

BELL SYSTEM PRACTICES
Teletypewriter and Data Stations

SECTION P35.650
Issue 4, February, 1959
AT&TCo Standard

14 AND 20 REPERFORATORS

REQUIREMENTS AND PROCEDURES

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1. GENERAL

1.01 This section contains the apparatus requirements and adjusting procedures for the maintenance of reperforators of the 14 type or 20 type.

1.02 This section is reissued to: ↙

(a) Suggest in 2.12 that the punch-block cleaning tool be used.

(b) Make some minor corrections and additions.

The changes are indicated by marginal arrows. ↘

2. REQUIREMENTS AND PROCEDURES

2.01 **Selector-Clutch Torque:** After the clutch has been relubricated and motor has been run for at least 10 minutes, a pull of Min 14 oz, Max 18 oz applied at right angles to the selector stoparm, when the motor is running, should hold the selector cam sleeve from rotating when the selector stoparm is held just clear of its stop.

Fig. 1

MIN. 14 OZS.
MAX. 18 OZS.
TO HOLD SLEEVE
STATIONARY

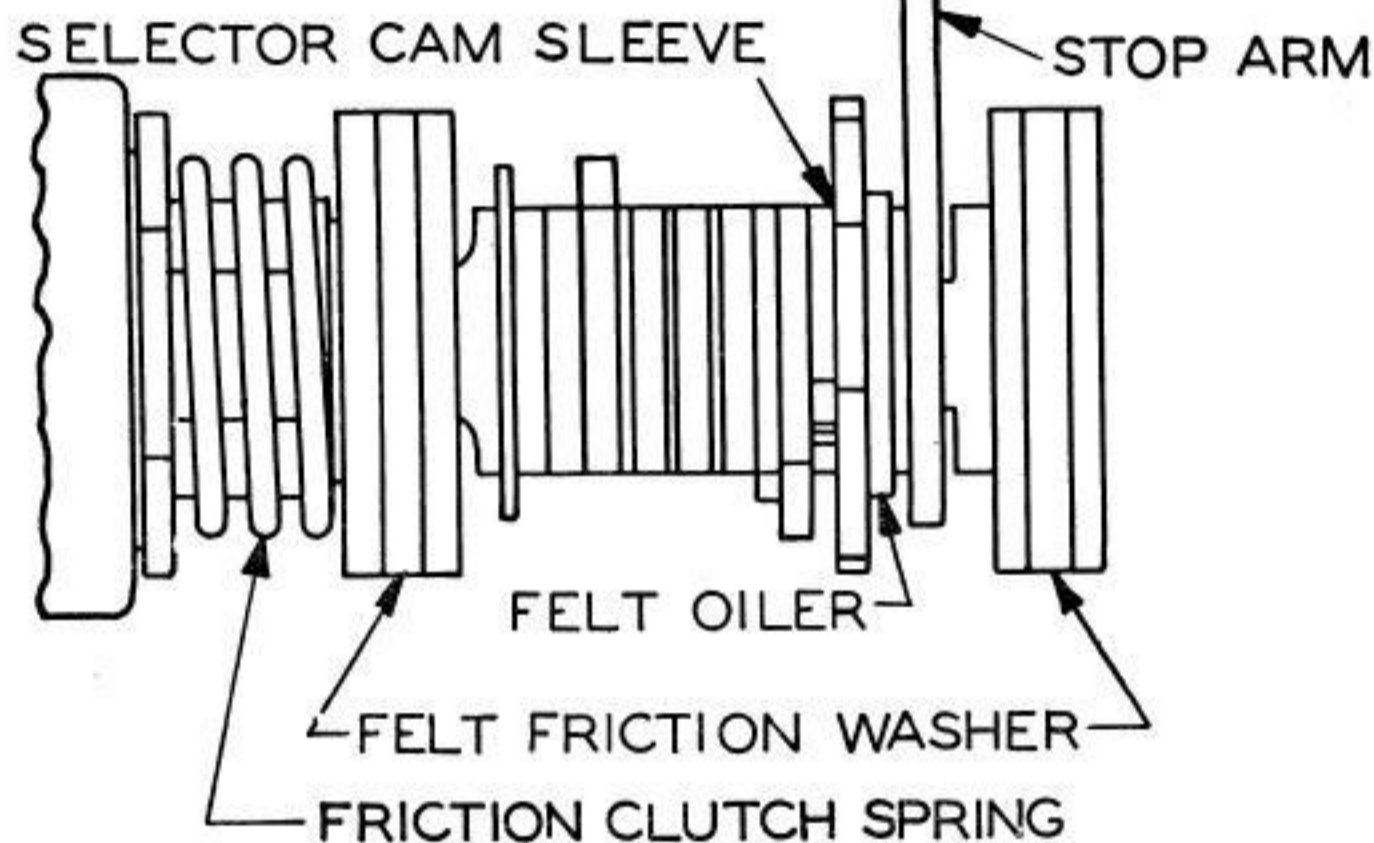


Fig. 1

(a) To adjust, replace the felt friction washers, add or remove the spring adjusting washers, replace the spring or, on units equipped with an adjustable capstan nut, readjust the nut.

Note: Replacing the felt washers will usually be satisfactory since the spring holds its adjustment over long periods. Before replacing the spring, check to see if the spring can be adjusted by the addition of washer-shims, TP96763 (.012"), TP96764 (.016") or TP96765 (.020"), around the shoulder of the TP72515 nut at the end of the spring nearest the bearing.

(1) To replace the felt washers: remove the range-finder assembly, remove the mounting-post nut and loosen the shoulder screw that mounts the space-out lever and swing the space-out lever to one side, detach

the locking-lever spring and remove the retaining disc noting that it has a left-hand thread and unscrews to the right (clockwise); remove the outer felt washer, cam-sleeve assembly, cam-sleeve disc, and inner felt washer, holding the selector levers away from the shaft and rotating the cam-sleeve disc until the notch in its edge registers with points of the selector levers.

Note: When putting in new washers, lubricate them as called for in Sections P30.011 and P35.603. ←

(2) To remove the friction-clutch spring or add adjusting washers, proceed as in (1) and remove the clutch driving disc and spring.

CAUTION: The following adjustment should not be made without first attempting to meet clutch torque requirements by replacing the clutch washers as directed in (1).

(3) On units equipped with an adjustable capstan nut, the nut may be adjusted to compensate for variations in spring tension. This can be done by turning the capstan nut with the blade of a 3" screwdriver. Turning the nut in a counterclockwise direction, as viewed from the selector end of the shaft, increases the tension.

2.02 The **motor** should be located so that the axis of the pinion shaft lies approximately in the mid-plane of the main-shaft gear.

(a) Gauge by eye.

(b) To adjust, loosen the motor mounting screws and reposition the motor on its mounting plate, keeping the edges of the motor base and the mounting plate parallel.

2.03 The **motor pinion** and the main-shaft gear should not bind and there should be a barely perceptible backlash between them at the closest point in their revolution.

(a) Gauge the bind by feel and the backlash by eye. Hold the pinion and move the main-shaft gear.

(b) To adjust, loosen the right motor-plate mounting screw and the locknut of the motor-plate adjusting screw. Slightly loosen the other two motor-plate mounting screws. Start the motor and carefully readjust the vertical position of the motor-plate adjusting screw until the gear noise is a minimum. Tighten the motor-plate mounting screws and adjusting-screw locknut and recheck the backlash.

