TELETYPE

PRINTING TELEGRAPH SYSTEMS

BULLETIN 244B

GENERAL DESCRIPTION
AND
THEORY OF OPERATION
MODEL 28 MULTI-MAGNET REPERFORATOR
LARP1, LARB1

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Title Page	Original
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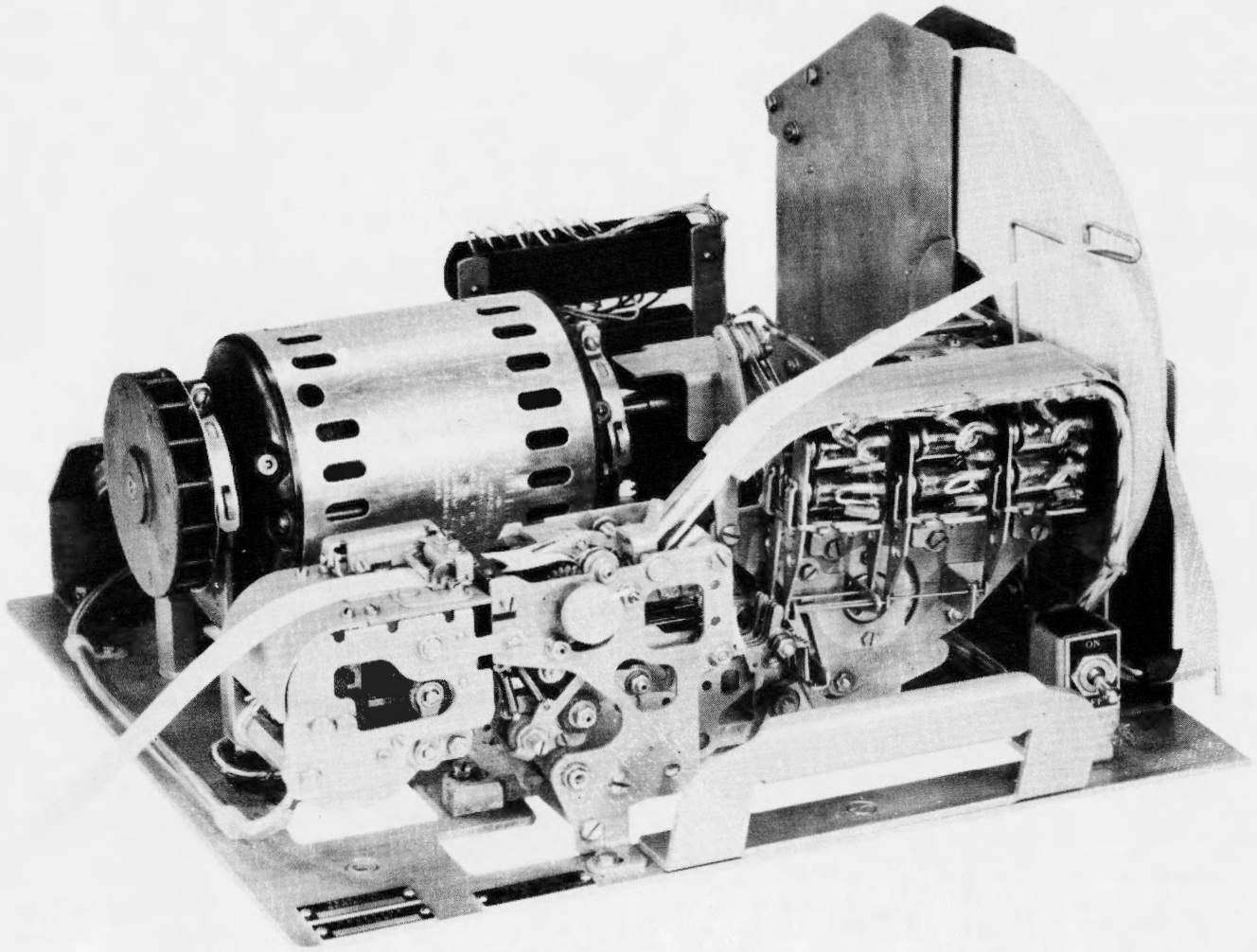
1-1	Original
2-1 to 2-3	Original
3-0 to 3-10	Original

The above list indicates the effective pages as of the date of issue. Upon receipt of change pages, insert them numerically and discard any superseded pages.



