gauge by eye and feel. See Fig. 40.

(a) To adjust, reposition motor stop lever eccentric.

4.70 **Motor stop lever** lower edge shall clear the motor stop function lever rear extension by not more than .002" when (1) platen is in "Letters" position, (2) "Motor Stop" combination is set up, (3) main shaft is rotated until printing bail is in extreme forward position and (4) motor stop pawls are released from latch.

(a) To adjust, reposition motor stop lever backstop screw. See Fig. 40.

4.71 **Motor stop pawls** shall clear their latches by approximately equal amounts and not less than .010" as in Fig. 42 when armature is moved from its operated to unoperated position with printing bail in its extreme rear position and motor stop release lever eccentric moved away from outer stop pawl. Gauge by eye.

(a) To adjust, reposition motor stop pawl backstop.

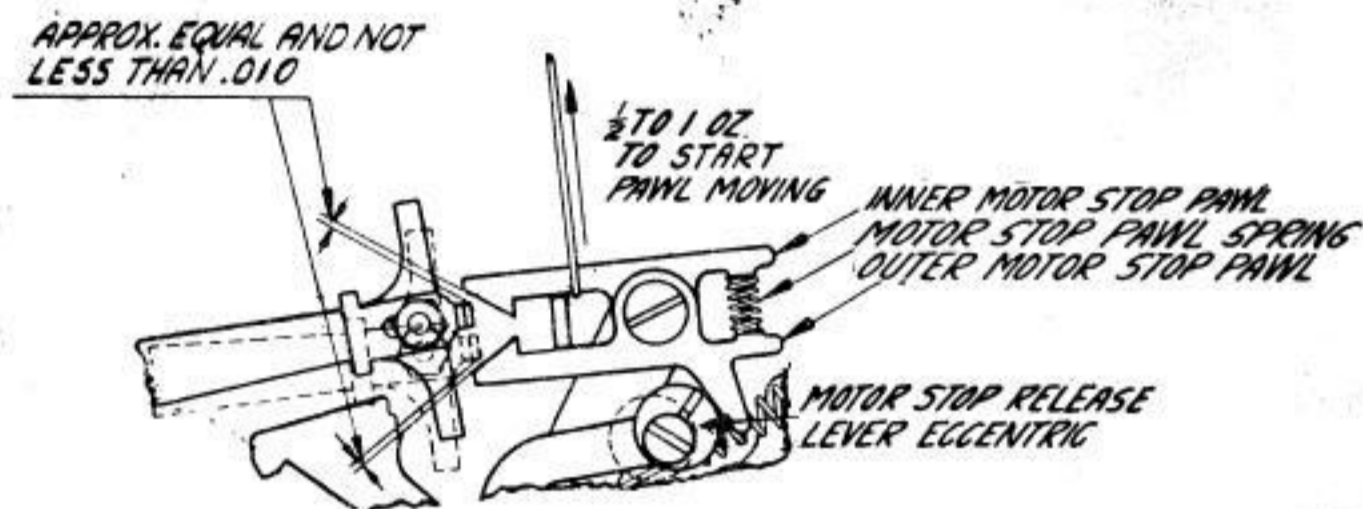


Fig. 42.

4.72 **Motor stop release lever eccentric** shall just touch outer motor stop pawl when (1) main shaft is rotated until printing bail is in extreme rear position and locking lever is on high part of cam, (2) armature is held in operated position, (3) inner motor stop pawl is engaged with motor stop pawl latch, (4) lower arm of motor stop release lever is in contact with motor stop lever eccentric, and (5) outer pawl is against motor stop pawl backstop. Gauge by eye and feel. See Fig. 40.

(a) To adjust, reposition motor stop release lever eccentric.

4.73 **Motor stop pawl spring** shall have a tension of Min. 1/2 oz. (14 gms.), Max. 1 oz. (28 gms.) measured as in Fig. 42 when printing bail is in extreme rear position.

4.74 **Motor stop lever spring** shall have a tension of Min. 1 oz. (28 gms.), Max. 1-1/2 ozs. (40 gms.) measured as in Fig. 43 when motor stop contact lever spring is unhooked and motor stop lever is in unoperated position.

(a) To adjust, reposition spring bracket on the post of selector unit.

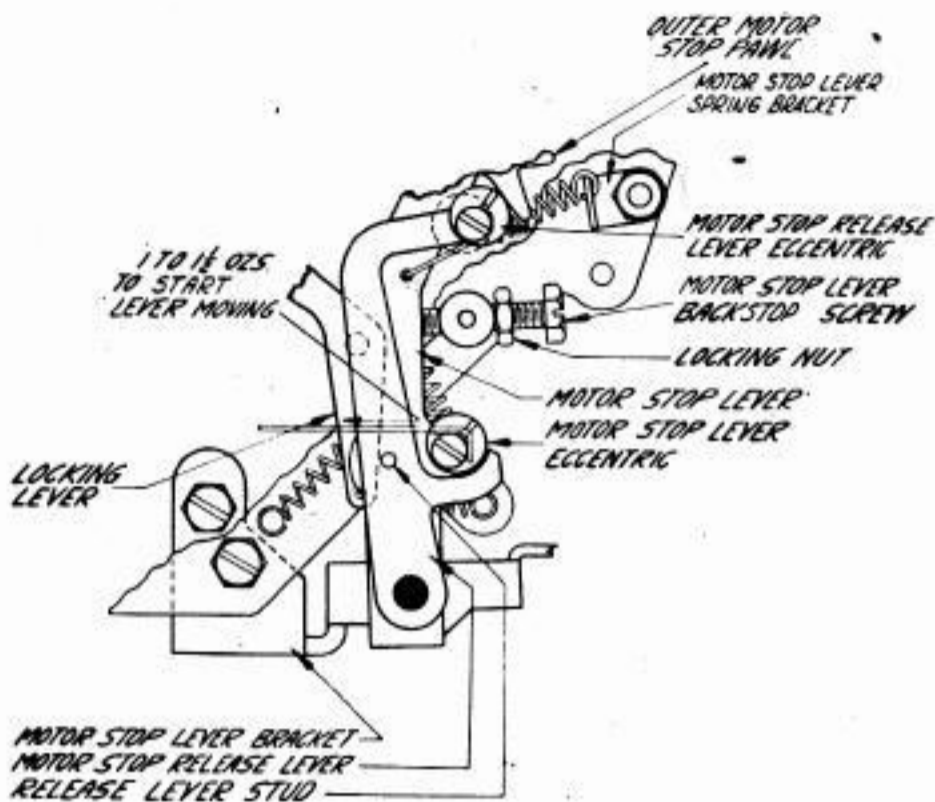


Fig. 43.

4.75 **Motor stop contact lever spring** shall have a tension of Min. 4-1/4 ozs. (120 gms.), Max. 5-1/4 ozs. (145 gms.) measured as in Fig. 44 when the contact spring is held away from lever

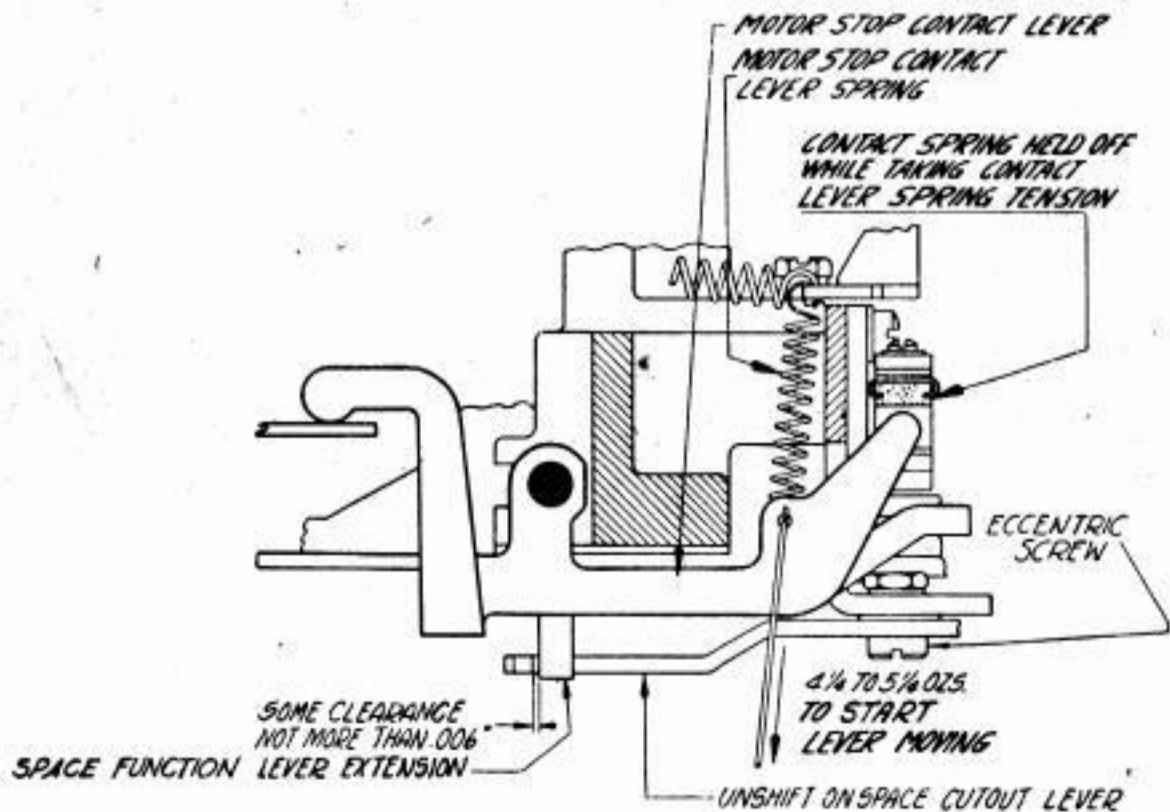


Fig. 44.

4.76 **Motor stop function lever spring** shall have a tension of Min. 5 lbs., Max. 6 lbs. measured as in Fig. 45 when motor stop function lever is resting against rear edges of vanes but not selected.

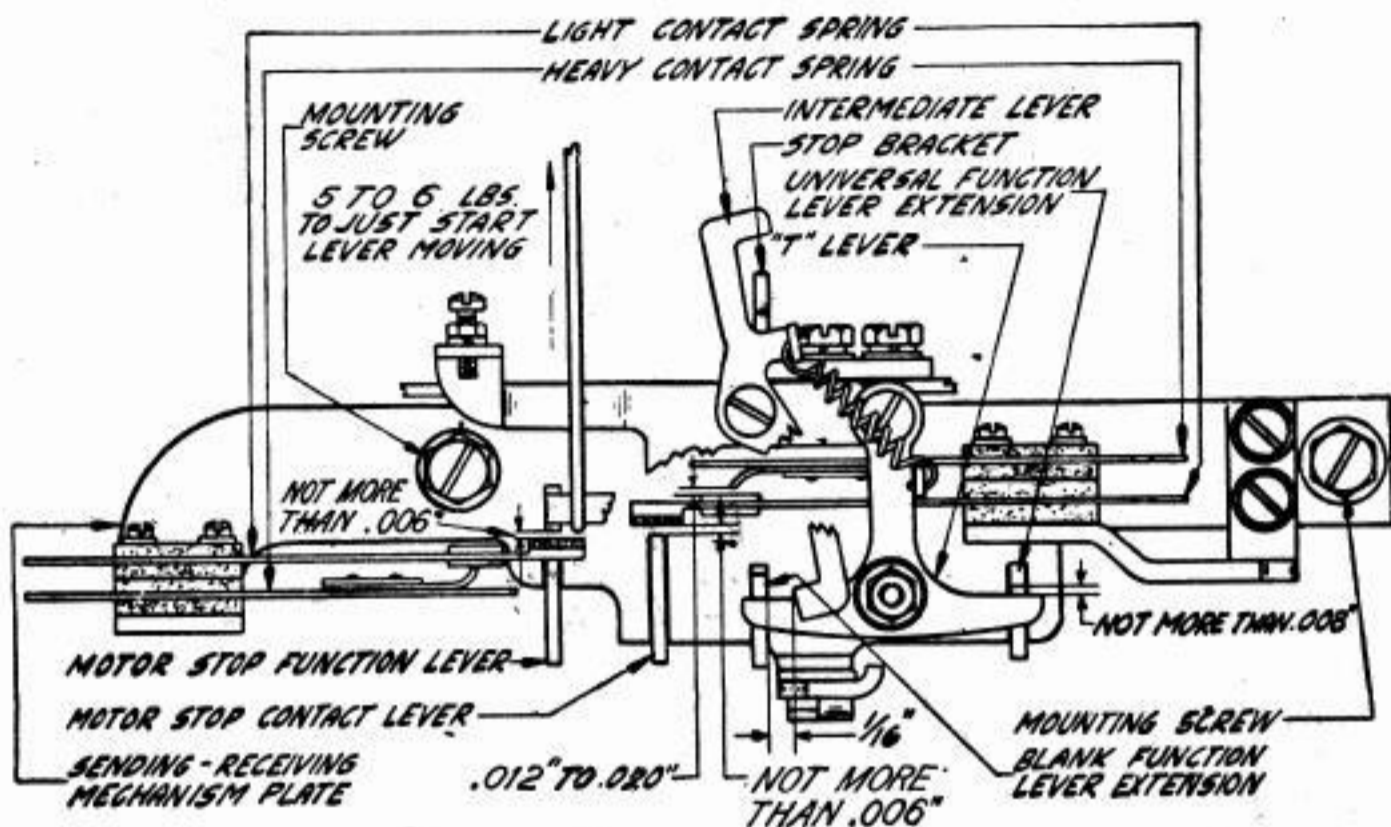


Fig. 45.

4.77 **Stop lever** shall overtravel trip latch Min. .004", Max. .006" as in Fig. 46.

(a) To adjust, reposition stop lever eccentric screw.

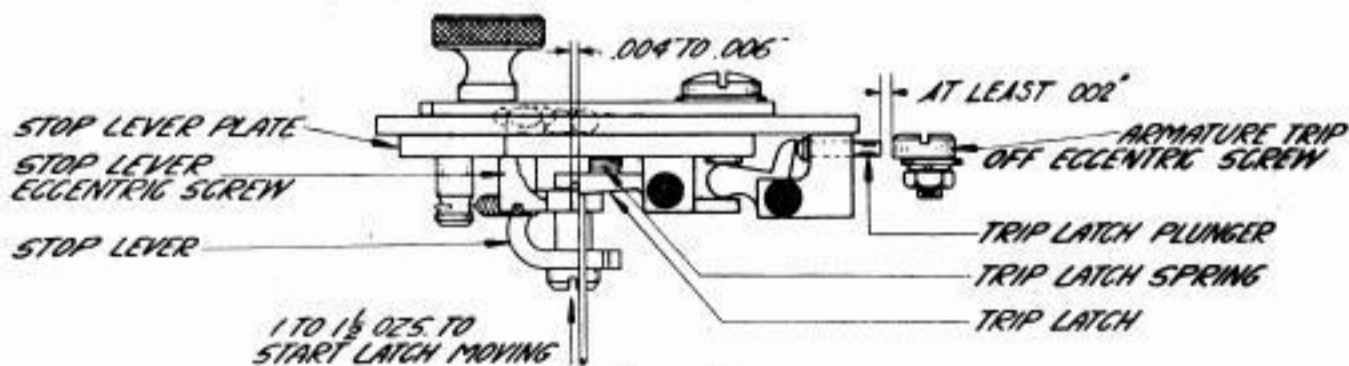


Fig. 46.

4.78 **Trip latch spring** pressure shall be Min. 1 oz. (28 gms.), Max. 1-1/2 ozs. (40 gms.) measured as in Fig. 46 when range finder assembly is held horizontal.

4.79 **Stop lever spring** shall have a tension of Min. 3/4 oz. (21 gms.), Max. 1-1/4 ozs. (35 gms.) measured as in Fig. 47.

Note: Check 4.77 before measuring this tension.

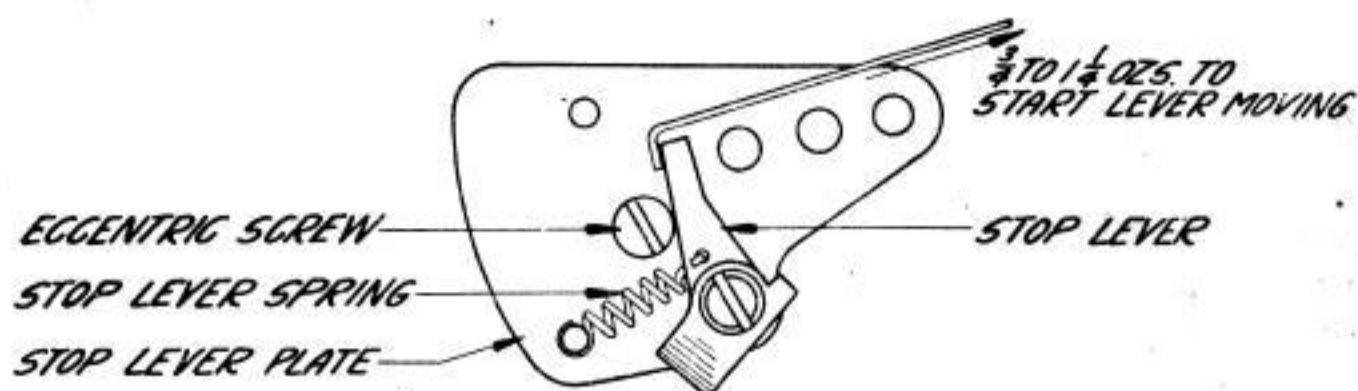


Fig. 47.

Note: Reassemble range finder assembly on typing unit taking care not to jam trip latch plunger trip off screw (eccentric screw on units having pull type magnets).

4.80 **Armature Trip-off Screw.** Stop lever shall clear its trip latch by not more than .002" when armature is unoperated and stopping edge of the lever is directly opposite the trip latch latching surface (Fig. 48); and the trip latch plunger shall have at least .002" end play as in Fig. 46 when the armature is operated and the stop lever is clear of the trip latch latching surface.

(a) To adjust, reposition armature trip off screw (eccentric screw on units having pull type magnets).

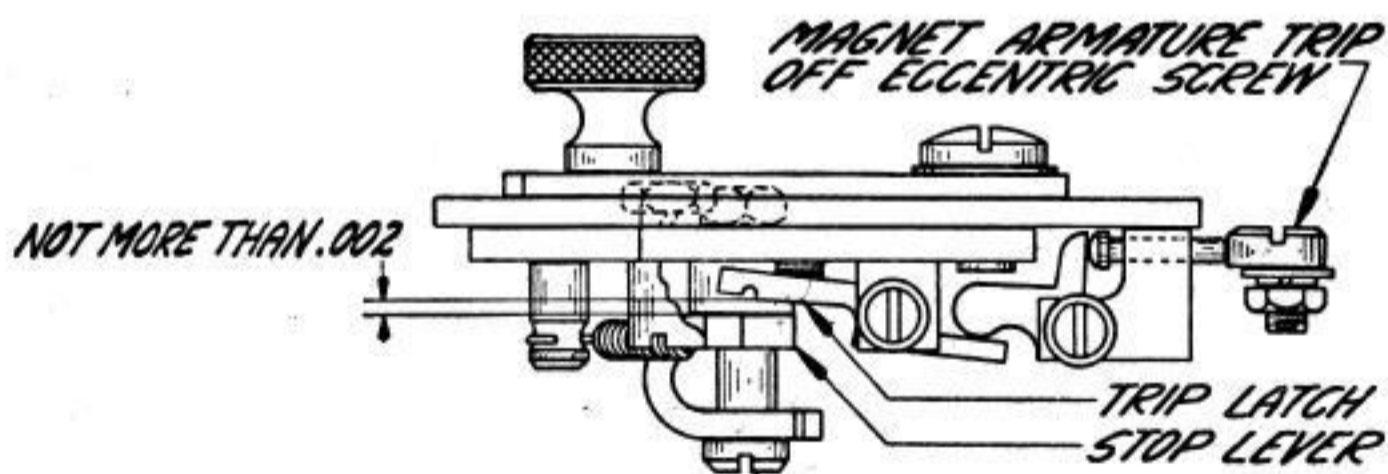


Fig. 48.