CAUTION: In making this adjustment with the motor running, care should be taken to avoid damaging the main-shaft gear or overloading the motor as the result of too close mesh between the gear and pinion.

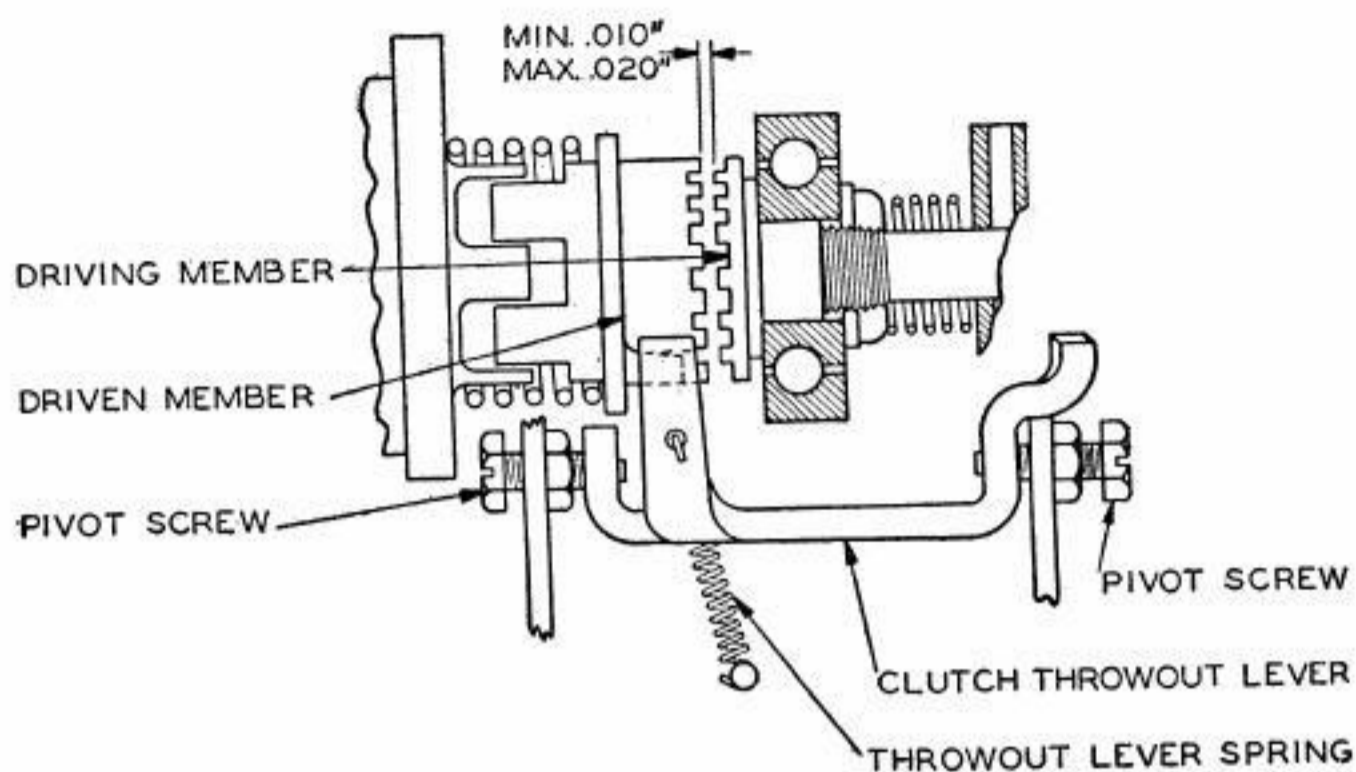


Fig. 2

2.04 The **main-shaft clutch teeth** should clear each other by Min .010", Max .020" when the clutch is fully cammed out of engagement. **Fig. 2**

(a) To adjust, reposition the clutch-throwout lever pivot screws making sure that the throwout lever is free in its bearings, with some endplay, not more than .002", when the pivot-screw locknuts are tightened.

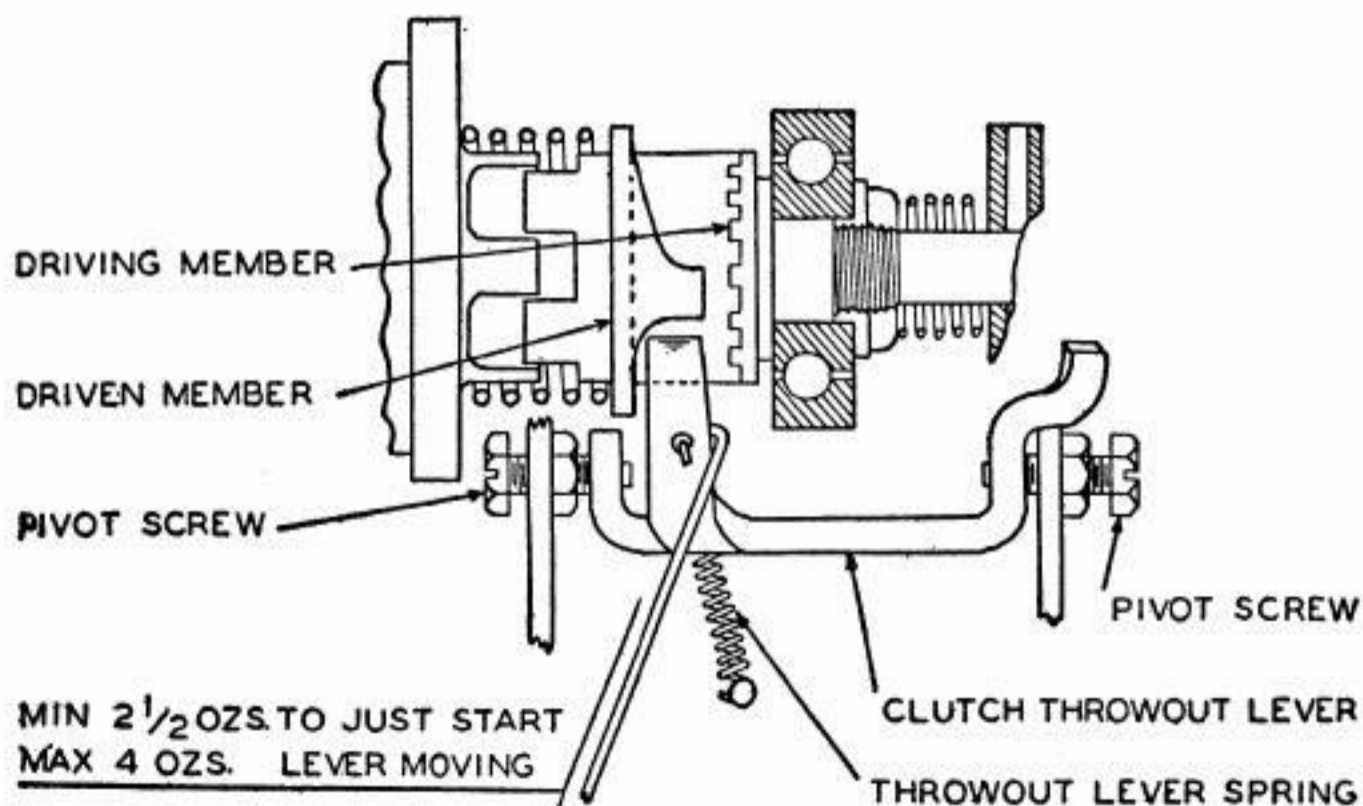


Fig. 3

2.05 The **clutch-throwout-lever spring** should have a tension as indicated in Fig. 3, measured at right angles to the throwout lever at the spring hole, when the clutch teeth are fully engaged and the clutch-throwout lever is resting against the low part of the driven clutch-member. **Fig. 3**

Note: Remove the large chad chute.