MULTI-MAGNET REPERFORATOR ON BASE

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SECTION 1

GENERAL DESCRIPTION

1. GENERAL

a. The Model 28 Multi-Magnet Reperforator is a motor driven electro-mechanical device for reproducing perforated tape for message relaying purposes in response to code impulses received on multi-wire signal paths from a distributor.

b. The multi-magnet reperforator is designed to operate at a speed of 1200 operations (200 words) per minute on a five level basis. The design permits conversion to provide seven level operation if required. A verifying reader assembly is attached to the reperforator unit. It senses the perforations in the tape and reads back the message code on multi-wire signal paths leading to the necessary facilities for verification as to accuracy.

2. DESCRIPTION

a. The multi-magnet reperforator consists of a base (Figure 1), a reperforator unit (Figures 2 & 3) and a motor unit (Figure 4). It incorporates the electrical and mechanical features necessary to perform the following functions:

(1) Translate code signals into mechanical action for controling the code combinations of the tape being perforated.

(2) Perforate and feed the tape in timed relation to a distributor.

(3) Feed-out a metered amount of tape under remote control.

(4) Sense the perforated tape and read back the message on multi-wire signal paths within the system for verification as to accuracy.

b. Magnet Current

(1) The code magnets operate on a signal line current of 0.40 ampere at 115 volts d-c.

(2) The function magnet and the tape feed-out magnet operate on local circuits of 0.100 ampere at 115 volts d-c.

c. Power Supply Requirements

Power requirements for the synchronous motor are as follows:

(1) Input voltage: 115 volts a-c plus or minus 10 percent

(2) Phase: Single phase

(3) Frequency: 60 cycles plus or minus 0.75 percent

(4) Input current:
Starting: 9.0 amps.
Running: 1.85 amps.

(5) Power factor: 0.30

(6) Wattage: 65 watts

SECTION 2

THEORY OF OPERATION

1. GENERAL

This section covers the operating principles and circuit descriptions of the multi-magnet reperforator. It consists of a base, a reperforator unit and a motor unit. Each element of the code is applied to an individual magnet. A function magnet and a tape feed-out magnet are also provided. Each code magnet and the function magnet are connected to a distributor by individual circuits.

2. REPERFORATOR UNIT

a. General — The reperforator unit (Figures 2 & 3) consists essentially of a main shaft, a bank of code magnets, a perforating mechanism, a verifying reader, a tape feed-out mechanism and a function mechanism.

NOTE

Pivot points are indicated on line drawings by solid black circles or ellipses.

b. Main Shaft

(1) The main shaft (Figure 7) is mounted horizontally by two bearings on the main casting of the reperforator unit. Between the bearings on the shaft are located a function clutch, a cam assembly and a tape feed-out metering eccentric. A gear on the inner end of the main shaft meshes directly with the motor pinion.

(2) The clutch on the main shaft, when tripped, drives the function mechanism through one cycle of operation and immediately disengages.

(a) Figure 5 shows a typical two stop clutch disengaged. Disengagement occurs when lug B on the shoe lever and the cam disk stop lug A are brought close together. The shoe lever pivots clockwise about its ear C which is located in a notch in the upper portion of the secondary shoe. Shoe lever ear D is moved to the right. The shoe springs contract and pull the two clutch shoes toward each other and away from the serrated drum surface. The drum continues to rotate but the mechanism attached to the cam disk does not.

(b) Figure 6 shows the same clutch engaged. Engagement occurs when the cam disk and lug B on the shoe lever are released. The shoe lever spring immediately contracts. The shoe lever pivots counterclockwise about shoe lever ear C under the influence of the shoe lever spring. It overcomes the tension of the shoe springs and moves the shoe lever ear D to the left. This forces the primary shoe against the serrated drum surface at E. The counterclockwise rotation of the drum drives the primary shoe downward and so makes further contact with the drum at F. The movement of the primary shoe in the direction of the drum is transferred to the secondary shoe at G which causes the secondary shoe to bear against the drum at H. The revolving drum drives the secondary shoe upward to make contact with the drum at I as well as H. A force component is developed at I in a horizontal direction but is transferred to lug J on the clutch adjusting cam disk which causes the cam disk to rotate with the drum. The associated mechanism attached to the cam disk then rotates with the drum.