4.81 **Pull Type Magnet Bracket.** Magnet core ends, on units equipped with pull type selector magnets, shall be approximately parallel to armature and shall clear armature non-magnetic (anti-freeze) strip by Min. .002", Max. .007" as in Fig. 37 when the armature is held in the operated position by hand.

(a) To adjust, reposition magnet bracket.

Note: Place typing unit in normal upright position.

4.82 **Platen unit** shall be midway between side frames and shall rotate freely on its bearings with no end play as gauged by eye and feel.

(a) To adjust, disconnect line feed and shift vertical links at upper shoulder screws, unhook platen balance and shift detent springs, and reposition platen unit pivot screws. See Figs. 49 and 52 for location of parts.

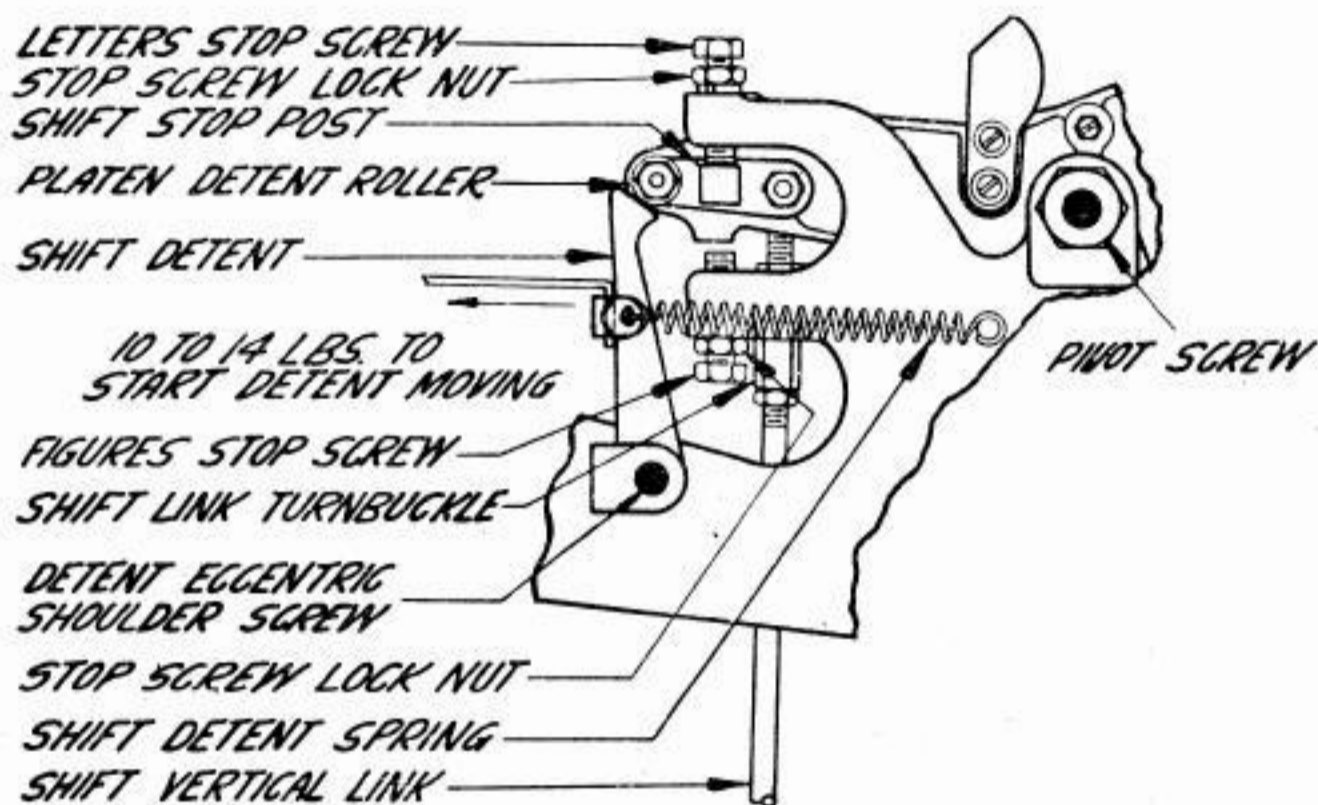


Fig. 49.

4.83 **Platen shift stop post** top and bottom surfaces shall be parallel to a line through the center of the platen detent roller and platen unit pivot screws as gauged by eye. See Fig. 49.

(a) To adjust, reposition post.

Note: Place type bar carriage on typing unit, (see note under 4.35).

4.84 **Letters Stop Screw.** Letter "N" shall type equally heavy top and bottom with platen in "letters" position.

(a) To adjust, raise letters stop screw if impression is light at bottom, and lower screw if light at top. See Fig. 49.

4.85 **Figures Stop Screw.** Top of figure "5" typed with platen in the "figures" position, shall type in line with top of letter "T" typed with platen in "letters" position. Gauge by eye.

(a) To adjust, reposition figures stop screw. See Fig. 49.

Note: Remove type bar carriage from typing unit (see note above 4.01) and place typing unit on right side.

4.86 **Figures, letters and line feed function levers** shall be free of bind and the tension of their springs shall be Min. 15 ozs. (425 gms.), Max. 19 ozs. (540 gms.) measured as in Fig. 50 when (1) blank combination is set up, (2) main shaft is rotated until printing bail is in extreme forward position, and (3) push bars are held away from function levers.

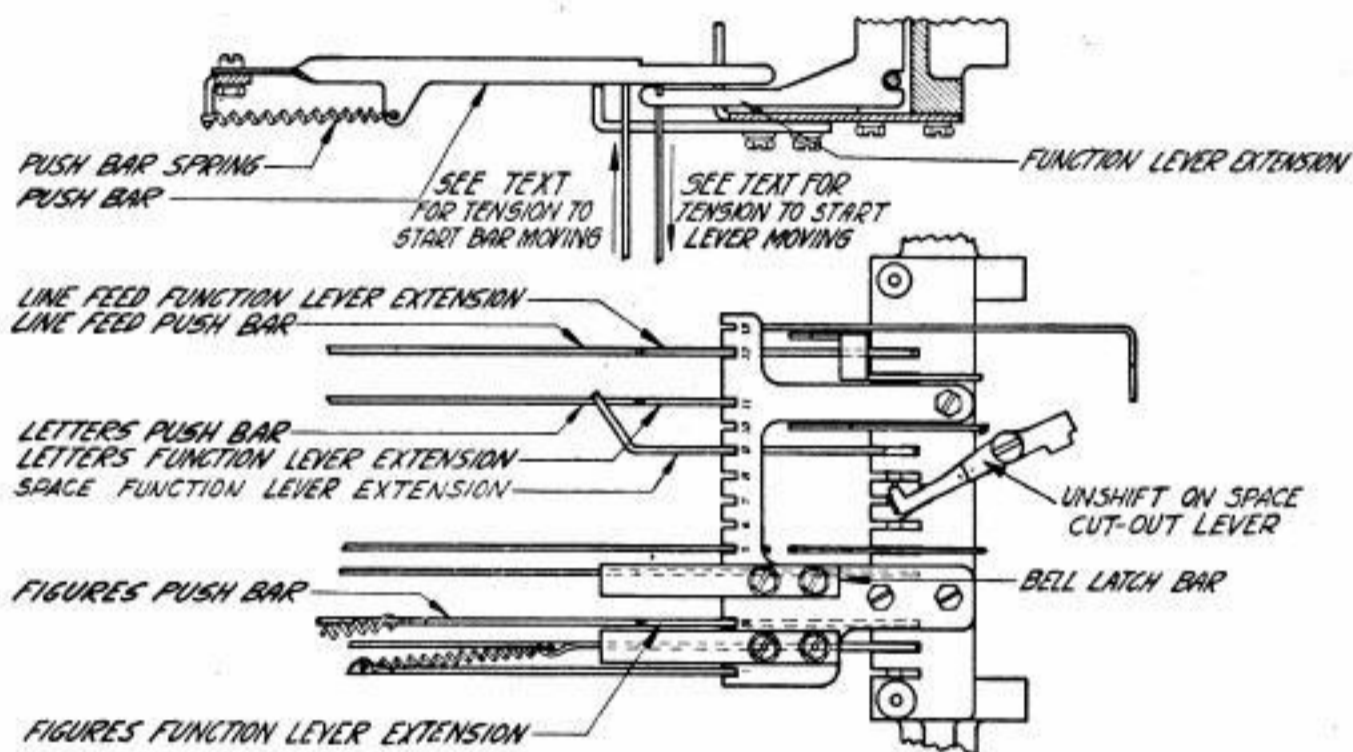


Fig. 50.

4.87 **Space function lever spring** shall have a tension of Min. 12 ozs. (340 gms.), Max. 16 ozs. (455 gms.) measured as in Fig. 50 when space function lever is resting against vanes but not selected and letters push bar is held away from function lever.

4.88 **Blank-printing and spacing cut-out function lever spring** on units so equipped shall have a tension of Min. 22 ozs. (625 gms.), Max. 30 ozs. (850 gms.) when printing bail is in extreme rear position and the spring is unhooked from the spring plate and stretched to position length.

4.89 **Function Bail Blade.** "Figures," "line feed," "letters" and "space" function levers shall clear the rear edge of the No. 1 (top) vane by Min. .004", Max. .015" as in Fig.

51 when the function combination of the lever being checked has been set up and main shaft rotated until function lever bail is blocked by the selected function lever except in the case of the space function lever which shall meet the requirement when (1) the unshift on space cut-out lever is released from the lower space function lever extension, (2) the platen is in the "figures" position, (3) space combination is set up and (4) the main shaft is rotated until function lever bail roller just leaves the cam surface of the space function lever.

Note: Before readjusting check 4.91, and if shift stop post does not meet requirements of 4.91 place shift bell crank operating lever bracket in extreme rear position, proceed with this adjustment and then adjust shift bell crank operating lever bracket in accordance with 4.91.

(a) To adjust, set up "figures" combination and rotate main shaft until the function lever bail is stopped by the "figures" function lever and reposition right end of function bail blade. Similarly set up "line feed" combination and reposition left end of function bail blade. Then check clearance of "letters" and "space" function levers in turn. If necessary to reposition blade for clearance of "letters" or "space" function levers, recheck "figures" and "line feed" function lever clearances.

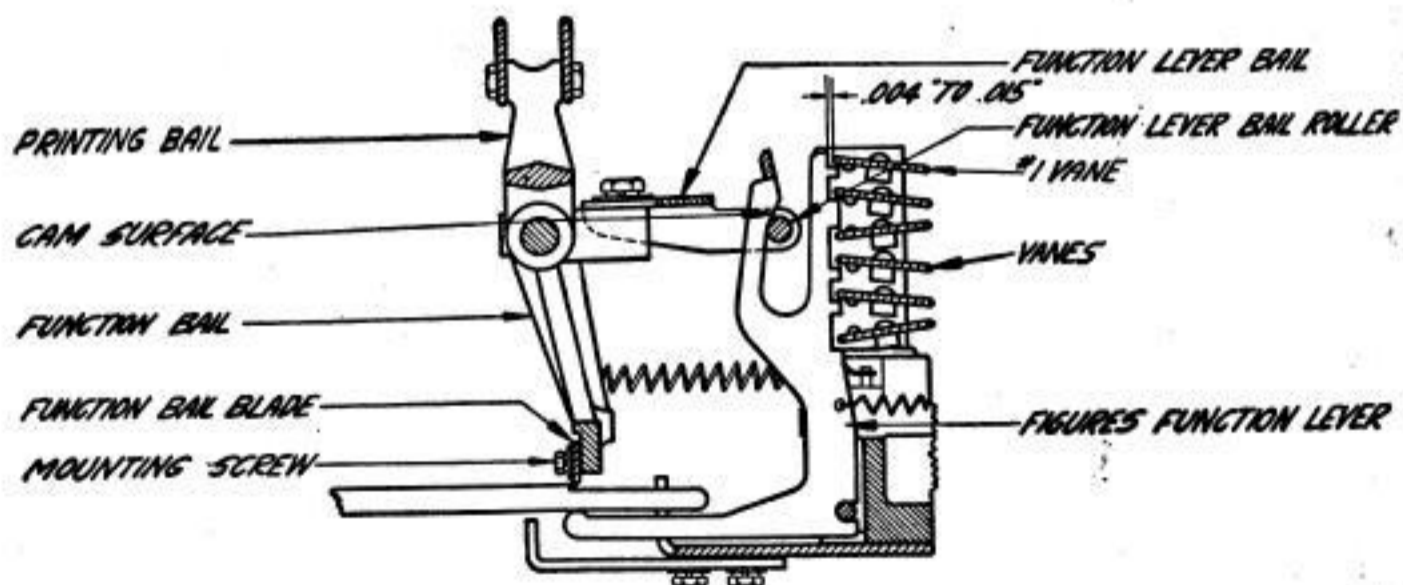


Fig. 51.

4.90 **Unshift on space cut-out lever** (Fig. 50) shall be rotated counter-clockwise (viewed from bottom) until it rests against its stop.

Note: Where it is desired on certain private wire services that the platen shall not return to "letters" position when "space" combination is received, the unshift on space cut-out lever shall be positioned so as to touch the side of the space function lever and the cut-out lever toe shall be to the rear of and clear the space function lever lower extension by not more than .006" as in Fig. 44, when printing bail is in extreme rear position.

- (a) To adjust, reposition space cut-out lever and its eccentric screw.

Note: "T" lever and attached mechanism may be removed from its mounting post to facilitate making this adjustment.

4.91 **Shift stop post** shall clear the "letters" and "figures" stop screws by Min. .010", Max. .025" when the shift detent and platen balance springs are removed, the platen is shifted from one position to another, the main shaft is rotated until the selected push bar is moved to its rearmost position by the function bail blade. These two clearances shall be within .010" of each other. See Figs. 49 and 52.

- (a) To adjust, reposition shift link turnbuckle until two clearances are equal within .010", then if either clearance is more than .025" move shift bell crank operating lever bracket toward front of typing unit, if less than .010" move bracket toward rear. If necessary to move bracket recheck to see that clearances are equal.

Note: If shift bell crank operating lever bracket has been removed for other reasons it should be assembled on the typing units in the middle of its elongated mounting holes and the shift link turnbuckle should be adjusted so that the function bail blade in its extreme forward position clears the notches in the letters and figures push bars by the same amount within .010" when the latter are selected, before the above adjustment is made.

Note: Place typing unit in normal upright position.

4.92 **Platen balance spring** shall have a tension of Min. 3-1/2 lbs., Max. 5 lbs. measured as in Fig. 52 when platen is in "letters" position.

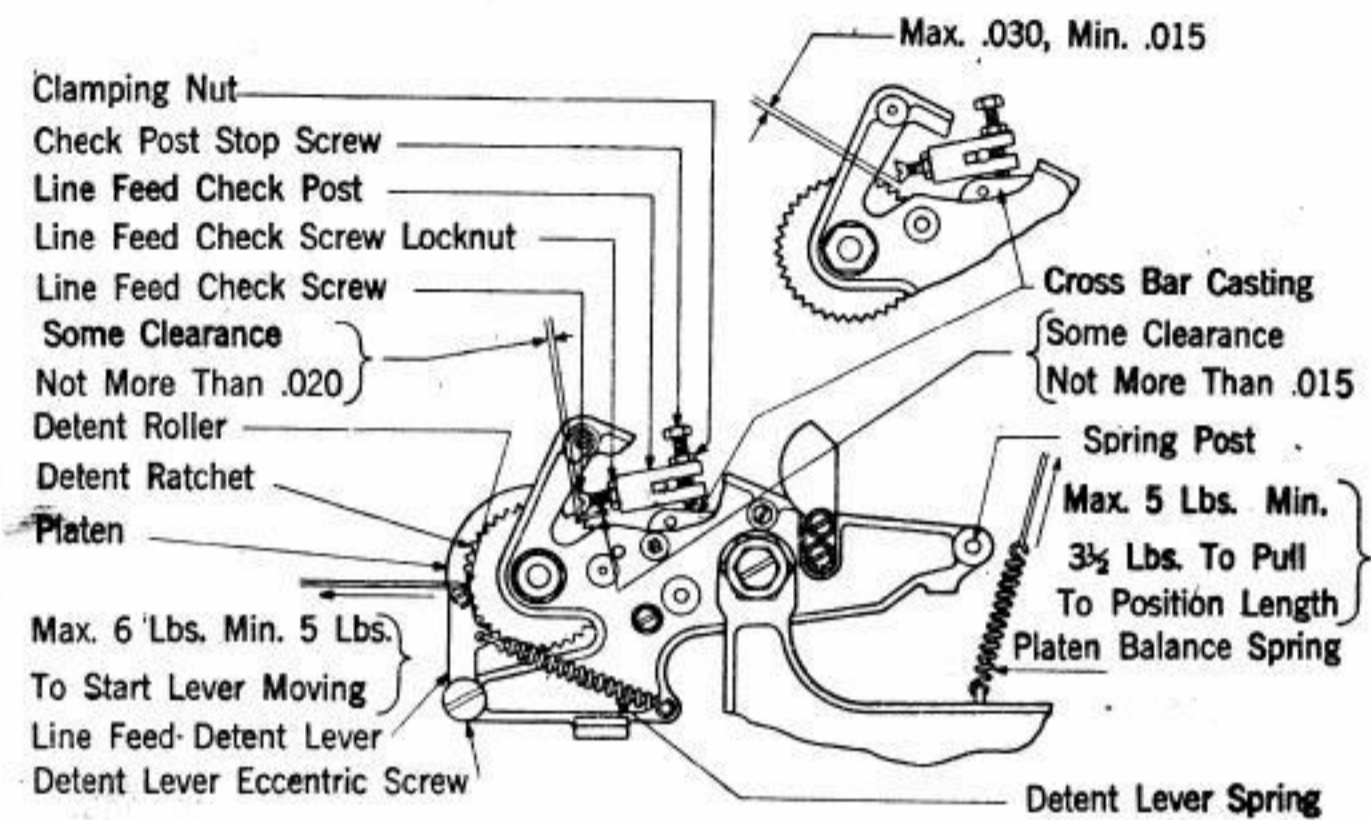


Fig. 52.

4.93 **Shift detent** (Fig. 49) shall ride the same distance either side of platen detent roller, gauged by eye, when platen is shifted from "figures" to "letters" position.

(a) To adjust, reposition eccentric shoulder screw of shift detent.

4.94 **Shift detent spring** shall have a tension of Min. 10 lbs., Max. 14 lbs. measured as in Fig. 49.

4.95 **Sixth Vane Extension.** On typing units equipped with old style sixth vane extension (a flat spring formed from spring steel), the sixth vane shall travel an equal amount, gauged by eye, either side of the detent in the "W" notch of the locking function lever when vane's detent spring is unhooked from its spring plate and platen is shifted from "figures" to "letters" position.

(a) To adjust, bend sixth vane extension making sure it does not bind in slot of letters push bar when in either "letters" or "figures" position. Check 4.40.