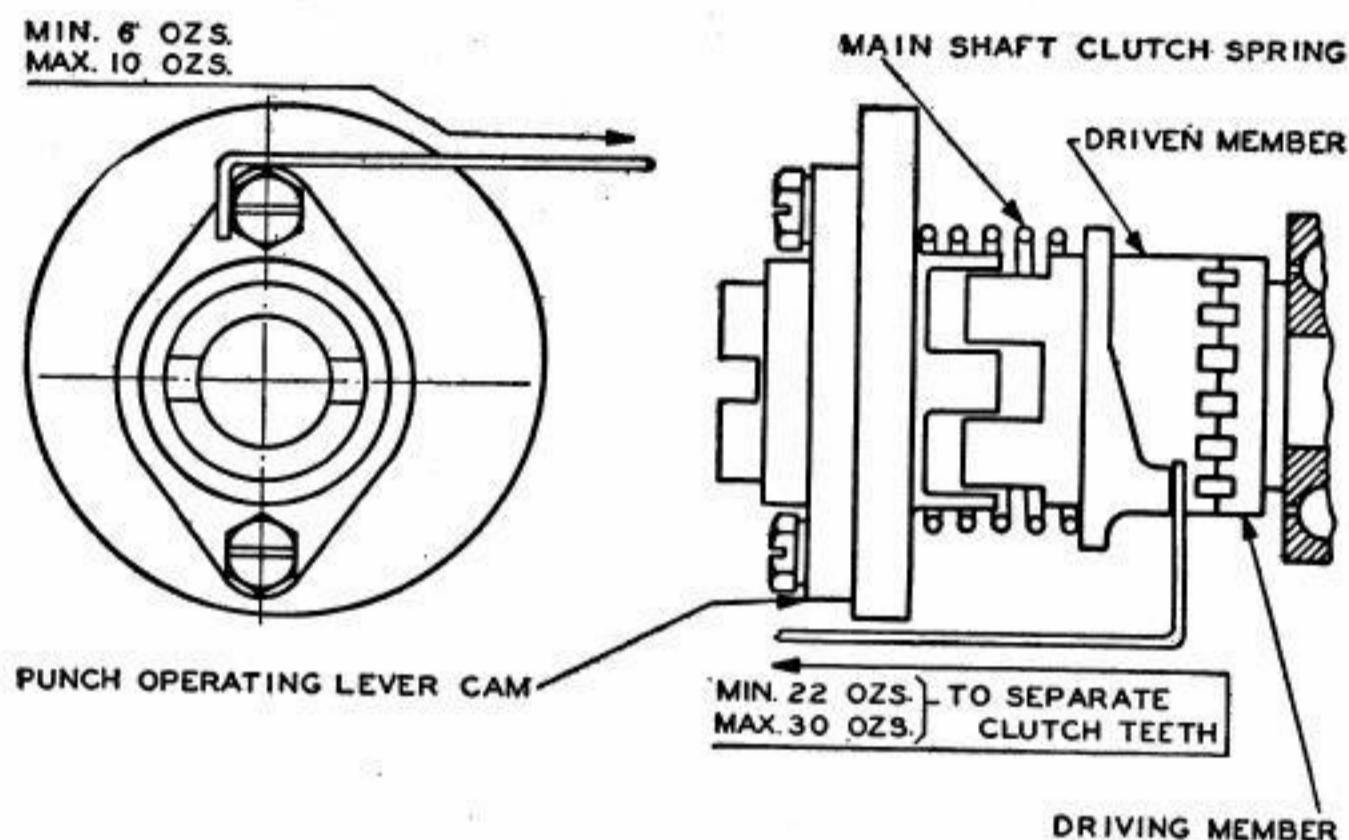


Fig. 4

2.06 **Main-Shaft Clutch Spring.** It should require a pull as indicated in Fig. 4 to separate the clutch teeth. With the teeth of the driven clutch-member resting against the teeth of the driving clutch-member, but not engaged, hook the scale over the throwout cam on the driven clutch-member and pull as nearly in line with the shaft as possible. **Fig. 4**

2.07 The **clutch driven-member**, after being pulled manually to the position of extreme disengagement, as in 2.06, should start and slide until it engages with or touches the driving-member teeth as the force opposing the clutch spring is reduced to not less than 10 oz. For identification of parts see Fig. 4.

- (a) 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.

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 by observing the punching of the first character received after the main shaft has been at rest for at least 10 minutes with the power disconnected.

Note: Replace the large chad chute.

2.08 **Punch Operating-Lever-Cam Friction-Clutch.** It should require a pull of Min 6 oz, Max 10 oz applied to the punch operating-lever cam screw perpendicular to the plane passing through the two cam mounting screws, with motor running, selector magnet operated and punch-operating lever held away from its cam, to move the cam in a direction opposite to that of normal rotation. **Fig. 4**

(a) This measurement requires considerable care. Observations should be made only when it is thought that the cam is not keeping in speed with the main shaft. If necessary to check this feature, hold the punch-operating lever away from the cam, block magnet-armature in operated position so main clutch will not engage, hook a scale over the top screw of the cam and pull in a direction reverse to normal rotation until the cam just starts to move.

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

CAUTION: It is important to keep the clutch stoparm against the driven jaw to prevent the main clutch engaging and winding the scale around the main shaft. Keep the armature operated to avoid tripping the clutch stoparm, or block or clamp the clutch stoparm so that the main clutch cannot engage.

2.09 The **punch-arm shaft** should turn freely with just perceptible endplay and the end of the shaft should be flush with the front of the front bearing block when the punch-arm is held against the front bearing block.