(3) Cam Assembly

(a) The cam assembly (Figure 7) is attached to the clutch cam disk and consists of two rocker bail cams and a reset disk. Each of the two cams and the disk perform their function in 180 degrees of rotation and are co-ordinated with the two stop positions of the clutch. The rocker bail cam actuates a rocker bail (Figure 8) from which motion is extended to the perforating and verifying reader mechanism for perforation and read-back purposes. The reset disk is fitted with two pins which, in 180 degrees of rotation, initiate resetting action for the function mechanism.

(b) Feed-Out Metering Eccentric — The feed-out metering eccentric (Figure 7) rotates continuously with the main shaft and supports a feed pawl for stepping the metering mechanism.

c. Selecting Mechanism

The code magnets receive code impulses on a multi-wire basis from a distributor within the system. When a code magnet attracts its armature in response to a code impulse, the armature trips a punch slide latch (Figure 9) directly or by means of a push rod depending on the location of the magnet with relation to the latch. The latch is held in the tripped position until the function mechanism operates whereupon the unlatched punch slide moves under its associated punch pin.

d. Function Mechanism

(1) When the function magnet is energized by a pulse from the distributor, its armature releases a function trip lever which is clamped to a function trip shaft (Figure 10). The function trip lever is drawn toward the magnet by its spring and causes a lower trip lever on the opposite end of the function trip shaft to ac-

tuate a main trip lever. The main trip lever has a reset bail trip lever attached to it as a forward extension. The forked end of the reset bail trip lever moves downward and thereby depresses the punch slide reset bail. Depression of the punch slide reset bail permits any punch slide that has been unlatched (due to energizing of its associated code magnet by a code impulse) to advance to a position below its respective punch pin. Punch slides identified with code magnets that are not energized will be retained in the unselected position by their latches.

(2) The main trip lever, in its counterclockwise movement, trips a release attached to a clutch trip shaft (Figure 10). Tension exerted by the release spring rotates the shaft and causes a clutch trip lever which is clamped to the mid-portion of the shaft to release the clutch. A lowe reset arm is clamped to the mid-portion of the function trip shaft. A trip lever reset cam is clamped to the inner end of the clutch trip shaft. As the cam assembly rotates, a pin on the reset disk depresses the lower reset lever to reset the function trip lever on the function magnet armature. Immediately following, another pin (diametrically opposite on the reset disk) raises the release sufficiently to permit the release to reset on the main trip lever. A clutch latch lever is suspended freely on the clutch trip shaft. Its spring causes it to ride the clutch cam disk. The contour of the cam disk is such as to permit the latch to engage a shoulder on the disk at the point of clutch disengagement.

NOTE

When rotating the motor by hand, the clutch will not fully disengage upon reaching the stop position. It will be necessary therefore, to apply pressure to the cam disk in the direction of rotation to permit the latch lever to seat and secure full disengagement. This will also be true on starting the motor under power if the clutch has been tripped during the off period. When the motor is operating under power the momentum of the rotating clutch insures full disengagement.

e. Perforating Mechanism

Action of the rocker bail cams during rotation causes the rocker bail (Figure 8) to apply longitudional motion to a drive link. The drive link connects with a rocker arm which is clamped to a toggle bail shaft in the perforating assembly. As the toggle bail (Figure 9) rocks, toggle links attached to the front and rear of the bail apply vertical motion to a punch slide post and horixontal motion to a punch slide reset bail. At the start of the perforating cycle, the punch slide reset bail withdraws from the shoulders on the punch slides and permits any slides that have been selected in response to code impulses to extend over the top of the punch slide post. These selected slides are carried upward by the post to force the punch pins through the tape. Unselected punch slides are retained in the unselected position by their latches and do not engage the post. Toward the end of the perforating cycle, the punch slide post returns to its lower position. The punch slides reset bail restores the punch slides to the unselected position and retains them there against the tension of their springs.