4.96 **"Letters" and "figures" push bar springs** shall exert a pressure of Min. 3 ozs. (85 gms.), Max. 5 ozs. (140 gms.) measured as in Fig. 50 when any character has been selected and main shaft rotated until printing bail is in extreme forward position.

4.97 **Platen shaft** shall have end play not to exceed .004".

(a) To adjust, reposition friction drag assembly on platen shaft.

4.98 **Single-double line feed detent** shall travel an equal distance either side of detent spring hump, gauged by eye, when detent lever is shifted from "single" to "double" line feed position. See Fig. 53.

(a) To adjust, reposition detent.

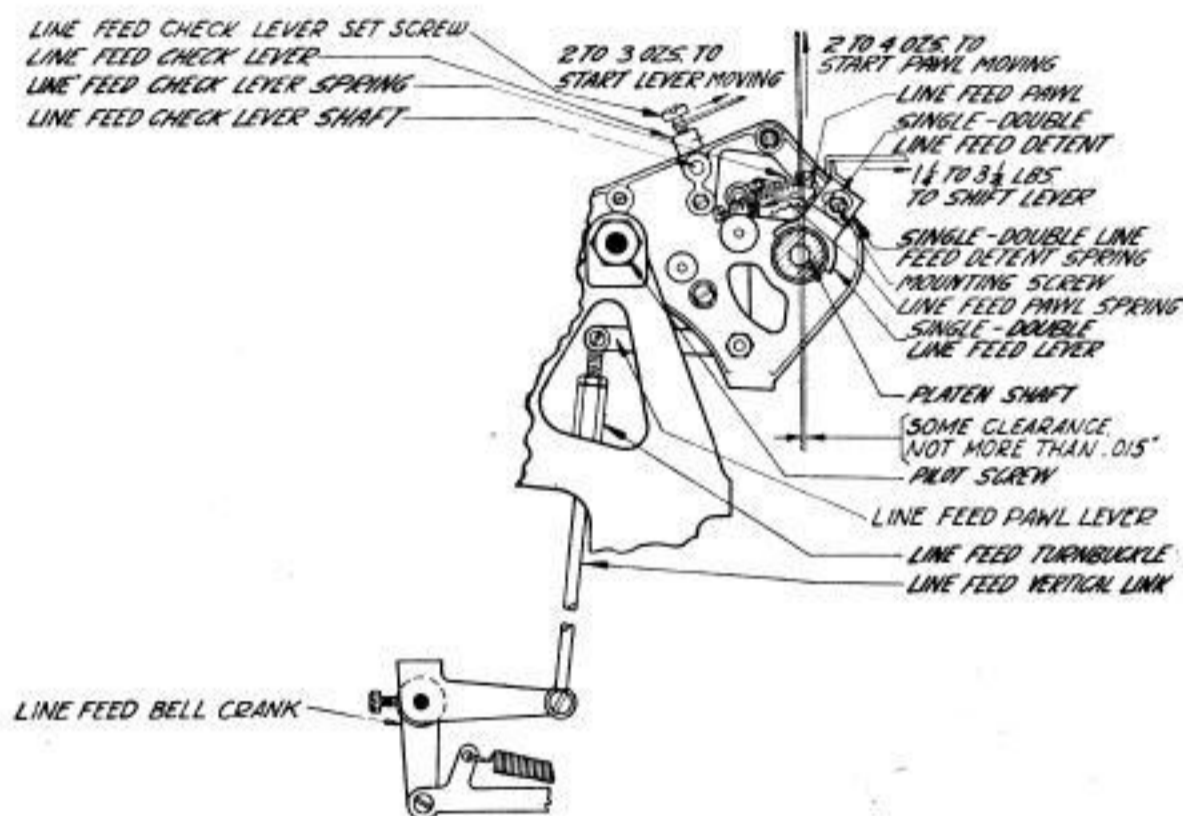


Fig. 53.

4.99 **Single-double line feed detent spring** shall exert a pressure of Min. 1-1/4 lbs., Max. 3-1/4 lbs. measured as in Fig. 53.

Note: On typing units having old style single-double line feed levers with handle formed by an extension on front of lever, the detent spring shall exert a pressure of Min. 2-1/2 lbs., Max. 4-1/2 lbs. measured at end of the lever as latter is pushed from "single" to "double" line feed position.

4.100 **Line feed pawl** shall just clear the edge of a ratchet tooth when the single-double line feed lever is in "single" line feed position, the line feed detent roller is in hollow between two ratchet teeth and the line feed bell crank is operated manually (Fig. 53).

Old style → (a) To adjust, reposition line feed detent lever eccentric screw (Fig. 52) so as to rotate platen by means of the detent lever making sure eccentric head of screw is to rear of screw's body. Check adjustment on at least four ratchet teeth located 90° apart.

Note: Place typing unit on right side.

4.101 Line feed pawl shall have advanced the platen one line space so that the line feed detent roller is in hollow between two ratchet teeth and shall then clear the front face of the ratchet tooth by not more than .015" as in Fig. 53 when (1) single-double line feed lever is in "single" line feed position, (2) "line feed" combination is set up, (3) main shaft is rotated until line feed push bar is being stripped from function bail blade and (4) play in line feed mechanism is taken up by pressing forward on pawl in a direction to make the clearance maximum.

(a) To adjust, reposition line feed link turnbuckle.

4.102 **Line feed push bar spring** shall exert a pressure of Min. 1-1/2 ozs. (40 gms.), Max. 2-1/2 ozs. (70 gms.) measured as in Fig. 50 when printing bail is in its extreme rear position.

Note: Place type unit in its normal upright position.

4.103 **Line feed detent lever spring** shall have a tension of Min. 5 lbs., Max. 6 lbs. measured as in Fig. 52.

4.104 **Line feed pawl spring** shall have a tension of Min. 2 ozs. (56 gms.), Max. 4 ozs. (110 gms.) measured as in Fig. 53 when single-double line feed lever is in "double" line feed position and line feed pawl is in unoperated position.

4.105 **Line feed check screw head** shall enter the 12th notch ahead of the one in which the detent roller rests and the top of the screw head shall clear the face of the tooth by not more than .020" as in Fig. 52 when the check screw is held in the bottom of the notch. Check adjustment on at least four ratchet teeth located 90° apart. ✓

(a) To adjust, reposition line feed check screw. On old style line feed check screws having slotted head with flat sides the flat sides shall be vertical and the adjustment made by turning screw in or out 1/2 turn at a time. If necessary line feed check post stop screw may be backed off when making this adjustment. /

4.106 Line feed check screw shall clear detent ratchet teeth by Min. .015", Max. .030" as in Fig. 52 when line feed check stop post is resting on cross bar casting.

Check adjustment on at least four ratchet teeth located 90° apart.

(a) To adjust, turn platen so that ratchet tooth showing minimum clearance is opposite line feed check screw and reposition line feed check post. Before tightening clamping nut position check post against inner edge of casting and position end of shaft flush with outside edge of casting.

4.107 Line feed check screw shall clear the bottom of each notch on detent ratchet by not more than .015" as in Fig. 52 when (1) "line feed" combination is set up, (2) main shaft is rotated until line feed pawl has reached end of its travel in feeding platen, (3) line feed check lever (Fig. 53) is against line feed pawl and (4) play of check lever shaft's right bearing is taken up to make this clearance a maximum.

(a) To adjust, reposition line feed check lever on shaft. When tightening set screw make sure line feed check lever shaft has end play not to exceed .004".

4.108 **Line feed check lever spring** shall have a tension of Min. 2 ozs. (56 gms.), Max. 3 ozs. (85 gms.) measured as in Fig. 53.

Note: Requirements 4.109 to 4.119 inclusive shall be omitted on sprocket feed typing units.

4.109 **Pressure roller release shaft arm** shall clear the boss just to rear of platen shaft boss by Min. 5/32", Max. 7/32" as in Fig. 54 when right pressure roller release shaft collar is against casting and arm is opposite boss, gauge by eye.

(a) To adjust, reposition right pressure roller release shaft locating collar. Check 4.110.

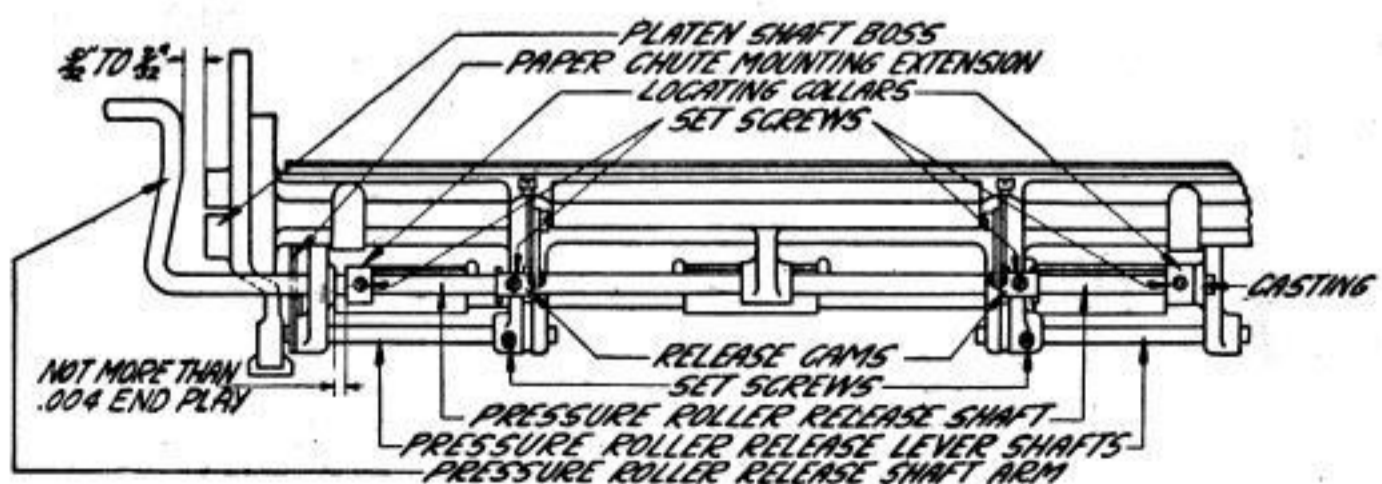


Fig. 54.

4.110 **Pressure roller release shafts** shall have end play not to exceed .004" as in Fig. 54, gauge by feel. Check 4.111.

(a) To adjust, reposition left pressure roller release shaft locating collar.

4.111 **Pressure Roller Release Cams.** High parts of cams shall rest on high part of their respective release levers as gauged by eye when pressure roller release shaft arm is in its rear position. See Fig. 55.

(a) To adjust, reposition cams.

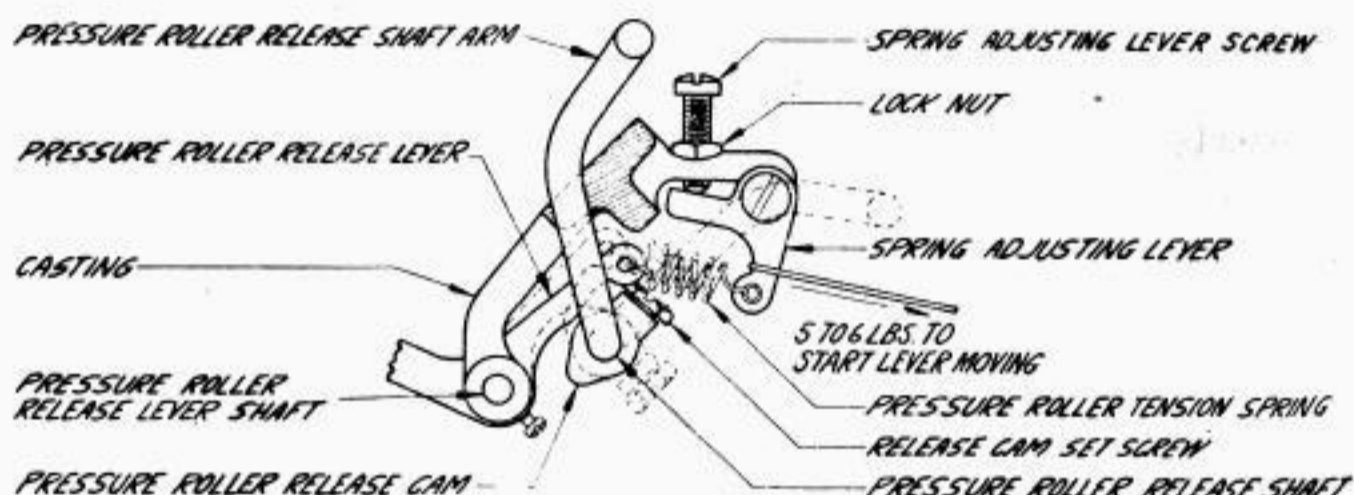


Fig. 55.

4.112 **Pressure roller tension springs** shall have a tension of Min. 5 lbs., Max. 6 lbs. measured as in Fig. 55 when pressure roller release is in its forward position.

(a) To adjust, reposition spring adjusting levers.

4.113 **Pressure roller release lever shafts** shall project beyond outer surfaces of paper chute mounting extensions by not more than 1/32" as gauged by eye when inner surfaces of the paper chute extensions are against casting. See Fig. 54.

(a) To adjust, reposition shafts.

4.114 **Paper chute springs** shall have a combined tension of Min. 2 ozs. (56 gms.), Max. 4 ozs. (110 gms.) measured as in Fig. 56 midway between side frames when pressure roller release shaft arm is in its operated (rear) position.

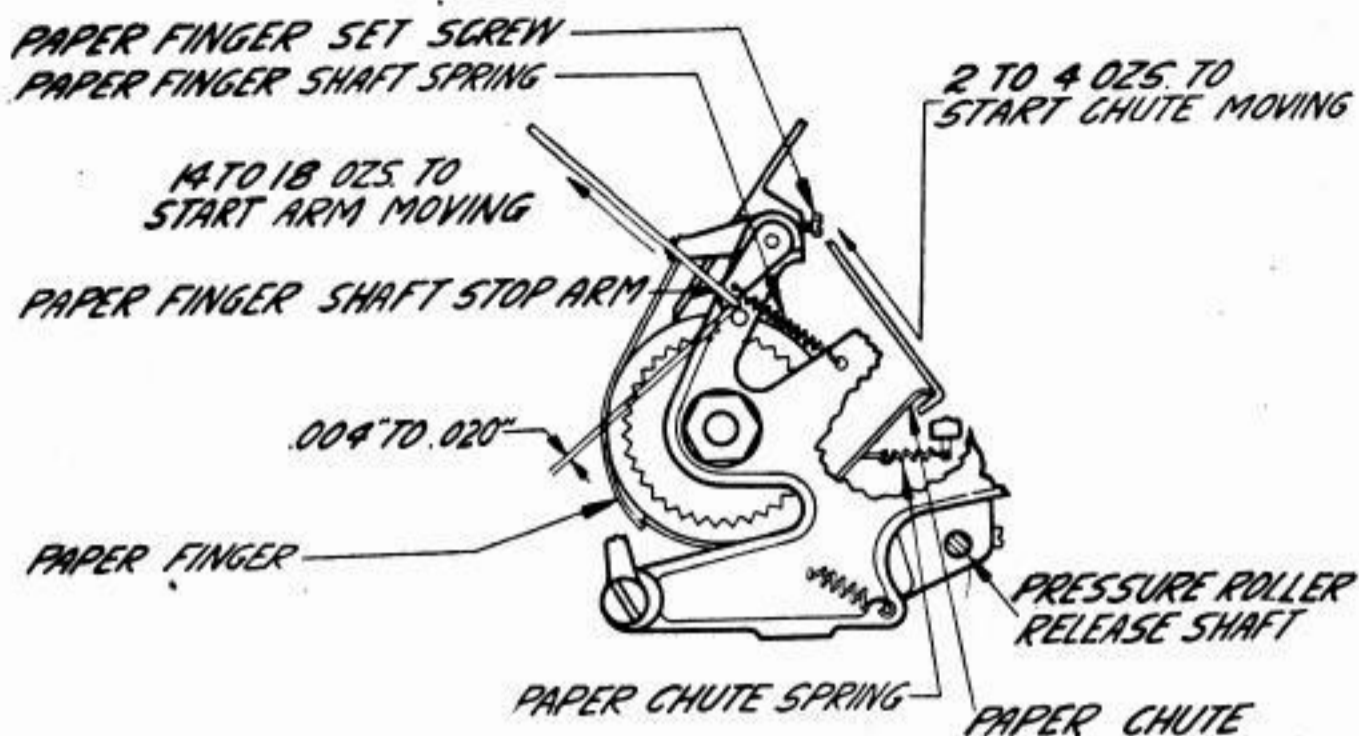


Fig. 56.

4.115 **Paper finger shaft stop arm** shall clear its stop post by Min. .004", Max. .020" as in Fig. 56 when paper fingers are resting against the platen.

(a) To adjust, reposition paper fingers.

Note: For 8-1/2" wide paper ^{paper} lower part of fingers should be flush with edges of platen. For narrower paper, paper fingers should be moved in accordingly.

4.116 **Paper finger shaft spring** shall have a tension of Min. 14 ozs. (385 gms.), Max. 18 ozs. (510 gms.) measured as in Fig. 56.

4.117 **Paper straightener rod** shall clear its stops by Min. .030", Max. .050" as in Fig. 57 when rod is in extreme forward position.

(a) To adjust, reposition paper straightener rod stops.

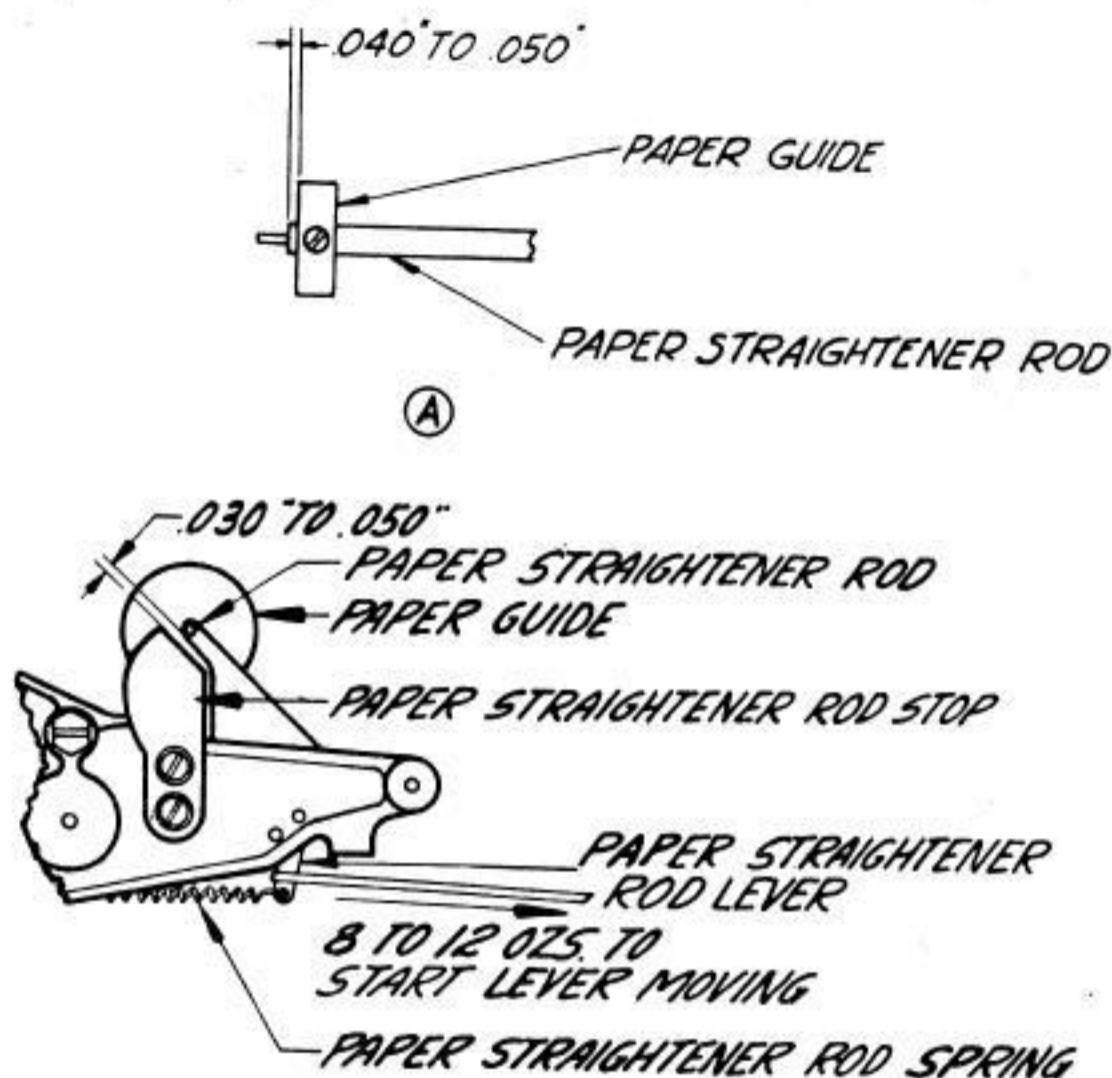


Fig. 57.