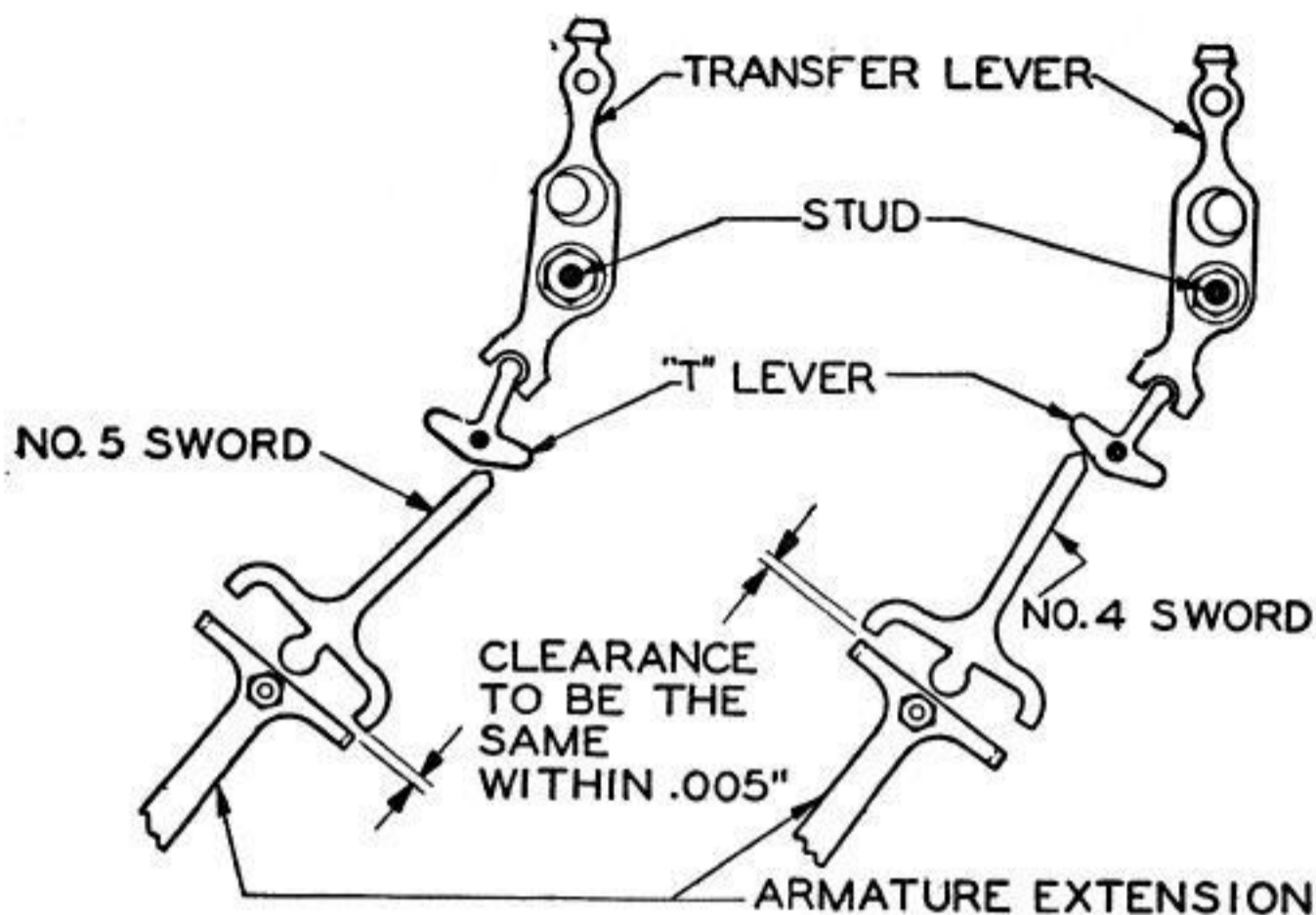


Fig. 5

(a) Gauge by eye and feel.

(b) To adjust the position of the shaft, remove the punch-hammer spring and reposition the punch-arm by means of its setscrews. To adjust the endplay of the shaft, reposition the rear bearing-bracket collar by means of its setscrews. Reassemble the punch-hammer spring.

2.10 Punch-Unit Bracket. The clearance between the engaging surfaces of the No. 5 sword and the armature extension with the armature unoperated should be the same within .005" as that between the No. 4 sword and the armature extension with the armature operated when the No. 4 transfer lever is in its left (spacing) position, the No. 5 transfer lever is in its right (marking) position and the selector cam sleeve in the stop position.

Fig. 5

(a) To adjust, loosen the two punch-unit-bracket mounting screws and reposition unit, using the rear screw as a pivot.

2.11 The **transfer levers** should be positioned so that their forked arms line up in the same vertical planes with the corresponding selector T levers. For identification of parts see Fig. 5.

Fig. 5

(a) Gauge by eye.

(b) To adjust, loosen the transfer-lever-stud locknuts and reposition the stud.

2.12 The **punch-hammer** travel should be such that the punches are driven through the tape sufficiently to punch all holes clearly each time the hammer is operated.

(a) Gauge by punching tape several times with **LTRS** combination set up.

(b) To adjust, back off the punch-hammer adjusting nut until the punches fail to perforate tape when **LTRS** combination is set up and the main shaft is rotated. Advance the adjusting nut slowly until all holes are just punched clean, and then advance the nut an additional 1/4 turn. For identification of parts see Fig. 9. **Fig. 9**

(c) If the tape does not move freely, the TP99947 punch-block cleaning tool should be inserted between the guide plate and the die plate of the punch block and moved forward and backward a few times to remove the lint and paper scraps.

CAUTION: Do not take apart defective punch blocks. If satisfactory punching cannot be obtained replace the entire punch-block assembly. The rust preventive should be removed from the replacing block before it is assembled to the perforator.

2.13 The **lock-bail wedge** should be seated firmly between at least two transfer levers, with the Y combination set up and the main shaft rotated until the punch hammer is in its extreme upward position. For identification of parts see Fig. 6. **Fig. 6**

(a) Gauge by eye and feel.

(b) To adjust, reposition the lock-bail eccentric-shaft.