f. Tape Feeding

The tape emerges from a container on the base and changes direction at two points before entering a tape guide on approaching the perforating mechanism. From the tape guide, the tape passes between a feed wheel and a die wheel (Figure 9) which perforate the feed holes. A tape shoe holds the tape in contact with the feed wheel from where it passes into the die block for code perforation. A feed pawl attached to the toggle bail acts upon a ratchet wheel at one end of the feed wheel shaft and advances the tape subsequent to the perforation of each code combination. A detent (with roller) attached to the outer assembly plate rides the ratchet wheel and insures uniform spacing of the perforations.

g. Magnet Release Contact

A release contact (Figure 3) is located on a bracket directly above the inner main shaft bearing. It breaks the circuit to the selector magnets and the function magnet immediately after the start of the function cycle. The contact is caused to break by the action of a contact bail which rides a rocker bail cam.

h. Tape Feed-Out Metering

The metering mechanism (Figure 11) includes a metering eccentric on the main shaft, a feed pawl and a check pawl, a feed out magnet, a switch and a ratchet wheel assembly. The circuit connections can be so arranged as to permit the function magnet to be energized through the feed out magnet contact and the switch upon energization of the feed out magnet. A feed pawl and a check pawl extend from the main shaft and rest upon an extension of the feed out magnet armature immediately above two ratchet wheels. The eccentric rotates continuously with the main shaft and causes the feed pawl to perform a feeding motion. This motion is ineffective while the feed out magnet is unoperated.

(1) Energization of both the feed out magnet and the function magnet initiates the metering cycle. So long as the function magnet remains energized, the perforating mechanism will continue to feed out blank tape. With the control magnet armature held attracted the pawls will engage and act upon the ratchets. The

primary ratchet is advanced with each revolution of the eccentric but the cut of the teeth and the contour of the feed pawl are such that the secondary ratchet is advanced one step every sixth operation. An adjusting plate on the secondary rathcet (adjustable for a predetermined length of blank tape) rises to a position where it operates a switch lever which then removes pressure from the switch plunger to break the function magnet and feed-out magnet circuits. Release of the feed-out magnet armature lifts the pawls and permits the secondary ratchet wheel to be restored by a return spring to its starting position.

i. Verifying Reader Mechanism

(1) The verifying reader mechanism (Figure 12) forms a self-contained assembly attached to the forward end of the perforating mechanism from which tape is fed into it. Sensing slides which terminate as sensing pins at their upper ends hook under a guide at the lower end. Due to their individual springs, they exert pressure in an upward direction. The sensing slide guide is supported by plates which pivot at one end and which are linked to a bracket attached to the under surface of a toggle shaft. A toggle shaft arm (Figure 8) connects with the drive link which actuates the perforating mechanism as previously described. By this linkage, the motions of the perforating and verifying reader mechanisms are co-ordinated.

(2) Forward movement of the drive link (Figure 8) is extended through the toggle shaft, bracket and linkage to the sensing slide guide so as to draw the slides downward. While the slides are in their lower position the tape is advanced from the perforator. Rearward movement of the drive link permits the sensing pins to rise and assume positions determined by the code perforations in the tape.

(3) In order to transmit the code to the required area of the system for verification, a contact bank is located at the forward end of the mechanism. Six contact screws are connected to a common circuit lead. Six contact levers act as circuit elements and are connected to individual wires which, with the common lead, are cabled to terminal facilities on the base unit. The horizontal portions of the contact levers align, at the rear ends, with insulated portions of the five sensing slides and one universal slide. When the sensing slides are in the downward position or when they rise against unperforated portions of the tape they hold the contacts open. When the sensing pins of the slides pass through perforations the associated contacts close. The universal contact closes on every operation.

3. BASE

The base (Figure 1) is a flat sheet metal plate having four feet, two handles and mounting facilities for the reperforator unit, the motor unit, a tape container, a power switch, circuit terminal blocks and connectors.

The tape container is equipped with a tape-out switch and tape lever which close the circuit to a warning device when the supply of tape becomes depleted.

4. MOTOR

The 3600 RPM (two pole), single phase, capacitor start, synchronous motor is located at the rear of the base. A combination hand wheel and fan is mounted on one end of the motor shaft. A motor starting relay and capacitor, together with a thermal cutout switch are mounted in a compartment on the underside of the motor. The thermal cutout switch (manual reset) is arranged to de-energize the motor if an overload should continue long enough to overheat the motor windings. A resilient mount on each end bell hub isolates the motor from direct contact with the cradle which supports it. Thus, the vibration transmitted to the base is reduced.