4.118 **Paper straightener rod springs** shall have a tension of Min. 8 ozs. (225 gms.), Max. 12 ozs. (340 gms.) measured as in Fig. 57 on the paper straightener rod levers.

4.119 **Paper Guides.** Outer sides of paper guide discs shall clear shoulders on paper straightener rod by Min. .040", Max. .050" as in Fig. 57 when 8-1/2" paper is used. For narrower paper move discs in correspondingly.

(a) To adjust, reposition paper guide discs.

4.120 **Rear spacing escapement pawl** shall clear low part of spacing escapement ratchet by Min. .020", Max. .040" as in Fig. 58 when "line feed" combination is set up and main shaft is rotated until function lever bail rests on top of line feed function lever.

(a) To adjust, reposition spacing escapement pawl operating arm.

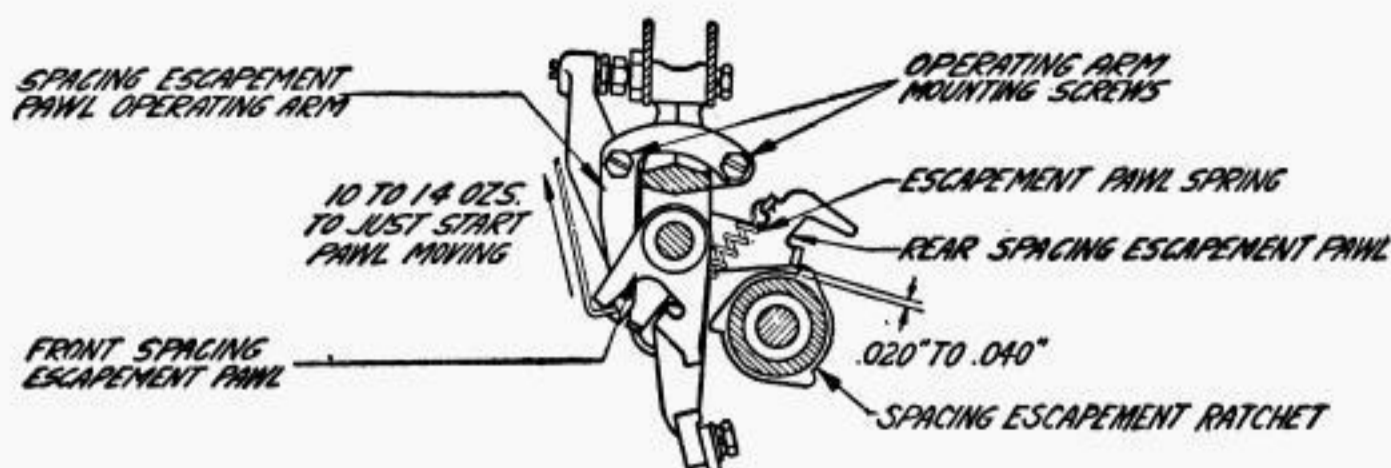


Fig. 58.

4.121 **Spacing escapement pawl spring** shall have a tension of Min. 10 ozs. (280 gms.), Max. 14 ozs. (395 gms.) measured as in Fig. 58 when main shaft has been rotated until printing bail is in extreme rear position.

4.122 **Margin bell hammer** shall clear its bell by Min. .020", Max. .060" as in Fig. 59 when hammer arm is resting against its stop post. Gauge by eye.

(a) To adjust, bend hammer arm along entire length, avoiding a sharp bend at any point.

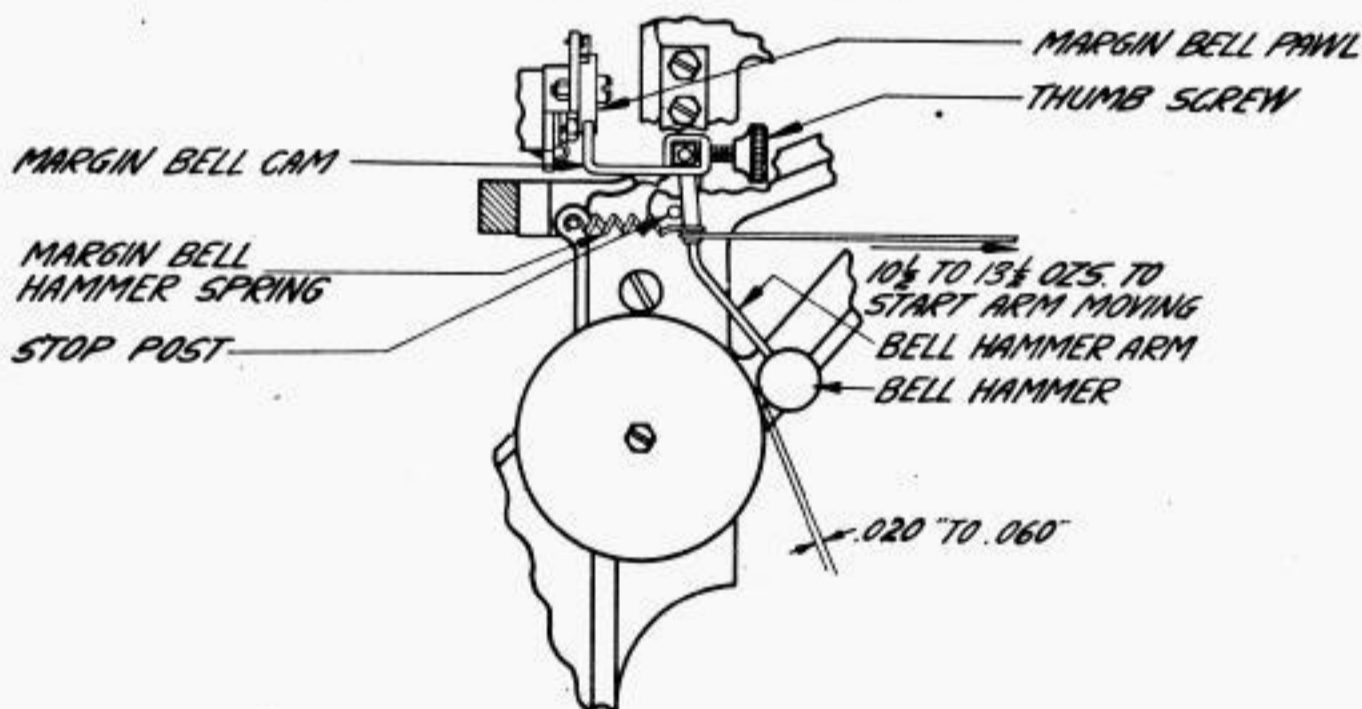


Fig. 59.

4.123 **Margin bell hammer spring** shall have a tension of Min. 10-1/2 ozs. (300 gms.), Max. 13-1/2 ozs. (380 gms.) measured as in Fig. 59.

4.124 **Signal bell hammer spring**, on units so equipped, shall have a tension of Min. 3 ozs. (85 gms.), Max. 5 ozs. (140 gms.) measured as in Fig. 60 when bell latch bar is in latched position.

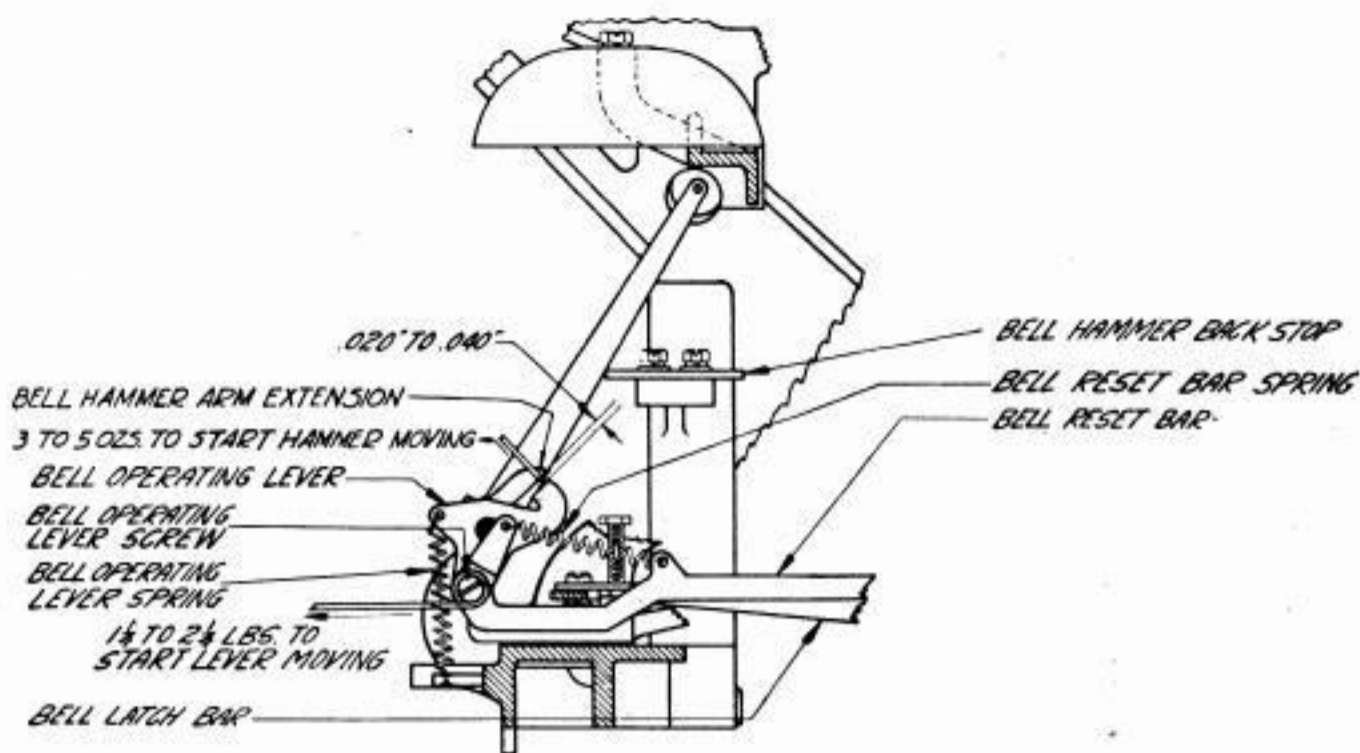


Fig. 60.

Note: Place typing unit on its right side.

4.125 **Signal bell latch bar** shall clear lobe on bell function lever rear extension by Min. .004", Max. .010" as in Fig. 61 when (1) platen is in "letters" position, (2) letter "S" combination is set up, (3) main shaft is rotated until printing bail is in extreme forward position, and (4) front shoulder on bell latch bar is fully latched on latch.

(a) To adjust, add or remove shims between bell latch bar latch and function lever comb.

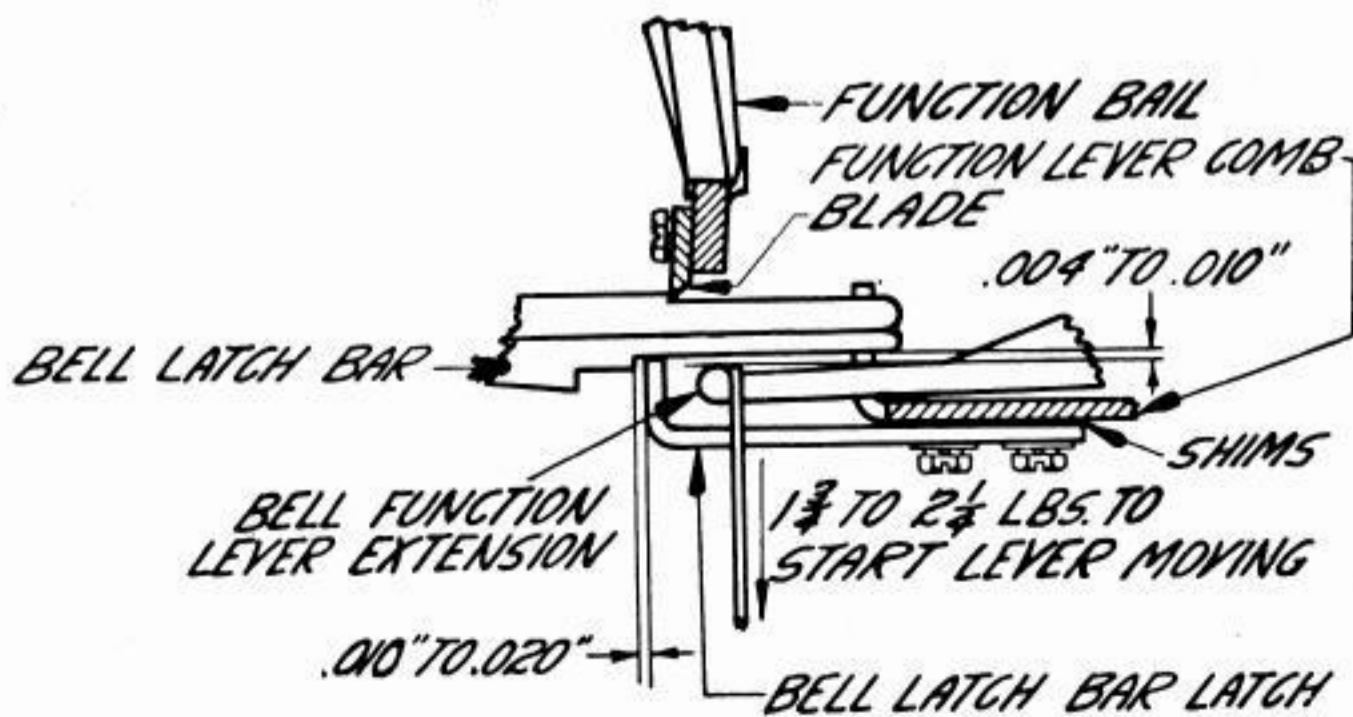


Fig. 61.

4.126 **Signal bell latch bar latch** shall clear front shoulder on bell latch bar by Min. .010", Max. .020" as in Fig. 61 when main shaft has been rotated until function bail is in extreme rear position and bell reset bar shoulder is fully engaged with function bail blade.

(a) To adjust, reposition bell latch bar latch to front or rear.

4.127 **Signal bell hammer arm extension** shall clear bell operating lever by Min. .020", Max. .040" as in Fig. 60 when bell latch bar is in latched position.

(a) To adjust, reposition bell hammer backstop.

4.128 **Signal bell operating lever spring** shall have a tension of Min. 1-1/4 lbs., Max. 2-1/4 lbs. measured as in Fig. 60 when bell reset bar spring is removed and rear shoulder of bell latch bar is resting against bell latch bar latch.

4.129 **Signal bell reset bar spring** shall have a tension of Min. 3 ozs. (85 gms.), Max. 5 ozs. (140 gms.) measured as in Fig. 62 when main shaft has been rotated until function bail is in extreme forward position and front shoulder of bell latch bar is resting against latch.

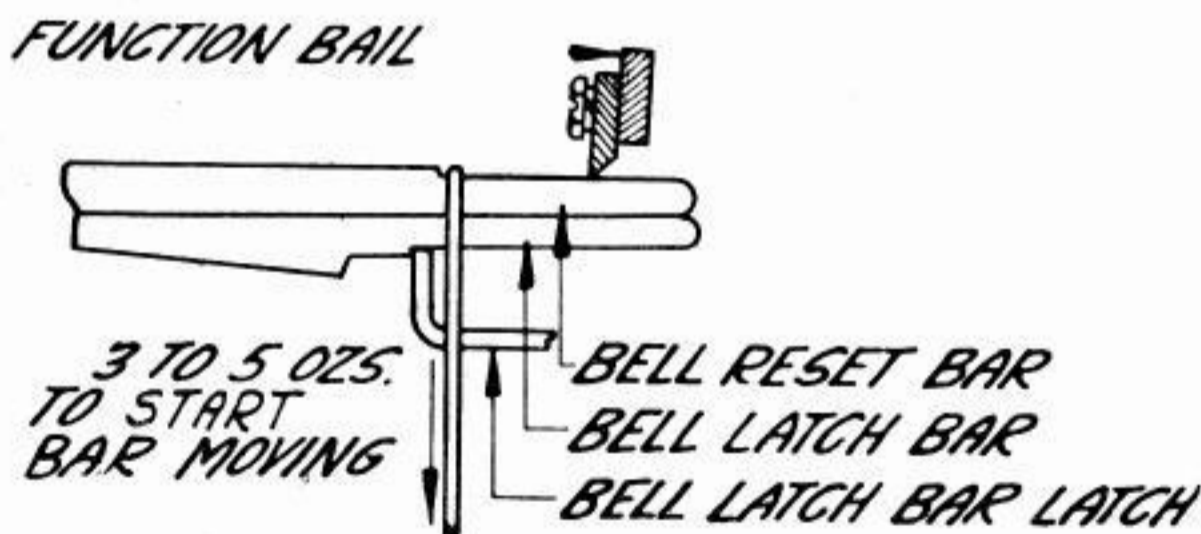


Fig. 62.

4.130 **Signal bell function lever spring** shall have a tension of Min. 1-3/4 lbs., Max. 2-1/4 lbs. measured as in Fig. 61 when any character is selected and main shaft is rotated until bell function lever rests against vanes but is not selected.

4.131 **Carriage return latch bar** shall clear lobe on the carriage return function lever's rear extension by Min. .004", Max. .010" when letter "O" combination is selected, main shaft is rotated until printing bail is in extreme forward position and carriage return latch bar shoulder is fully latched on its latch.

- (a) To adjust, use shims between carriage return latch bar latch and function lever comb. See Fig. 63.