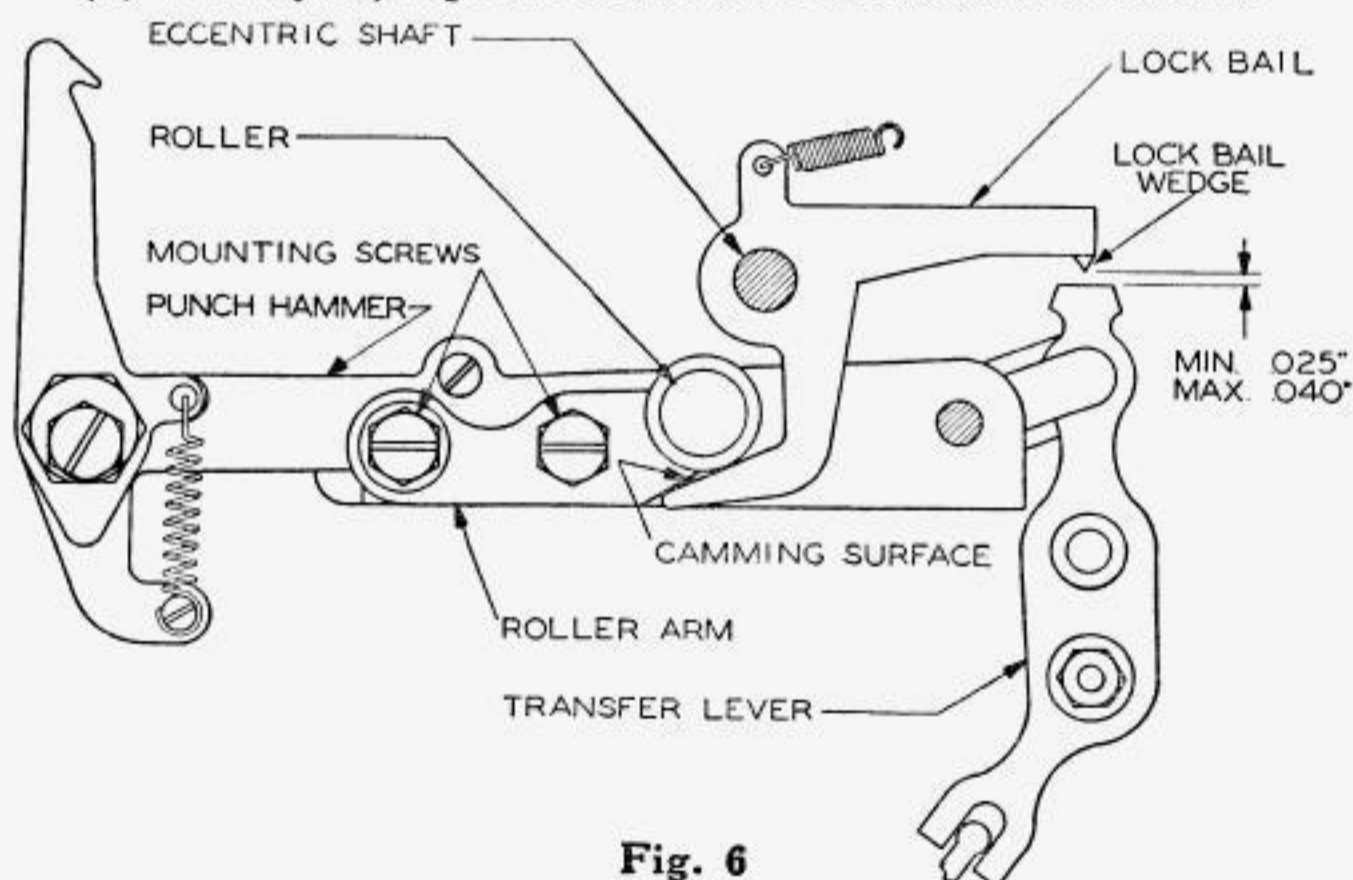


Fig. 6

2.14 The **lock-bail wedge** should clear the transfer levers as indicated in Fig. 6 when the main shaft is in its stopped position and the transfer levers are held in center of their travel.

Fig. 6

- (a) To adjust, loosen the roller-arm mounting screws and reposition the roller arm. Tighten the mounting screws.

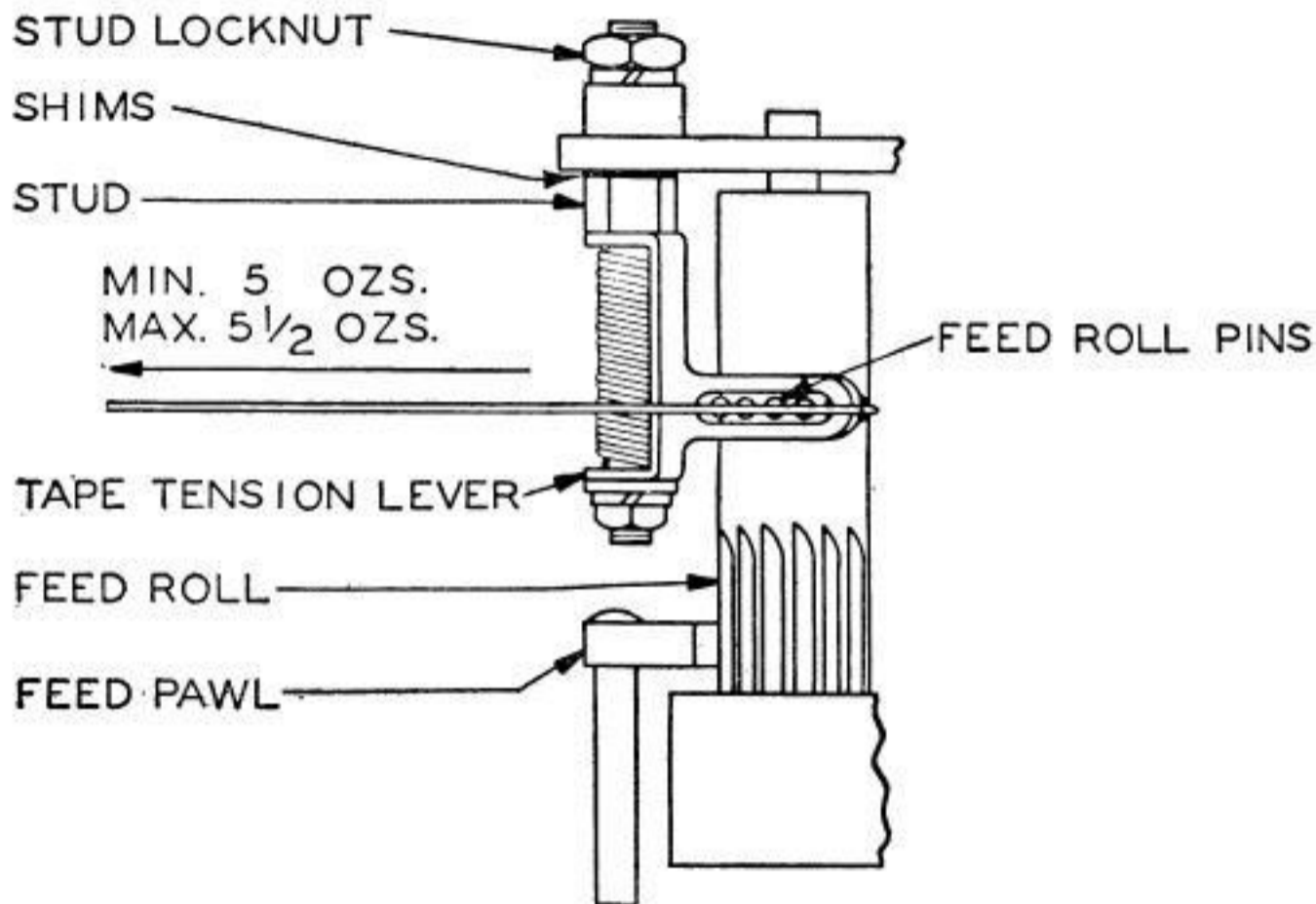


Fig. 7

2.15 (a) The **tape-tension lever** should be centrally located with respect to the feed-roll pins. This should be measured as follows:

(1) Take up the feed-roll endplay towards the star wheel and the tension-lever endplay towards its adjusting nut. The edge of the lever slot may touch the feed-roll pins on the side of the pins nearest the ratchet but there must be clearance on the other side.

(2) Take up the feed-roll endplay away from the star wheel and the tension-lever endplay away from the tension-adjusting nut. The edge of the lever slot may touch the feed-roll pins on the side farthest away from the ratchet but there must be clearance on the other side.

- (b) To adjust, add or remove shims between the shoulder on the tape-tension-lever stud and its mounting bracket.

2.16 The **lock-bail spring** tension should be Min 6 oz, Max 10 oz measured at the center of the lock-bail locking edge as the bail starts to move when the main shaft is in the stop position.

(a) Gauge by pulling vertically upward.

2.17 The **punch levers** should be free of bind and in alignment with their respective punch-block tape pins when the punch hammer is in its unoperated (lower) position.

(a) Gauge by eye.

(b) To adjust, loosen the punch-hammer-pivot-screw locknuts and relocate the hammer by repositioning the pivot screws. In locating the pivot screws make sure that the punch hammer is free in its bearings with just perceptible endplay and then tighten the pivot-screw locknuts.

2.18 The **feed roll** should rotate freely and have not more than .004" endplay when the tape-tension lever, feed pawl and the feed-roll detent lever are held clear of the roll.

(a) Gauge by feel.

(b) To adjust, reposition the feed-roll bearing plate to eliminate bind and add or remove shims between the punch block and the feed-roll bearing-plate to adjust endplay.