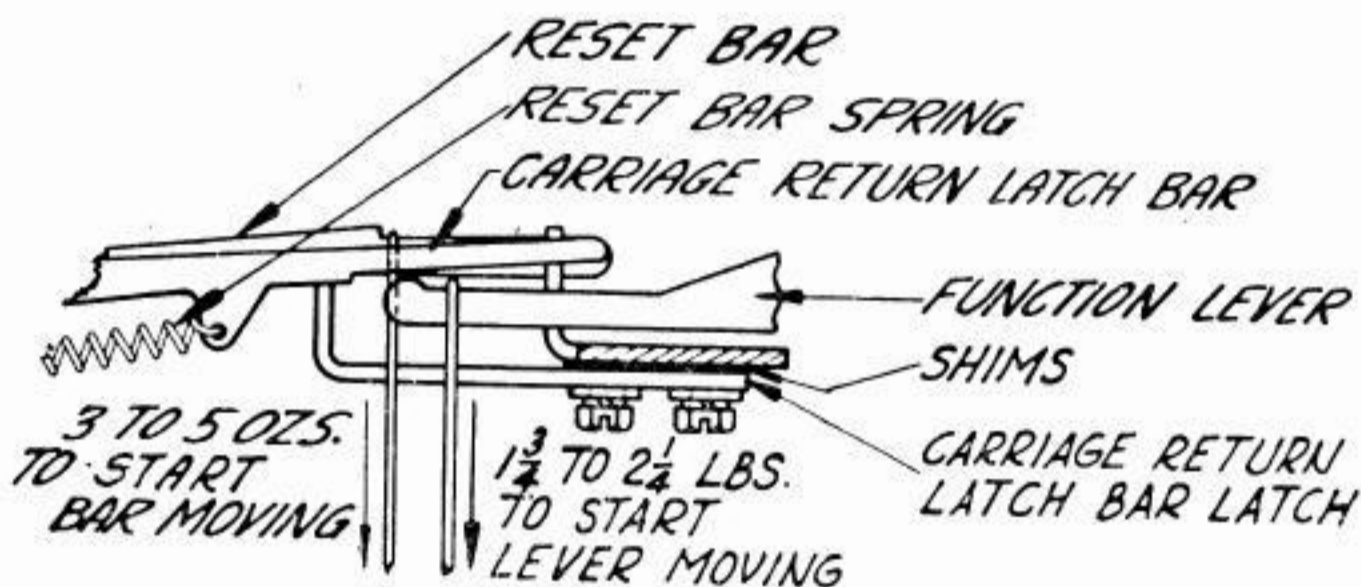


Fig. 63.

4.132 **Carriage return latch bar latch** shall clear the shoulder on the carriage return latch bar by Min. .010", Max. .020" when main shaft has been rotated until function bail is in extreme rear position and shoulder of carriage return reset bar is fully engaged with function bail blade.

- (a) To adjust, reposition carriage return latch bar latch. See Fig. 63.

Note: Place typing unit in its normal upright position.

4.133 **Lock bar latch** shall clear lock bar by Min. .006", Max. .015" as in Fig. 64 when front end of dashpot lever is held to extreme left and play between lock bar and shoulder stud is taken up in direction to make clearance a minimum.

- (a) To adjust, reposition lock bar latch eccentric screw.
 Note: Use position of eccentric screw which will give greater tension to lock bar latch spring.

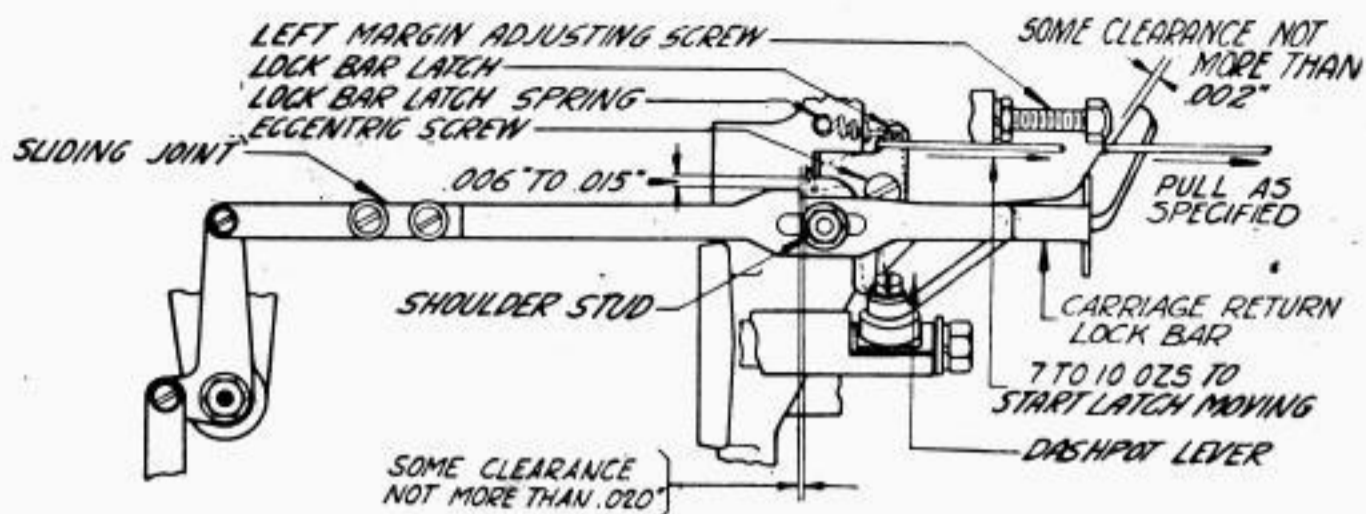


Fig. 64.

4.134 **Lock bar latch spring** (new style light spring) shall have a tension of Min. 7 ozs. (200 gms.), Max. 10 ozs. (285 gms.) measured as in Fig. 64 when carriage return lock bar latch is unlatched (resting on upper part of lock bar).

Note: Tension of old style (short heavy) spring shall be Min. 1-1/2 lbs., Max. 2-1/4 lbs. measured in same manner. New style springs shall be used when old style springs require replacement.

4.135 **Carriage return clutch teeth** shall clear each other by Min. .010", Max. .020" as in Fig. 65 when carriage return latch bar is latched and the shoulder of lock bar is held against edge of the latch.

(a) To adjust, loosen lock bar sliding joint clamping screws and change length of lock bar. See Fig. 64.

Note: Before readjusting, loosen clutch driven member mounting screw and take up play between driven member and mounting screw in counter-clockwise direction with respect to shaft viewed from lower end of shaft.

4.136 **Lock bar shoulder** shall clear lock bar latch by not more than .020" as in Fig. 64 when "carriage return" combination is selected, main shaft rotated until carriage return function lever just trips carriage return latch bar off its latch and play in lock bar connections is taken up by pulling gently lengthwise on lock bar so as to make clearance minimum.

(a) To adjust, reposition carriage return operating lever stop screw. See Fig. 65.

Note: Place typing unit on its right side.

4.137 **Carriage return reset bar spring** shall have a tension of Min. 3 ozs. (85 gms.), Max. 5 ozs. (140 gms.) measured as in Fig. 63 when function bail is in extreme forward position and carriage return latch bar is tripped off its latch.

4.138 **Carriage return function lever spring** shall have a tension of Min. 1-3/4 lbs., Max. 2-1/4 lbs., measured as in Fig. 63 when any character combination is selected and main shaft is rotated until carriage return function lever is resting against vanes but not selected.

4.139 **Carriage return operating lever spring** (new style) shall have a tension of Min. 5 lbs., Max. 7 lbs., measured as in Fig. 65 when shoulder of carriage return latch bar is against its latch.

Note: Old style springs had tension of Min. 7 lbs., Max. 10 lbs. New style springs shall be used when old style springs require replacement.

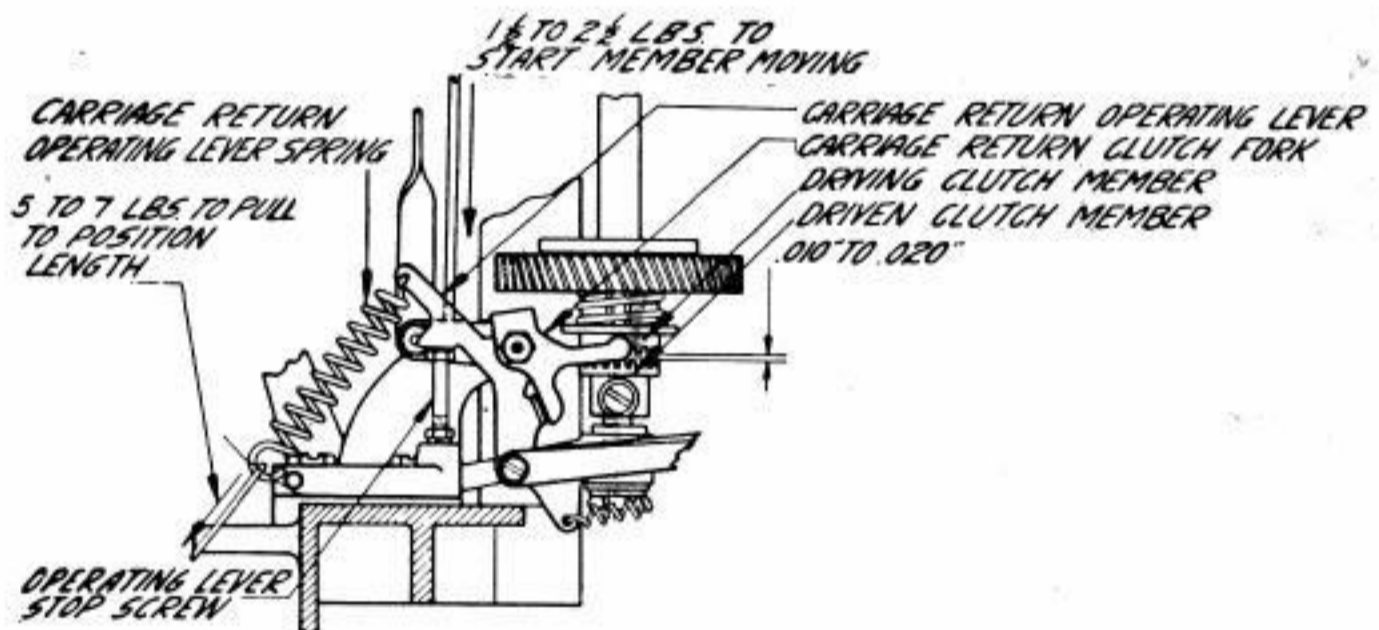


Fig. 65.

4.140 **Carriage return clutch spring** shall have a tension of Min. 1-1/2 lbs., Max. 2-1/2 lbs. measured on the carriage return clutch fork adjacent to the lock bar latch link as in Fig. 65 when carriage return latch bar shoulder is resting against its latch and carriage return lock bar latch is held away from the lock bar.

4.141 **Dashpot lever spring** shall have a tension of Min. 18 ozs. (510 gms.), Max. 24 ozs. (680 gms.) measured when front end of dashpot lever is in extreme right position and the spring is unhooked from the dashpot lever and stretched to position length.

4.142 **Spacing stop lever** shall clear main shaft driving disc by Min. .060", Max. .080" and the right side of a spacing stop sleeve tooth by Min. .040", Max. .080" as in Fig. 66 when the lever is held against its stop and the tooth is opposite the lever.

(a) To adjust, reposition spacing stop lever bracket.

Note: Bracket need not be kept horizontal since right margin adjusting screw may be adjusted to take care of any realignment required.

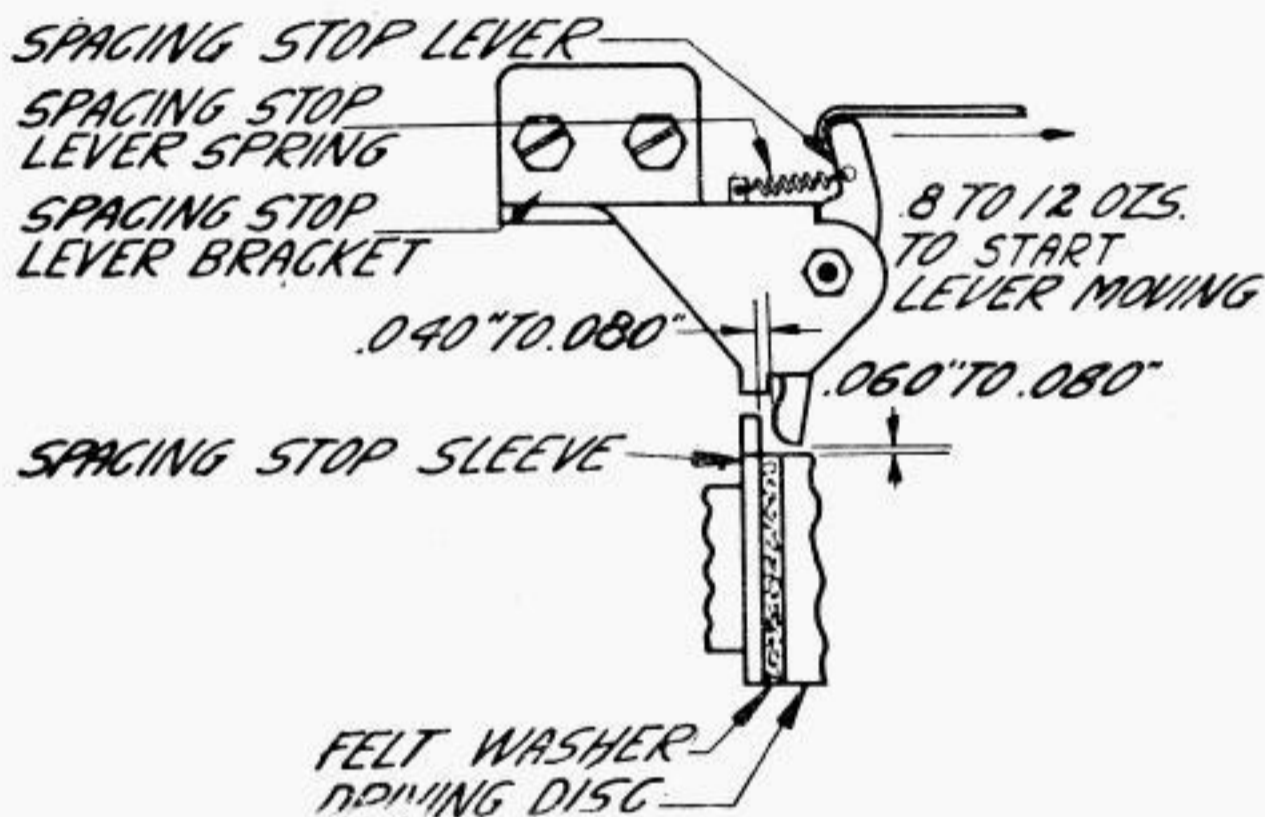


Fig. 66.

Note: Place typing unit in normal upright position.

4.143 **Spacing stop lever spring** shall have a tension of Min. 8 ozs. (225 gms.), Max. 12 ozs. (340 gms.) measured as in Fig. 66.

Note: Reassemble type bar carriage assembly on typing unit. (See Note under 4.35)

4.144 **Carriage Guide Screws.** Upper surface of screw heads shall clear upper surface of groove in front carriage track by not more than .008" as in Fig. 21 at all points of the carriage travel when printing bail is in extreme rear position.

(a) To adjust, reposition guide screws.

4.145 **Code bar bell cranks** shall not bind and shall permit code bars to return and rest firmly against their stops in both left and right positions after "letters" and "blank"

combinations are alternately selected and main shaft is rotated until function levers are lifted free from rear edges of vanes. See Fig. 67.

(a) To adjust, reposition bell crank eccentric bushing if only one or two bars fail to return to stops. If all code bars fail to return to either the left or right stop, reposition bell crank mounting plate. Check to see that upper end of bell cranks do not engage code bars deeply enough to cause bind.

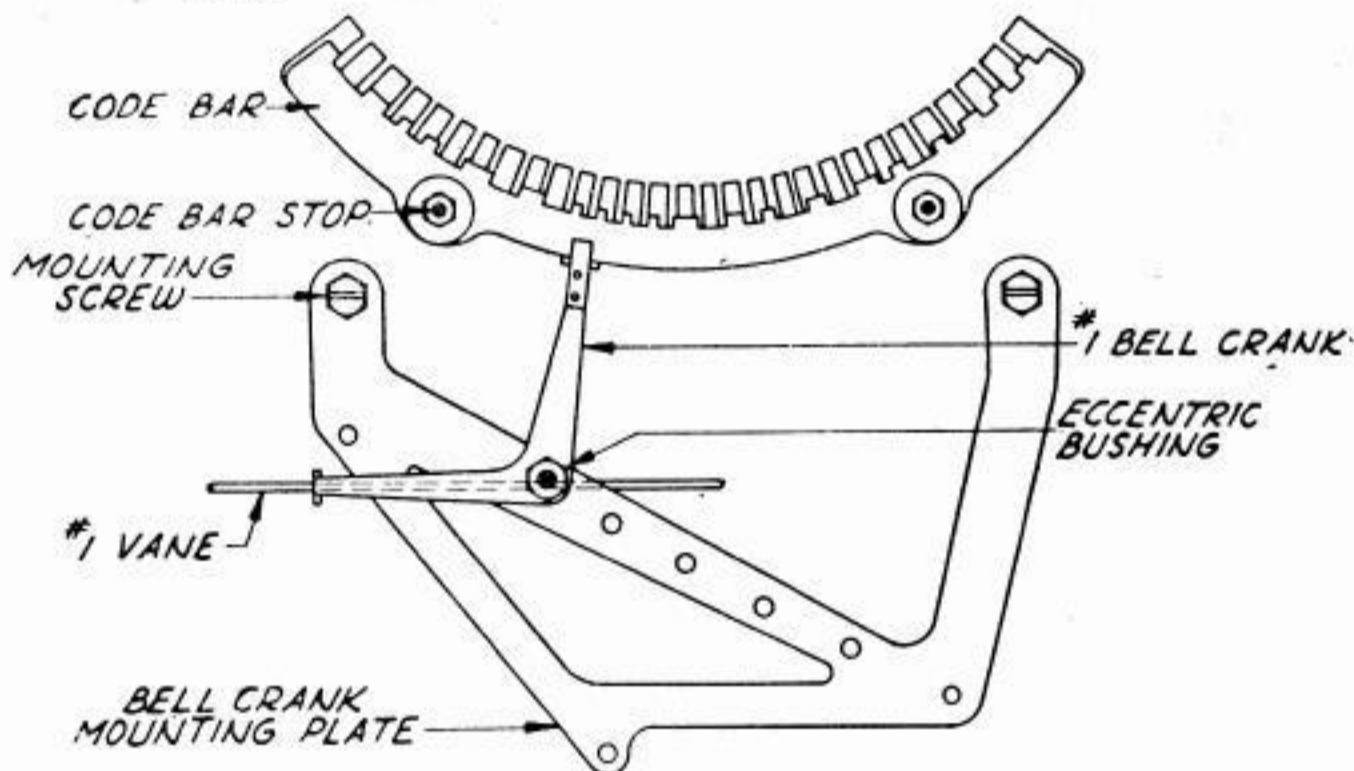


Fig. 67.

4.146 **Spacing rack** shall run on the spacing gear with a minimum backlash without bind at any point in rack travel as gauged by eye and feel. See Fig. 68.

(a) To adjust, reposition rack to front or rear.

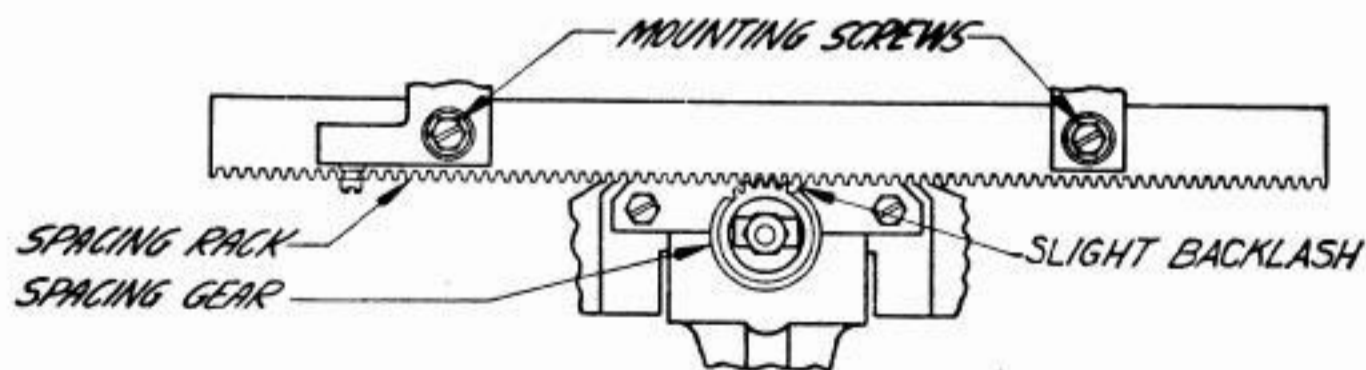


Fig. 68.

4.147 **Type bar guide** shall clear platen at its nearest point by Min. $11/64$ ", Max. $7/32$ ", gauged by eye, when platen is in "letters" position.

(a) To adjust, use shims, 73427M, between type bar guide adapter plate and type bar segment.

4.148 **Locking function lever spring** shall have a tension of Min. 40 ozs., Max. 50 ozs., measured as in Fig. 25 when main shaft has been rotated until printing bail is in extreme rear position and locking function lever is held against its pivoting shaft.

4.149 **Sixth vane detent spring** shall have a tension of Min. 6 ozs. (170 gms.), Max. 8 ozs. (225 gms.) measured as in Fig. 22.

4.150 **Carriage return spring** shall have a tension of Min. 3-3/4 lbs., Max. 4-1/4 lbs. measured at lower part of right ribbon spool bracket as carriage starts to move from its extreme left position when (1) main shaft has been rotated until printing bail is in extreme rear position, (2) carriage return lock bar is held in approximately its latched position so as to disengage the clutch teeth, and (3) dashpot lever is held in operated position.

(a) To increase tension, turn center shaft of the carriage return spring drum. To decrease tension operate carriage return spring drum escapement lever.

Note: Requirements 4.151 and 4.152 shall be omitted on sprocket feed typing units which shall be adjusted in accordance with P36.619.

4.151 **Paper spindle drag spring** shall have a tension of Min. 5 lbs., Max. 8 lbs., measured as in Fig. 69 viewed from rear of typing unit when an empty paper spindle is locked in its slots with retaining plates and both ends of the spindle shaft are resting in the bottom of their slots.

(a) To adjust, bend spindle drag spring.

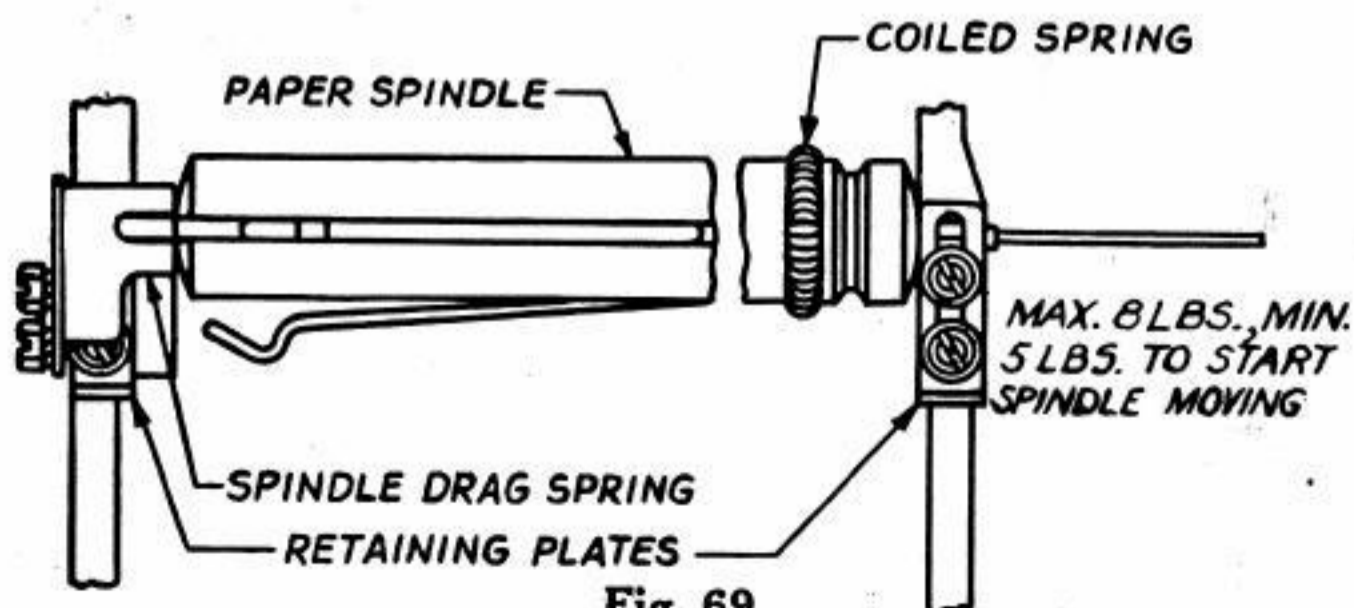


Fig. 69.

4.152 **Platen friction assembly** shall require a pull of Min. 6 ozs. (170 gms.), Max. 8 ozs. (225 gms.) applied as in Fig. 70 to start the platen rotating when pressure roller release shaft arm is in extreme rear position, line feed detent lever spring is unhooked, and platen handle is placed vertically upward.

- (a) To adjust, reposition adjusting nuts of friction assembly.

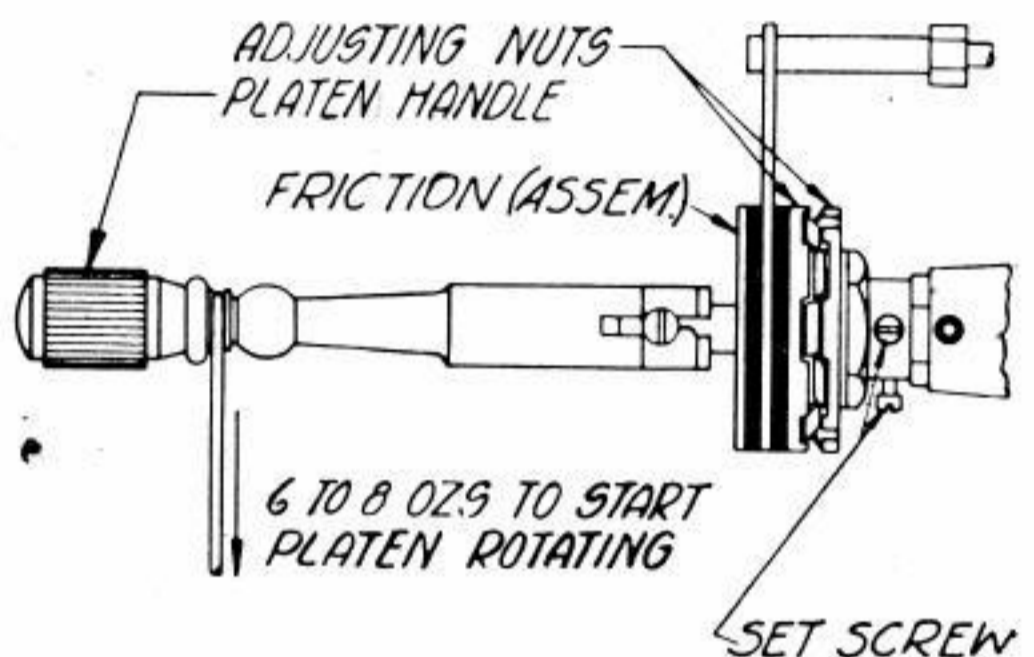


Fig. 70.

4.153 **Send-Receive "T" lever friction washer** shall exert a drag of Min. 5 ozs. (140 gms.), Max. 6-1/2 ozs. (185 gms.) measured as in Fig. 71 when printing bail is in its extreme rear position and "T" lever right arm has been positioned to clear the universal function lever extension by Min. .040", Max. .060".

- (a) To adjust clean friction surface free of oil and grease by wiping with cloth. Replace friction washer if necessary.

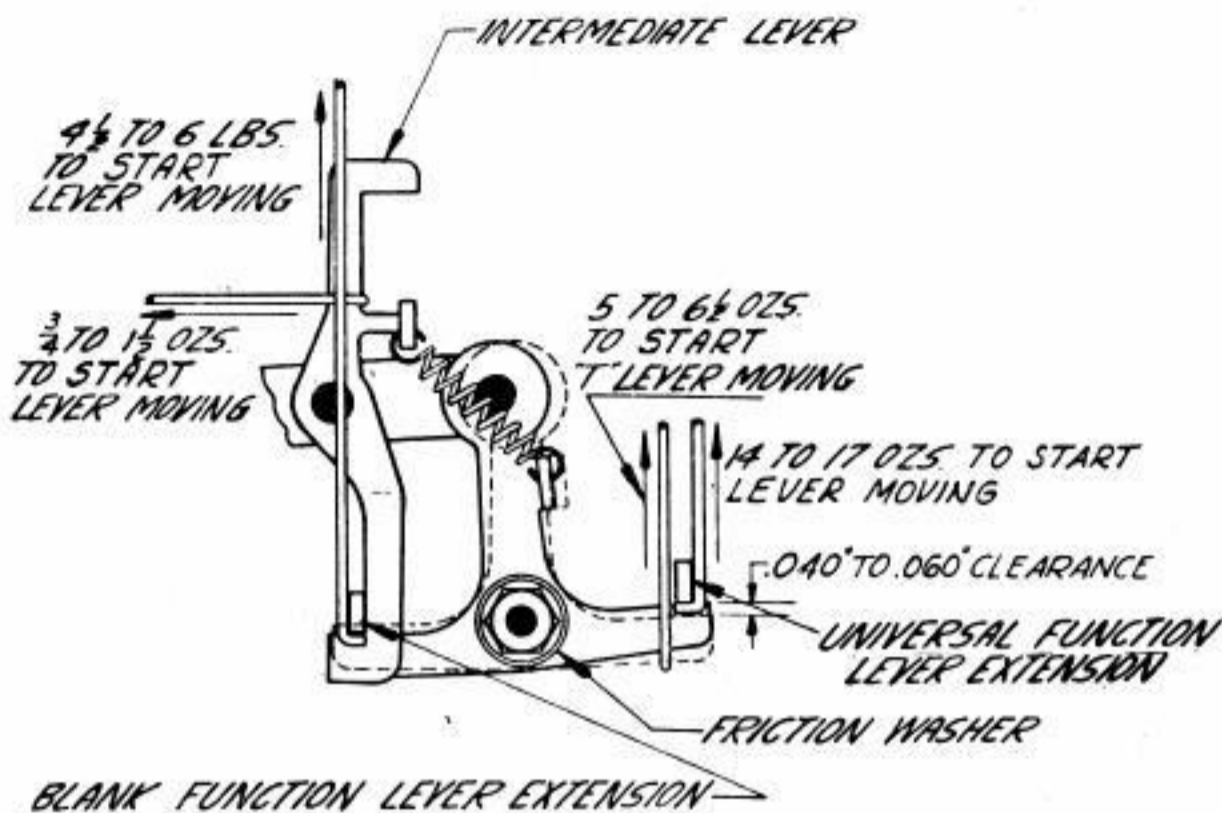


Fig. 71.

4.154 **Universal function lever spring** shall have a tension of Min. 14 ozs. (395 gms.), Max. 17 ozs., (480 gms.) measured as in Fig. 71 when printing bail is in extreme rear position.

4.155 **Blank function lever spring** shall have a tension of Min. 4-1/2 lbs., Max. 6 lbs., measured as in Fig. 71 when printing bail is in extreme rear position.

4.156 **Send-Receive "T" lever** right arm shall clear universal function lever extension by not more than .008" as in Fig. 45 when left arm of "T" lever is in contact with the blank function lever extension, "blank" combination is set up, and main shaft is rotated until blank function lever is completely selected and function bail roller is just leaving the cam surface of the blank function lever except on typing units equipped with "blank" printing-spacing cut-out function lever in which case main shaft shall be rotated until function lever bail rests on top of "blank" printing-spacing cut-out function lever.

Note: If typing units are not equipped with blank and universal function levers, the send-receive mechanism plate shall be adjusted so that it clears the function lever spring plate by Min. .020", Max. .030" at both ends.

- (a) To adjust, reposition sending-receiving mechanism plate.

Note: 4.157 to 4.160 inclusive apply only to units equipped with mechanical motor stop mechanism. For units equipped with upper case "H" contact assembly see 4.182.

4.157 **Right Motor Stop Contact Springs:** Fibre insulator on light spring shall clear motor stop contact lever by not more than .006" as in Fig. 45 when printing bail is in extreme rear position, selector armature is held in operated position and inner motor stop pawl is engaged with its latch.

- (a) To adjust, bend light contact spring making sure heavy contact spring is not bearing against light spring.

4.158 Gap between contacts of light and heavy right motor stop contact springs shall be Min. .012", Max. .020" as in Fig. 45 when selector armature is in unoperated position and outer motor stop pawl is engaged with latch.

- (a) To adjust, bend heavy right motor stop contact spring.

4.159 **Left Motor Stop Contact Springs:** Fibre insulator on light spring shall clear lobe on motor stop function lever's front extension by not more than .006" as in Fig. 45 when printing bail is in its extreme rear position.

- (a) To adjust, bend light spring making sure heavy contact spring is not bearing against the light spring.

4.160 Left motor stop contacts shall just close as gauged by eye when "motor stop" function lever is selected and main shaft rotated until right motor stop contacts are about to open.

- (a) To adjust, bend heavy left motor stop contact spring.

4.161 **Intermediate lever** shall be approximately vertical gauged by eye, when "blank" combination is selected and main shaft is rotated until intermediate lever toe is under blank function lever extension.

- (a) To adjust, reposition intermediate lever stop bracket and check 4.162.

4.162 Left end of intermediate lever toe shall be to right of blank function lever extension by at least 1/16" as in Fig. 45 when letter "T" combination is set up and main shaft rotated until printing bail is in extreme forward position. Gauge by eye.

- (a) To adjust, readjust intermediate lever stop bracket and check 4.161.

4.163 **Intermediate lever spring** shall have a tension of Min. 3/4 oz. (21 gms.), Max. 1-1/2 ozs. (40 gms.) measured as in Fig. 71 when printing bail is in extreme rear position, "T" lever's right end is moved into contact with universal function lever extension and reset lever is held so that its upper edge is horizontal.

Note: Place typing unit on correctly adjusted base and tighten mounting screws. Check position of motor unit in accordance with P36.640.

4.164 **Send-Receive Reset Lever Upper Adjusting Screw:** Intermediate lever toe's upper edge shall clear blank function lever extension by Min. .004", Max. .006" as in Fig. 72 when (1) printing bail is in extreme rear position, (2) send-receive-break lever is in "send" (up) position, (3) intermediate lever toe is moved under blank function lever, (4) "T" combination is set up and (5) motor is rotated until blank function lever overlaps toe of intermediate lever by half thickness of the blank function lever.

(a) To adjust, reposition reset lever upper adjusting screw.

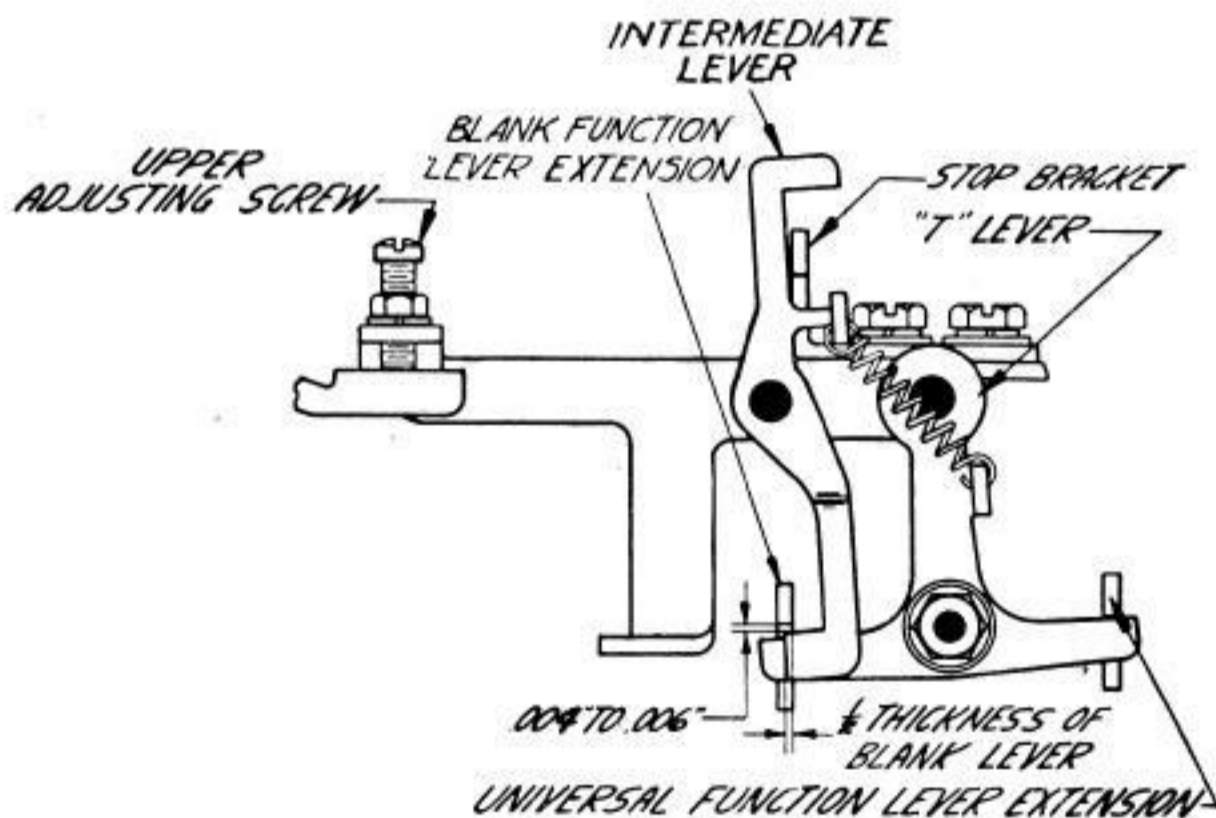


Fig. 72.

4.165 **Send-receive reset lever lower adjusting screw** shall clear motor stop function lever's front extension by not more than .002" as in Fig. 73 when (1) platen is in "letters" position, (2) "motor stop" combination is selected, (3) motor

is rotated until printing bail is in extreme forward position and (4) send-receive lever is in "send" (up) position.

Note: This requirement applies only to units equipped with mechanical motor stop mechanism.

- (a) To adjust, reposition reset lever lower adjusting screw.