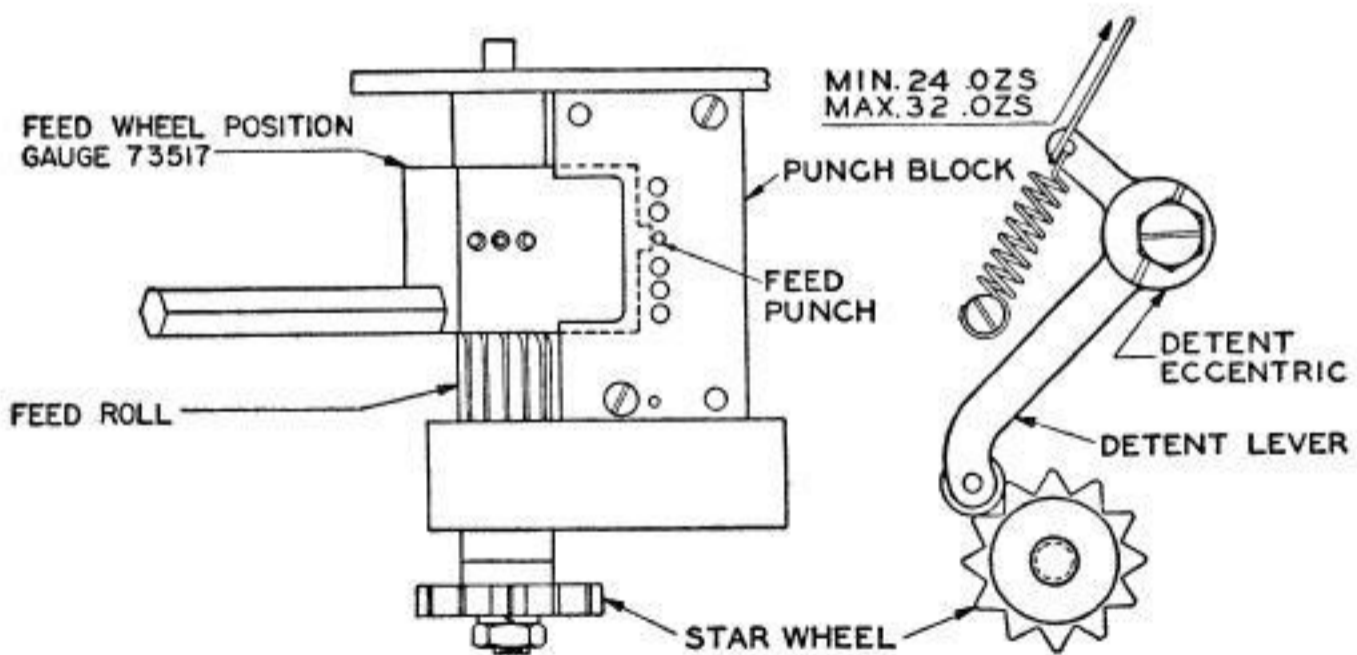


Fig. 8

2.19 The **feed-roll-detent spring** tension should be Min 24 oz, Max 32 oz measured behind the spring hole in the detent lever as the detent roller starts moving from the star wheel.

(a) Gauge by pulling in line with the spring.

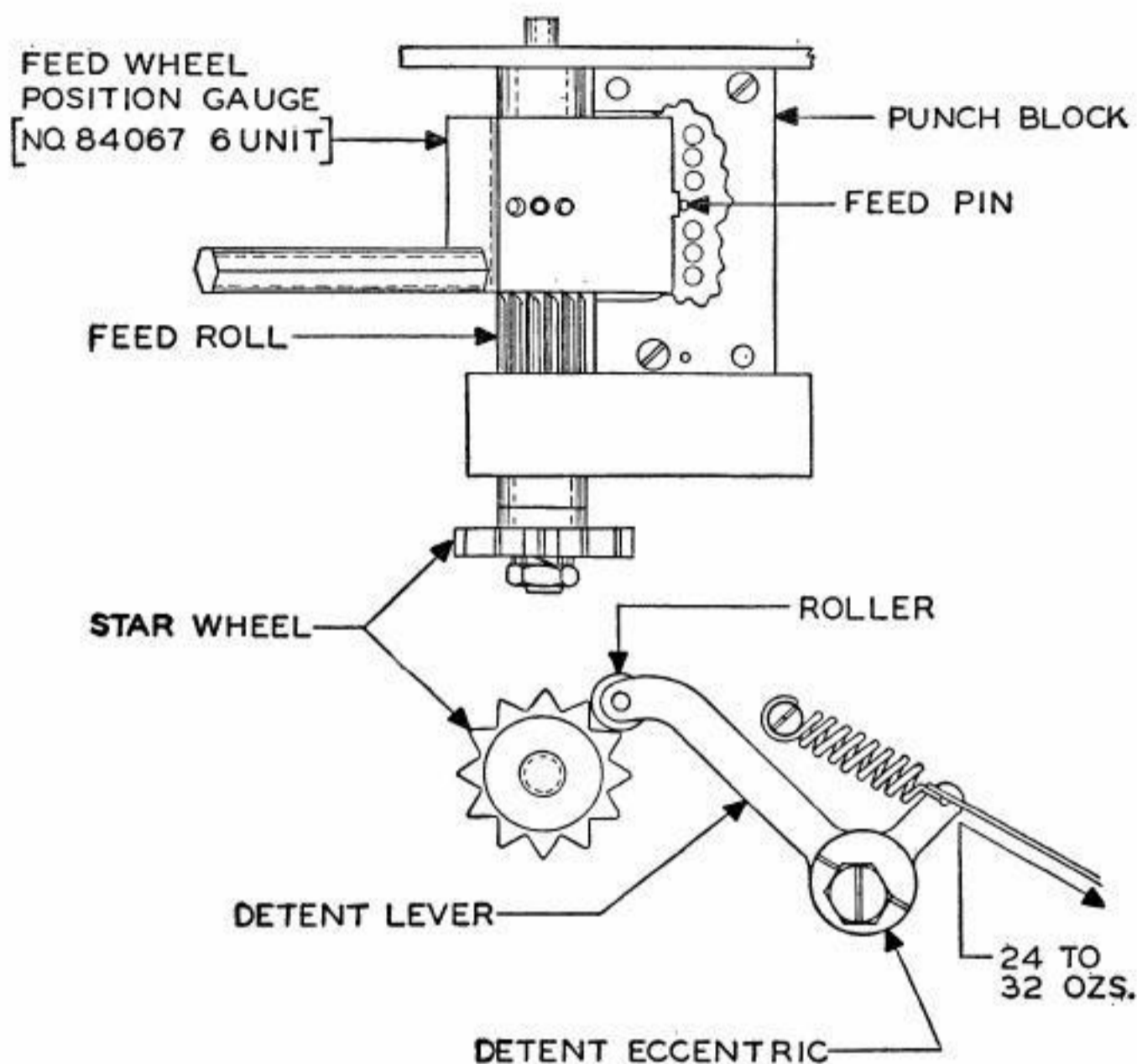


Fig. 8A

2.20 The **tape-stripper plate** upper edge should clear the feed roll by not more than 0.10" throughout a complete revolution of the feed roll.

(a) Gauge by eye.

(b) To adjust loosen the tape-stripper-plate mounting screws and reposition the plate.