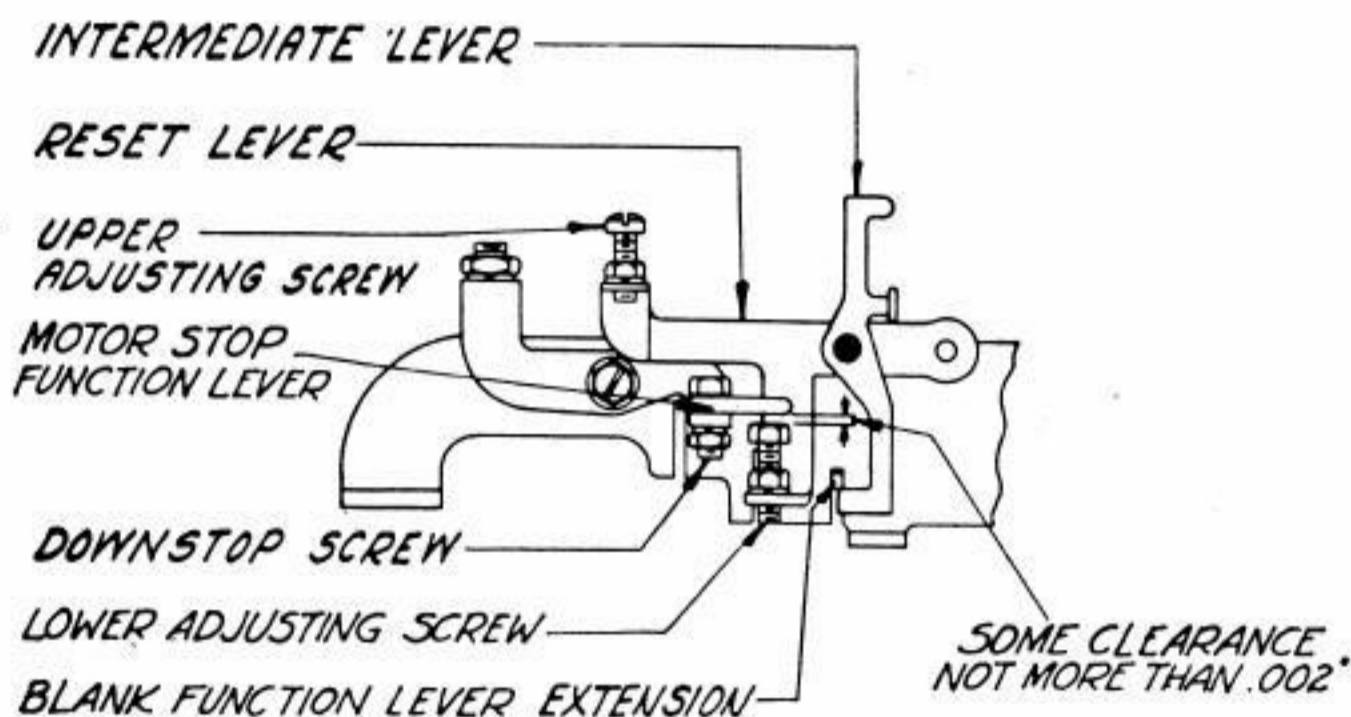


Fig. 73.

4.166 **Send-receive reset lever down stop screw:** Upper contact lever (or operating lever) of the send-receive-break mechanism of the associated base shall overtravel latching surface of stop in lug on stop lever plate by not more than .002" as in Fig. 74, gauge by eye, when (1) send-receive lever (or handle) is in "send" (up) position, (2) intermediate lever toe is under blank function lever extension, (3) "blank" combination is set up, (4) main shaft is rotated until function bail roller just leaves cam surface of blank function lever, and (5) send-receive-break mechanism break lever (key) is depressed and immediately released.

Note: An old style send-receive-break mechanism having single set upper break contact springs upper contact lever (or operating lever) shall overtravel latching surface of stop lug on safety pawl by not more than .002".

- (a) To adjust, reposition send-receive reset lever down stop screw.

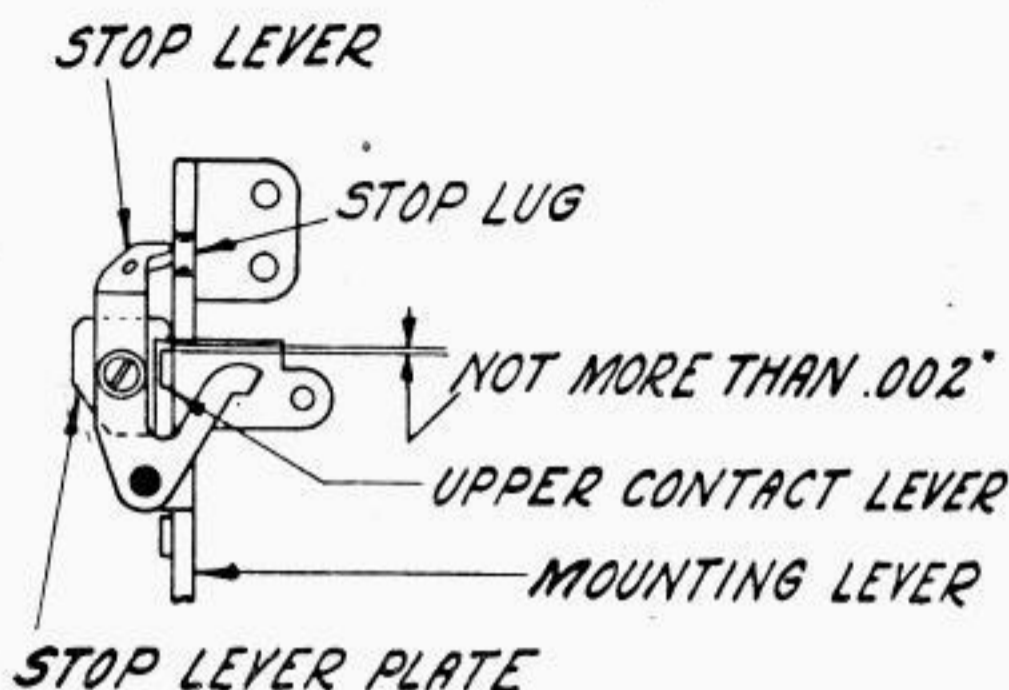


Fig. 74.

4.167 **Left Margin:** First character of a line shall be typed within $1/16''$ of the specified margin, normally $7/8''$ from platen's left end. Gauge by eye.

Note: This requirement shall be omitted on sprocket feed typing units which shall be adjusted in accordance with P36.619.

(a) To adjust, place carriage in position to print character within $1/16''$ of the specified margin and lock carriage by operating dashpot lever, check to see that carriage return clutch is fully engaged, reposition left margin adjusting screw until it clears the dashpot lever by not more than $.002''$ when an 8 pound pull is exerted on the dashpot lever at right angles to the curved surface $1/32''$ behind the margin adjusting screw as in Fig. 75 and when the adjusting screw lock nut is slightly tightened to take up end play in threads, then turn the adjusting screw $1/6$ turn in direction to eliminate this clearance.

Note: The above applies to units having new style dashpot levers. On units equipped with old style levers having shoulder to rear of margin adjusting screw, a 10 pound pull (instead of 8 as above) shall be applied at right angles to surface of lever just in front of the shoulder when making the adjustment.

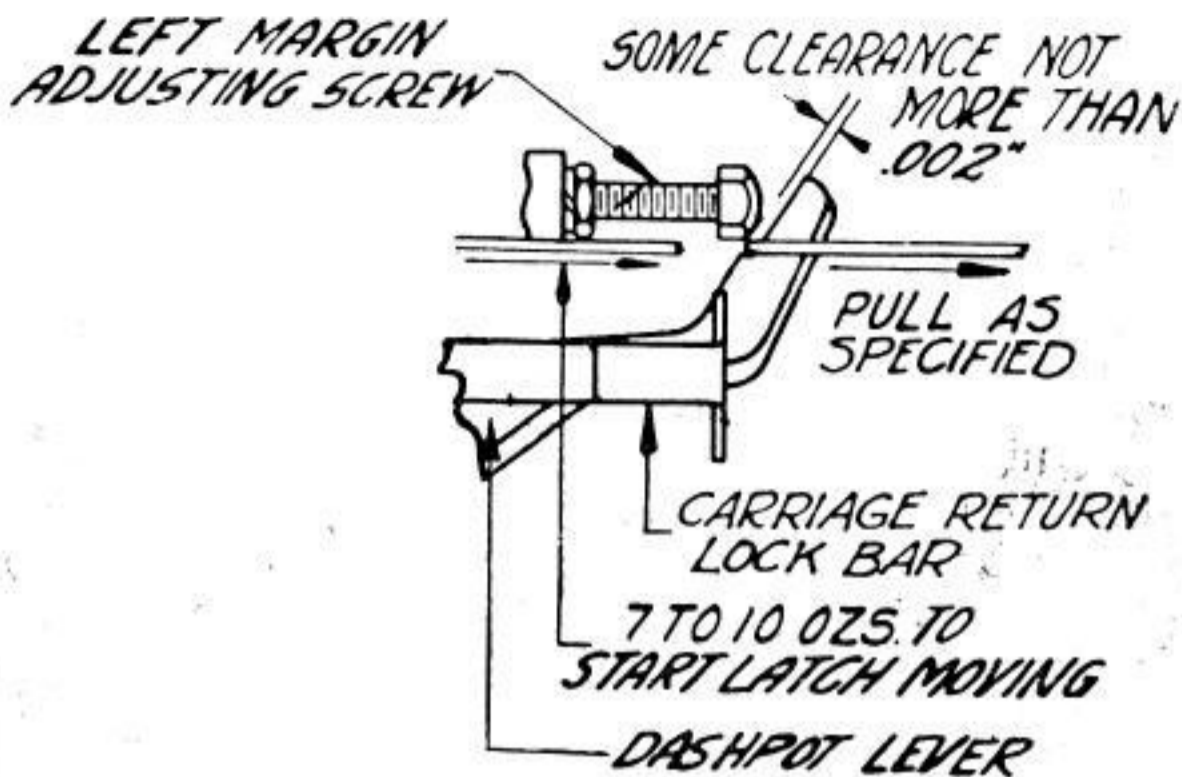


Fig. 75.

4.168 **Right Margin:** Spacing stop pawl shall clear spacing stop sleeve projection by Min. .015", Max. .030" as in Fig. 76 when right margin adjusting screw arm is in normal engagement with its detent and carriage is in next to last position of the line (71st position for a normal line of 72 characters).

(a) To adjust, reposition right margin adjusting screw.

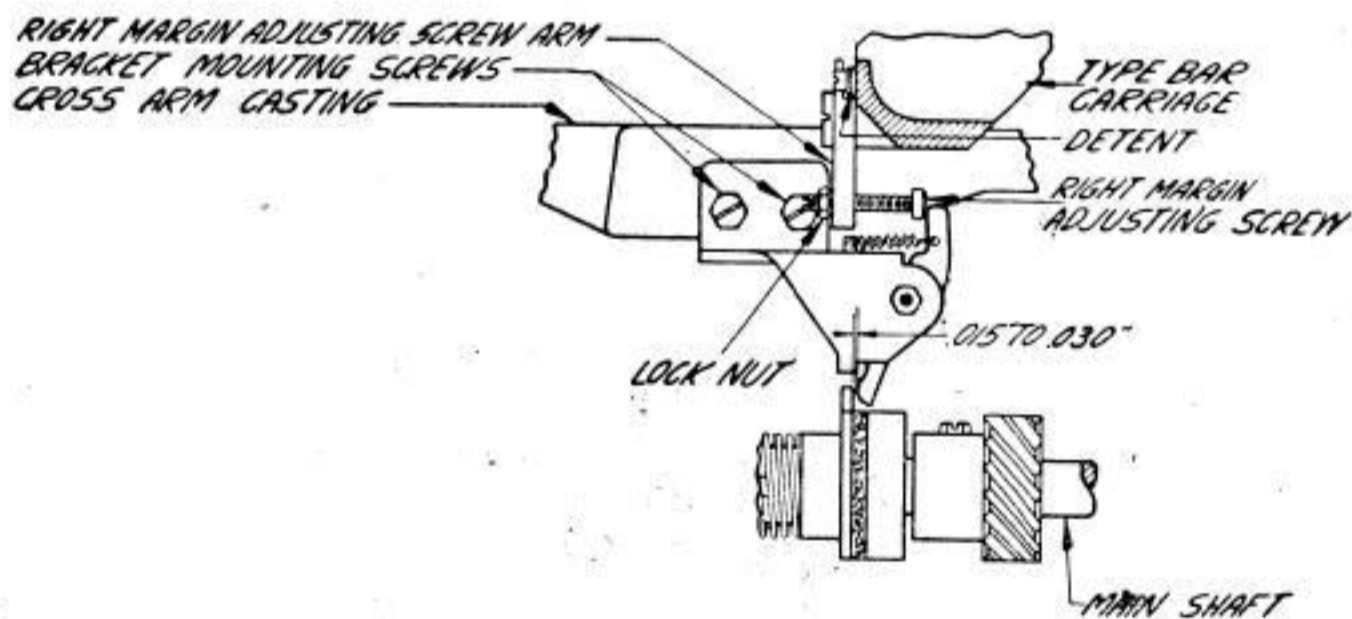


Fig. 76.

4.169 **Ribbon Oscillator Lever:** Ribbon shall completely cover any "letters" character as it is being printed and shall not cover any part of the character after printing

is completed and main shaft clutch is disengaged when the ribbon lockout bar is in the unoperated position.

(a) To adjust, shift platen to "figures" (up) position, loosen ribbon oscillator lever clamping screw and nut and reposition oscillator up or down. See Fig. 77.

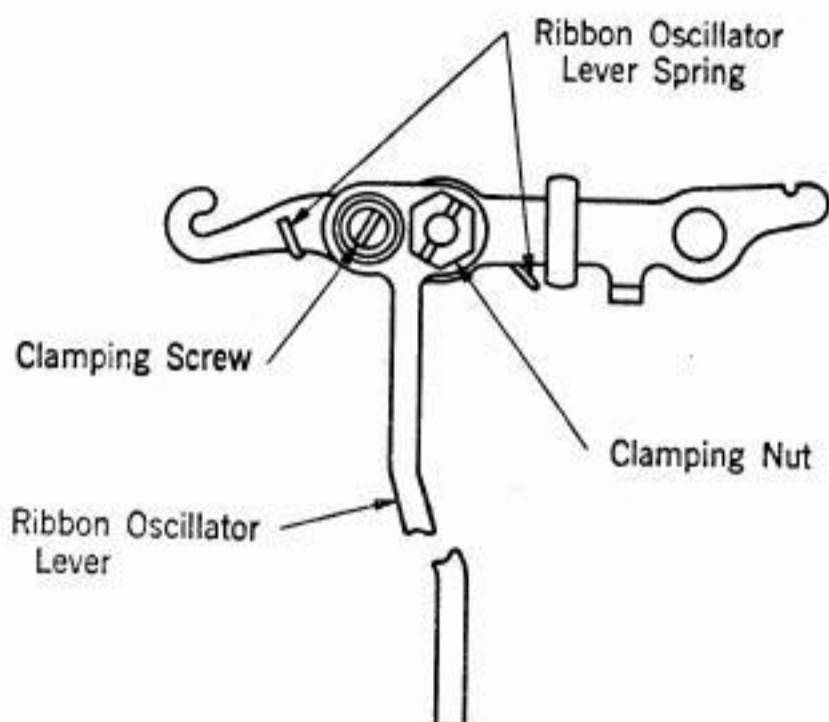


Fig. 77.

Note: 4.170 and 4.171 apply only to units equipped with adjustable ribbon lockout bar.

4.170 Ribbon Lockout Bar: Ribbon shall be locked so as to prevent printing any portion of a character when the lockout bar is against its stop (moved to left).

(a) To adjust, remove ribbon, ribbon carrier and type bar guide from its adapter plate, and loosen ribbon lockout bar adjusting screw; move platen to "figures" position; hold ribbon oscillator down and move lockout bar to left against its stop sliding the lockout bar extension over the top of the oscillator; push lockout bar extension down so that the oscillator extension is held firmly against the type bar guide adapter plate and at same time hold right end of lockout bar down; tighten lockout bar adjusting screws and reassemble type bar guide, ribbon carrier and ribbon.

4.171 Ribbon lockout bar shall require a pull of not more than 5 pounds applied as in Fig. 78 to move the bar to its unoperated position.

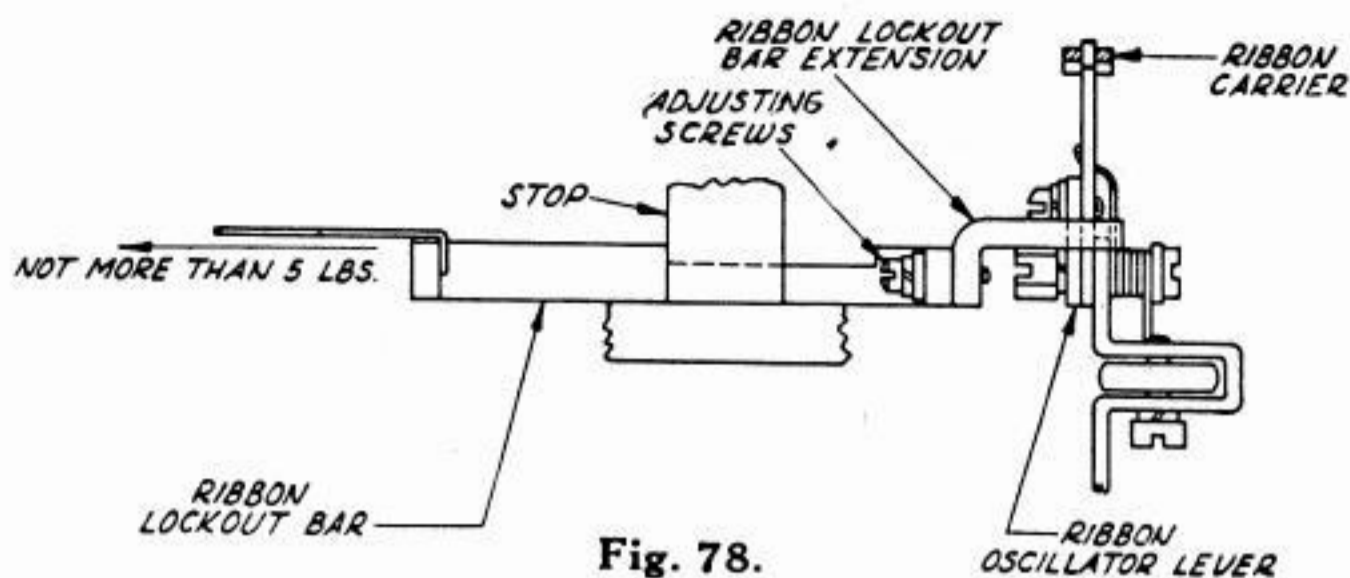


Fig. 78.

4.172 **Spacing Clutch Torque:** After motor has been run for at least 10 minutes a pull of 24 ozs. (680 gms.) applied to spacing escapement ratchet tooth horizontally toward rear of typing unit as in Fig. 79 shall hold ratchet stationary with the motor running, carriage return lock bar tied in latched position (carriage free to move) and rear spacing escapement pawl held clear of ratchet. A pull of 18 ozs. (510 gms.) applied under same conditions shall not hold ratchet stationary.

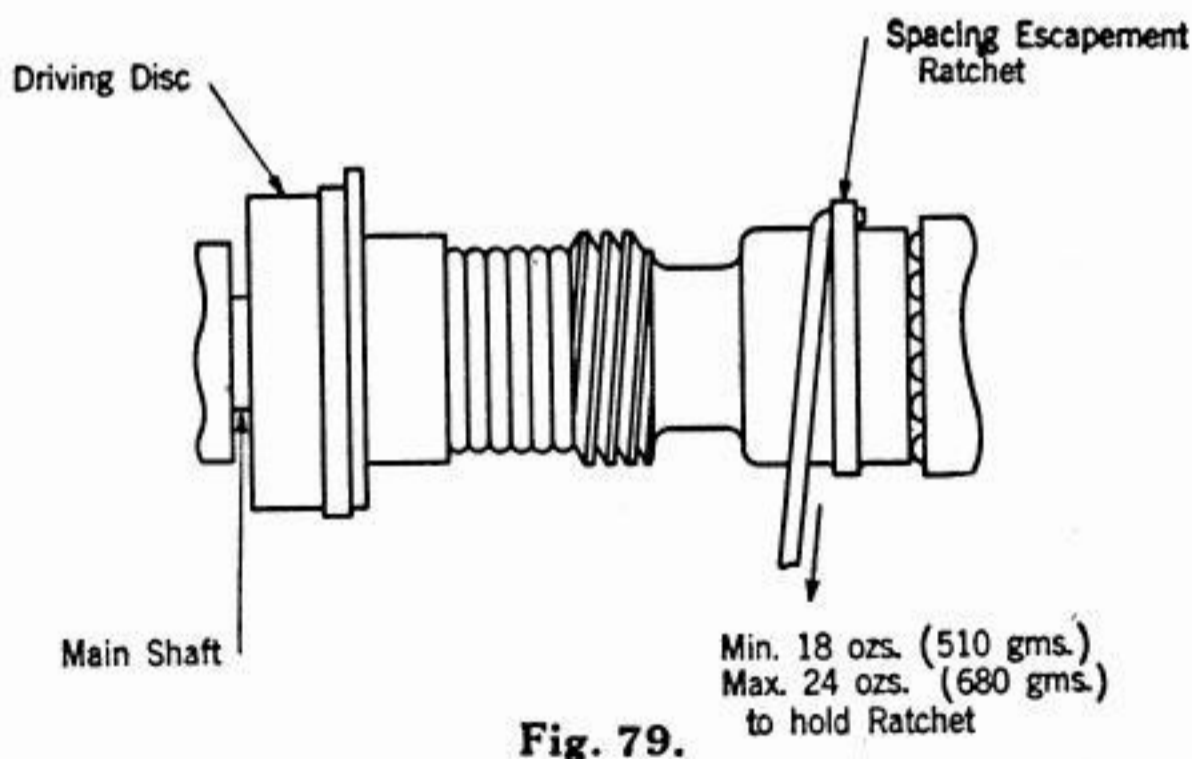


Fig. 79.

4.173 **Margin bell** shall ring when carriage has been advanced to the 66th space from the extreme right for a 72 character line.

Note: For shorter or longer lines adjust in accordance with order.

(a) To adjust, return carriage to extreme left side of typing unit, space carriage 66 spaces, and reposition margin bell cam until its right side is in contact with margin bell pawl. See Fig. 59.

4.174 Selector Clutch Torque: After motor has been run for at least 10 minutes and clutch has been freshly lubricated a pull of 18 ozs. (510 gms.) applied as in Fig. 80 when motor is running shall hold selector cam sleeve from rotating when selector arm is held just clear of its stop. A pull of 14 ozs. (395 gms.) similarly applied shall not hold sleeve from rotating.

(a) To adjust, recondition or replace felt friction washers or replace spring as follows:

Note: Reconditioning of washers by removing them and kneading with the fingers to soften them, or their replacement by new washers will usually be satisfactory in most cases since the spring holds its adjustment over long periods.

(1) To recondition felt washers; remove range finder assembly detach locking lever spring and remove retaining disc noting that it has a left-hand thread and unscrews to right; remove outer felt washer, cam sleeve assembly, cam sleeve disc, and inner felt washer holding selector levers away from shaft and rotating cam sleeve disc until notch in its edge registers with points of selector levers; knead felt washers with fingers and saturate with oil as specified in Section P36.601.

(2) To remove clutch spring, proceed as in (1) and remove clutch driving disc and spring.

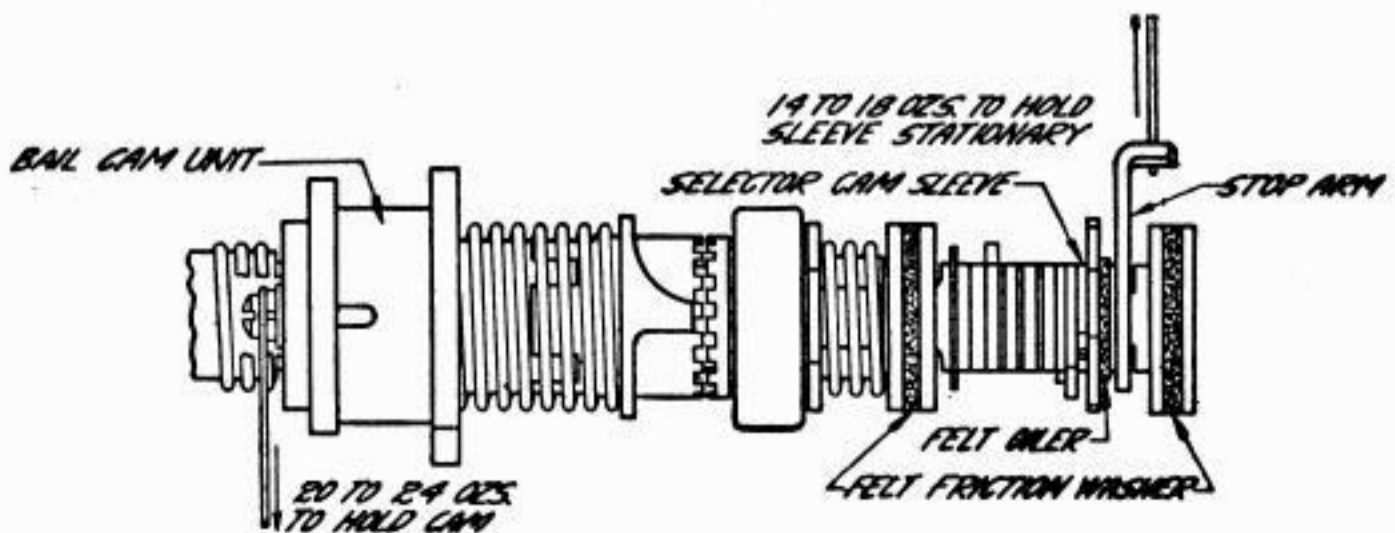


Fig. 80.

4.175 **Bail Cam Unit Friction Clutch Torque:** After motor has been run for at least 10 minutes a pull of 24 ozs. (675 gms.) applied horizontally to screw head on bail cam as in Fig. 80 shall move cam in a direction opposite normal rotation when motor is running, function bail spring is removed and printing bail is held away from its adjusting screw. A pull of 20 ozs. (565 gms.) applied under same conditions shall not move cam.

Note: This measurement requires considerable care, and need be checked only when it is thought that cam is not being brought up to speed as the clutch engages.

(a) To check, hold printing bail away from its adjusting screw, block magnet armature in operated position so main clutch will not engage, hook scale over screw as in Fig. 69, and pull in a direction reverse to normal rotation until cam unit just starts to move.

Note: Pulling too far will tend to make main clutch engage and give a greater reading, therefore only a slight backward motion of cam should be given.

Caution: It is important to keep clutch stop arm against driven jaw to prevent main clutch engaging and winding scale around main shaft so either keep armature operated to avoid tripping clutch stop arm, or block or clamp clutch stop arm so that main clutch cannot engage.

(b) To adjust, replace compression spring, steel disc, and felt washer of clutch.

Note: If torque is too high, lubricate clutch and re-check before replacing parts.

4.176 **Dashpot Vent Screw:** Carriage shall return from its extreme right position with minimum shock without bouncing when carriage return lock bar is held in its latched position.

(a) To adjust, reposition dashpot vent screw. If proper operation of the carriage cannot be obtained by adjustment of screw, replace dashpot leather washer.

4.177 **Type bars and pull bars** shall move freely and not bind in type segment slots as gauged by feel.

(a) To adjust, clean and if necessary stone down with either 138-139M or 87698M carborundum stones the section which fits in slot.

4.178 Type bar toes shall be straight and approximately in line with the type pallet and shall enter type bar guide freely without bind as gauged by feel.

(a) To adjust, loosen type bar guide adapter plate mounting screws and reposition plate so that "Z" and "V" type bars enter guide freely, bend toes of other type bars so they enter guide freely. If necessary adjust opening of guide by bending to just take thickest type bar without bind and thinnest type bar with not more than .007" side play.

4.179 Type bar heels shall strike pallets of other type bars in space between upper and lower case characters, gauged by eye, when one bar is held in the type bar guide and each of the others is raised up to it.

(a) To adjust, reposition type pallets as outlined below.

4.180 **Alignment of Type:** Characters (upper and lower case) shall type evenly on all sides and appear vertical, centrally spaced, and not noticeably out of line horizontally with respect to letter "N."

Note: The "N" type bar and pallet on each typing unit is aligned at the factory to serve as a master for use in aligning other type bars and pallets. If many type require readjustment it may be found advantageous to replace the "N" type bar with a master "N" type bar, 82021M, and align the type with it and then reinstall the original "N" type bar, aligning it with the other characters.

(a) To check, type a series of characters between the letter "N" as "NANBNCN," etc. In case of doubt on any character, type character at least 6 times between two letter "N's." The bottom of the large fractions should line up with the bottom of letter "N."

Note: Before checking type alignment check "letters" and "figures" stop screw adjustments 4.84 and 4.85 and type bar adjustments 4.177 and 4.178.

(b) To adjust proceed as in (1) below if only a few type require adjusting. If many require adjusting check position of "N" type pallet with other type and either reposition "N" pallet as outlined in (1) so as to make minimum readjustment of other pallets necessary or replace "N" type bar with a master "N" type bar 82021M as outlined in (2) below.

Note: Following adjustments are interrelated and it is necessary, when making one adjustment, to recheck others.

(1) **To adjust horizontal alignment**, heat pallet with electric soldering copper until solder is melted and then move pallet up or down by tapping. If type is still slightly out of alignment raise or lower character by gripping type bar about one inch below type pallet with nine prong pliers, 78591M, with single prong to front for raising type and single prong to rear for lowering type, and press until correct alignment is obtained. **To adjust spacing**, bend type bar toe with three prong pliers, 78589M. **To straighten characters**, grip type bar firmly with short nose pliers just below pallet and bend the end of the type bar with parallel pliers 78590M. **To adjust evenness of typing**, cut or peen type just back of light typing portion so as to throw this part of pallet forward, using one side type cutting pliers, 78588M, to correct light typing at either side and two side type cutting pliers, 78587M, to correct light typing at either top or bottom. Recheck 4.179.

Note: While these adjustments may be made with standard repairmen's tools, the adjustments can be more readily accomplished using tools referred to. These tools are not usually included in the repairman's tool kit.

(2) **To replace a type bar**; remove the type bar carriage (see note above 4.01), the ribbon, the two screws and lock washers mounting the type bar guide to the adapter plate, and the ribbon carrier after disengaging it from hook on ribbon oscillator lever, and then lift the type bar guide off its dowels; raise the type bar in question until it passes the ribbon oscillator lever, then raise the selected pull bar until it is disengaged from the type bar and remove the type bar from its slot in the type bar segment. Insert the new type bar in the slot just vacated engaging the teeth on the pull bar so the top of the pull bar is even with that of the other pull bars when the type bar is resting against its backstop. (New type bars are usually over-size and the section which fits in the segment will probably have to be stoned down with either the 138-139M or 87698M carborundum stones so that the type bar does not bind and has not more than .003" side play when against its backstop and .002" side play

when in its typing position.) Reassemble the type bar guide on the adapter plate using the two screws and lock washers previously removed, the ribbon carrier on the type bar guide engaging its lower end in the ribbon oscillator lever hook, and the type bar carriage on the typing units (see note under 4.35). Recheck 4.169 and 4.178 to 4.180. If "N" type pallet has been replaced recheck 4.84 and 4.85.

4.181 **Shift-Blank-Stop Mechanical Motor Stop, 87403M.**

Typing units equipped with shift-blank-stop mechanical motor stop mechanism shall meet the following requirements:

(a) Blocking lever's blocking edge shall clear motor stop function lever's front edge by not more than .002" and its rear projection shall be in contact with the motor stop function lever's right side when "Y" combination is set up on vanes and main shaft is rotated until function levers rest against vanes. Gauge by eye and feel. Check also when "space" combination is set up on the vanes.

(1) To adjust, loosen blocking lever assembly mounting screws and rotate assembly around right screw.

(b) Blocking lever spring humps shall travel approximately equal amounts above and below the center of the blocking lever's forward extension as send-receive key is moved from "send" to "receive" position and vice versa. Gauge by eye.

(1) To adjust, reposition spring.

(c) Blocking lever spring left arm hump shall clear the blocking lever but by not more than .004" when,

(1) send-receive mechanism is in send position, (2) blank selection is set up on vanes, (3) main shaft is rotated until blank function lever rests against vanes, (4) intermediate lever is not under blank function lever, (5) "T" lever is rotated clockwise until it touches blank function lever, and (6) blocking lever rear projection is resting against line feed function lever.

(1) To adjust, bend left arm of spring.

(d) Blocking lever spring right arm hump shall clear blocking lever by not more than .004" after rotating

"T" lever clockwise with printing bail in its extreme rear position when (1) send-receive mechanism is in send position, (2) "T" selection is set up on vanes, (3) main shaft is rotated until printing bail is in extreme forward position, (4) blocking lever's blocking edge and rear projection is in contact with the motor stop function

lever's front and right sides, respectively, and (5) "T" lever is in contact with universal function lever.

(1) To adjust, bend right arm of spring.

4.182 **Upper Case "H" Contact Assembly, 87868M:** Typing units equipped with contacts which open momentarily upon receipt of upper case "H" shall meet the following requirements:

(a) Pressure between contacts shall be Min. 4 ozs. (115 gms.), Max. 6 ozs. (170 gms.) measured at contact of light spring as contacts separate when printing bail is in extreme rear position.

(1) To adjust, bend light spring.

(b) Gap between contacts shall be Min. .010", Max. .015" when platen is in "figures" position, "H" combination is set up, and main shaft is rotated until upper case "H" function lever is completely selected.

(1) To adjust, bend heavy spring. Recheck (a).

4.183 **Remote signal bell contacts** on units so equipped shall meet the following requirements.

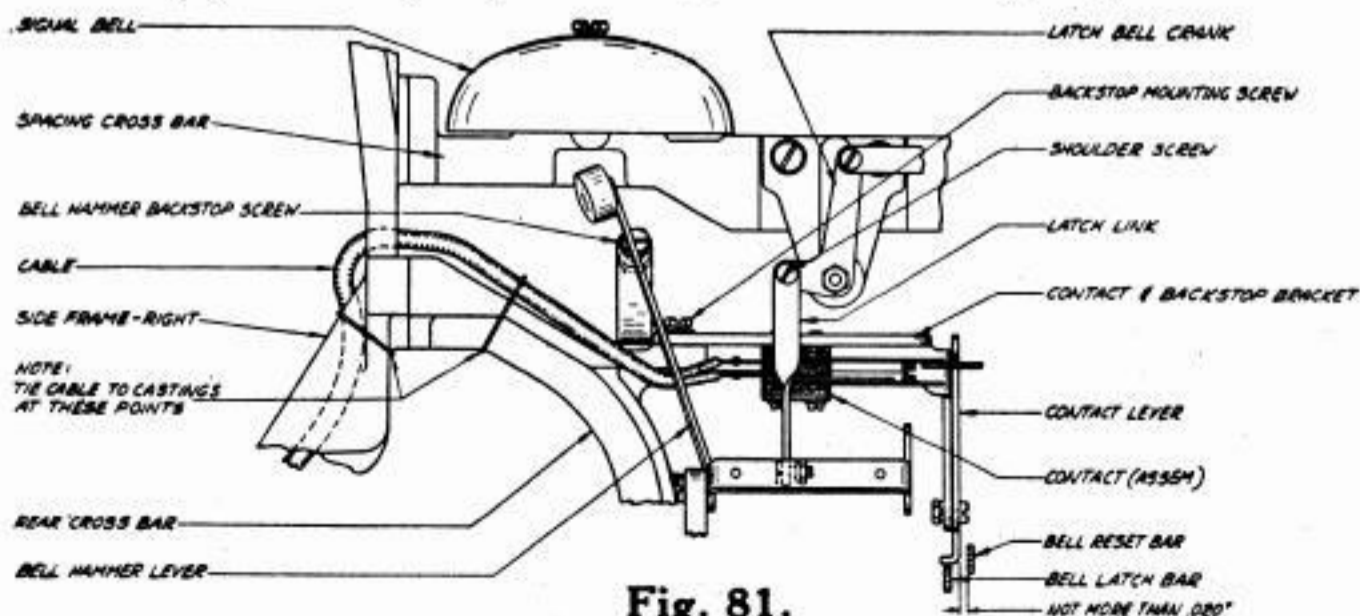
(a) Contact lever shall clear bell reset bar by not more than .020" as in Fig. 81 when play in lever is taken up to make clearance minimum.

(1) To adjust, reposition contact and back stop bracket.

Note: Place typing unit on right side.

(b) Upper contact spring insulator shall press against contact lever with a pressure of Min. 1 oz. (28 gms.), Max. 2 ozs. (56 gms.) measured as in Fig. 82 when bell latch bar is in its latched (unoperated) position and lower contact is held clear of upper contact.

(1) To adjust, bend upper contact spring.



- (c) Lower contact spring shall press against its stiffener with a pressure of Min. 1 oz. (28 gms.), Max. 2 ozs. (56 gms.) measured as in Fig. 82.
- (d) Gap between contacts shall be Min. .025", Max. .035" as in Fig. 81.
- (1) To adjust, bend lower contact spring stiffener and then recheck (c).

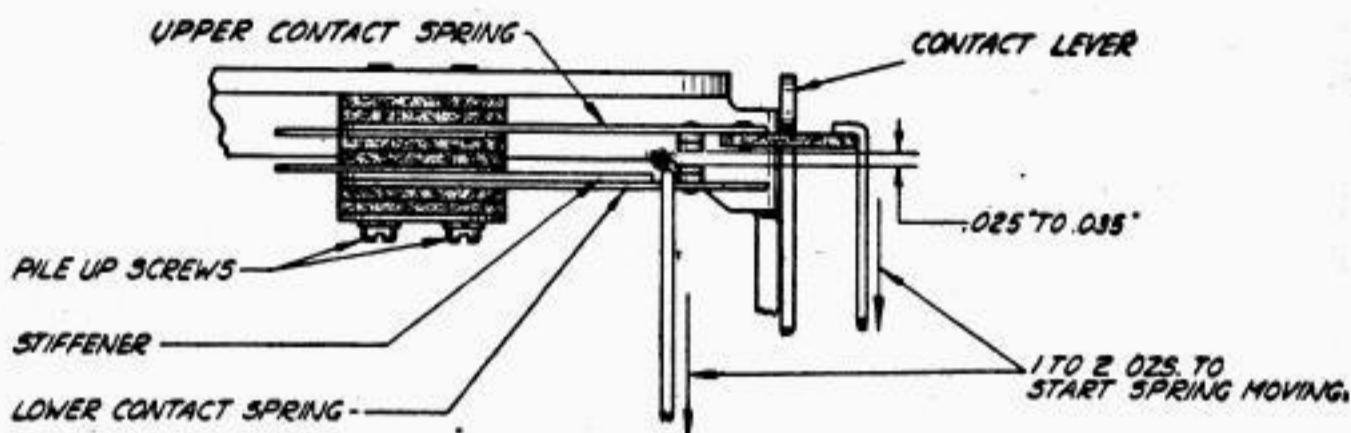


Fig. 82.

- 4.184 **Tabulator mechanism** on units so equipped shall meet the requirements of P36.618.
- 4.185 **Sprocket feed mechanism** on units so equipped shall meet the requirements of P36.619.
- 4.186 **Orientation Range and Distortion Tolerance:** Typing units shall be capable of meeting the orientation range or distortion tolerance requirements given in another section of the "P" series covering this subject.