2.21 **Tape-tension-lever spring:** The tape-tension lever should bear against the feed roll with a pressure as indicated in Fig. 5 measured at the end of the lever and perpendicular to a plane passing through the center of the tension-lever stud and the end of the lever. **Fig. 7**

(a) To adjust, loosen the tape-tension-lever-stud locknut and rotate the stud clockwise or counterclockwise to increase or decrease spring tension.

2.22 **Feed-Roll Detent—Preliminary Setting—**(Final Setting Par. 2.25)—The distance from the center of the feed punch to the center of a feed-roll pin should be approximately .600" when the punch-arm roller is on a high part of its cam.

(a) To check, hold the tape-tension lever away from the feed roll and insert feed-wheel position gauge (Use gauge TP73517 for the 14 reperforator, see Fig. 8. For the 20 reperforator use gauge TP84067, see Fig. 8A.) in the punch block so that the projection of the gauge stops against the feed punch. With the gauge in this position a feed-roll pin should line up with the middle hole in the gauge. **Figs. 8, 8A**

(b) To adjust, loosen the feed-roll-detent-lever screw and turn the eccentric bushing until the middle hole of the gauge fits freely over the feed-roll pin. Tighten the feed-roll-detent screw, remove the gauge, and restore the tape-tension lever to its normal position.

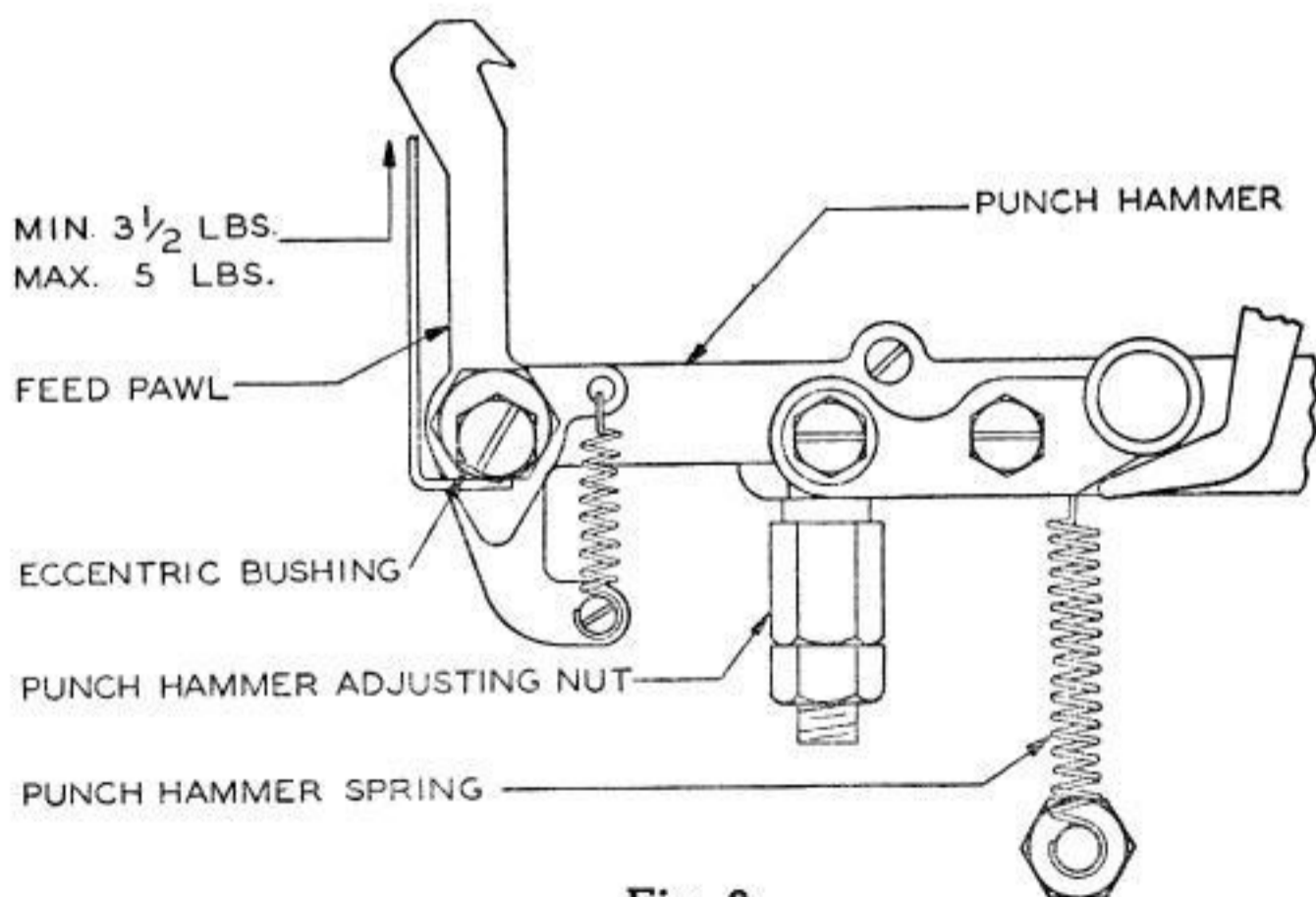


Fig. 9

2.23 The **feed pawl** should engage the next feed-roll ratchet tooth when the main shaft has been rotated until the selected punch levers clear the punch pins as indicated in Fig. 10 **Fig. 10**

(a) To adjust, reposition the feed-pawl eccentric.

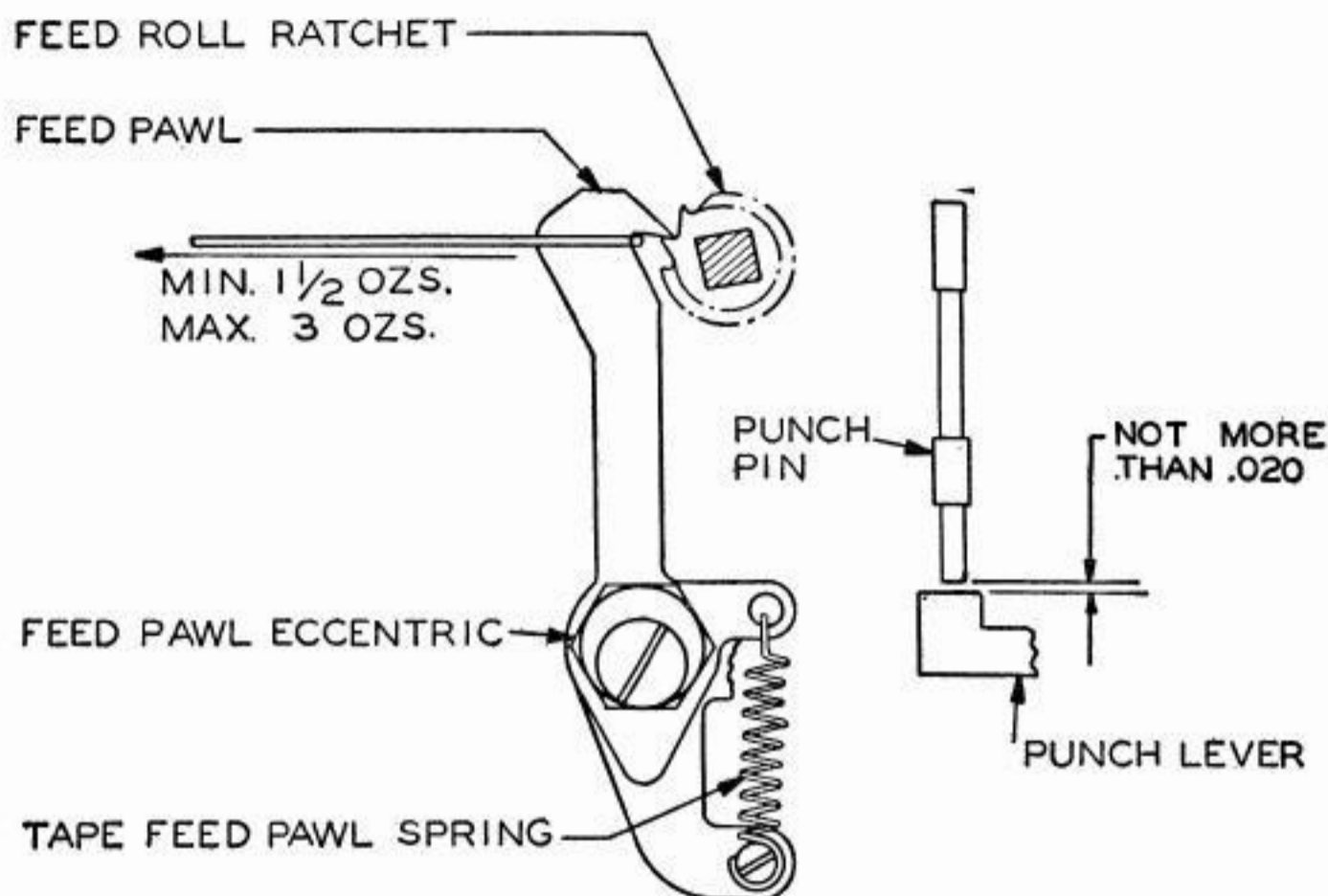


Fig. 10

2.24 **Feed-Pawl Spring.** It should require a pull as indicated in Fig. 10 to start the feed pawl moving. **Fig. 10**

2.25 **Feed-Roll Detent—Final Setting** (Preliminary Setting Par. 2.22)—Perforations in the tape should be evenly spaced, 10 to the inch, with an allowable variation of $\pm .007''$ in a 4" length.

(a) To check, perforate a series of nine "**BLANK**" and one **LTRS** combinations seven or eight times, place the tape on top of a TP95960 gauge, then hold the tape and the gauge up to a light background and align a No. 3 code hole in the tape with the hole 1-1/2 inches from the left end of the gauge. Gauge holes should be visible through all No. 3 code holes to the right of the point of alignment and the code hole above the large hole at the right end of the gauge should fall entirely within the circumference of the gauge hole.

- (b) To adjust, loosen the feed-roll-detent screw and reposition the eccentric bushing.

Note: If the feed-roll-detent eccentric is changed, recheck Par. 2.23.

2.26 The **tape guide** should be positioned so that tape may be readily inserted into the punch block.

- (a) Gauge by inserting tape.

- (b) To adjust, loosen the guide mounting screws and reposition the guide.

2.27 **Punch-Hammer Spring.** It should require a pull as indicated in Fig. 9 to start the punch hammer moving when the main-shaft clutch is disengaged and the lock bail is held away from the transfer levers. **Fig. 9**

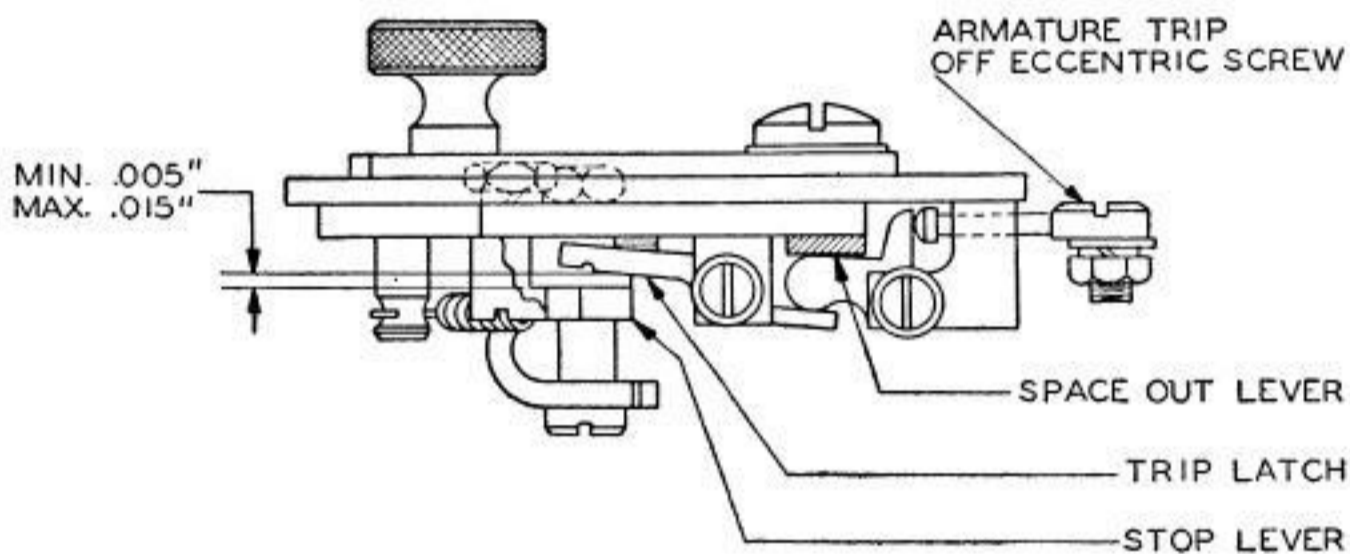


Fig. 11

2.28 The **space-out lever** should not bind and should hold the triplatch so that it clears the stoplever as indicated in Fig. 11 when the space-out lever is in its down position. **Fig. 11**

- (a) Gauge the minimum by eye and maximum with wire gauge.

- (b) To eliminate bind, reposition the space-out lever guidepost. To adjust clearance, bend the lower end of the space-out lever.

2.29 **Space-out-lever spring** tension should be Min 5 oz, Max 8 oz, measured on top of the manual space-out lever as the lever starts to move.

- (a) Gauge by pushing down on the lever.

2.30 **Outer motor-unit slip-connector springs** should have a tension of Min 2 lb, Max 4 lb, measured at the end of the springs just below the head of the motor-block terminal screw as the springs break contact with the terminal screw when the motor unit is mounted in its proper position.

(a) To gauge, remove the chad drawer and guide.

(b) To adjust, remove the motor and bend the springs.

2.31 **Inner motor-unit slip-connector spring** ends should be within .015" of a straightedge laid across the two outer slip-connector springs (adjusted in accordance with Par. 2.30) when the motor is removed from the base.

(a) To adjust, bend the springs.

3. REFERENCE TO BELL SYSTEM PRACTICES

3.01 The following BSPs contain information applicable to the 14 and 20 reperforators.

| <u>BSP</u> | <u>SECTION</u> |
|---|----------------|
| Lubrication—14 and 20 Reperforators | P35.603 |
| Motors and Governors | P32.004 |
| Orientation Tests and Distortion Tolerances | P30.002 |
| Requirements and Procedures—General | P30.012 |
| Selector Mechanisms | P32.001 |