SECTION 3

FIGURES
FOR
SECTIONS 1 AND 2

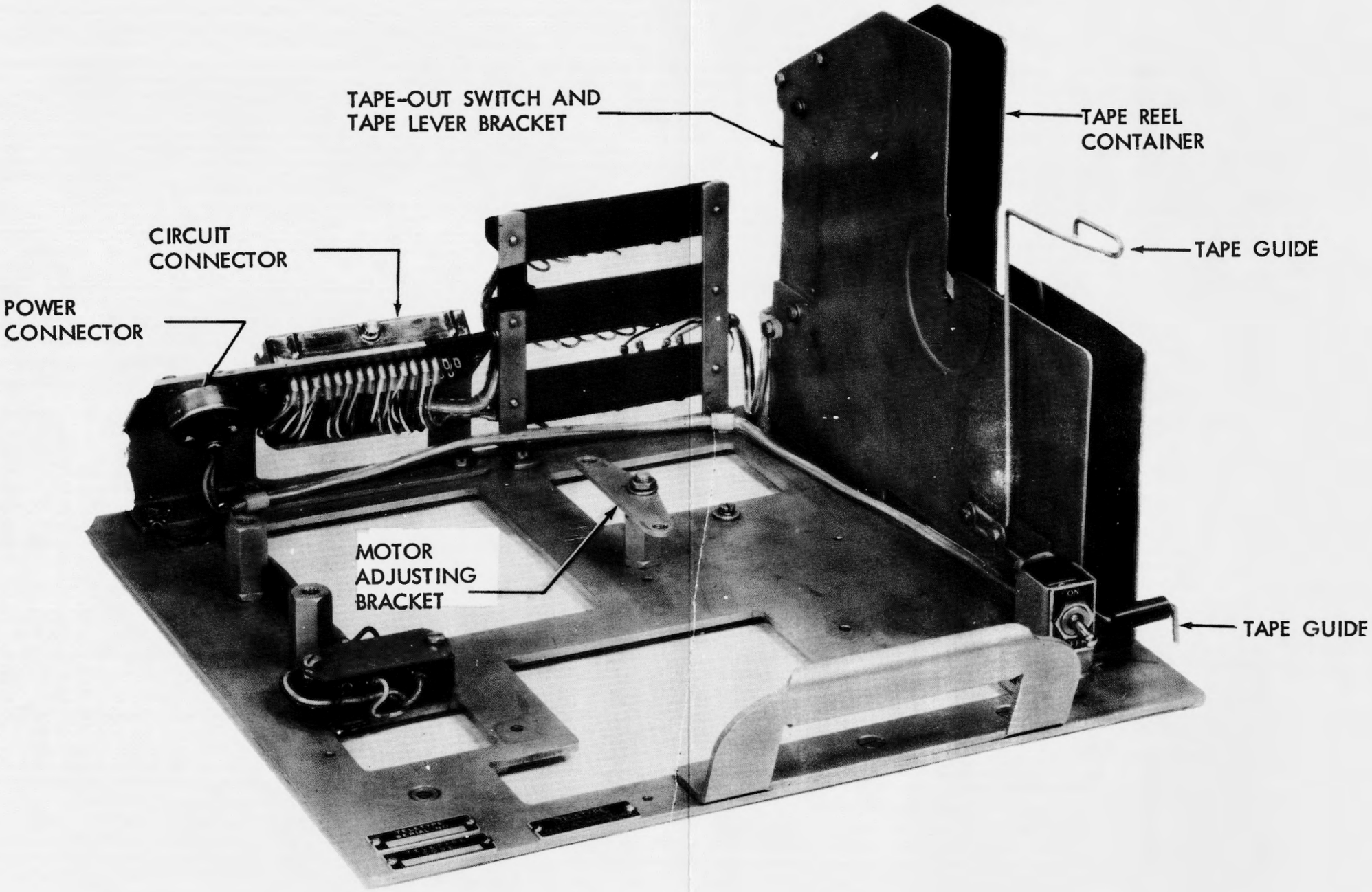

FIGURE 1, BASE

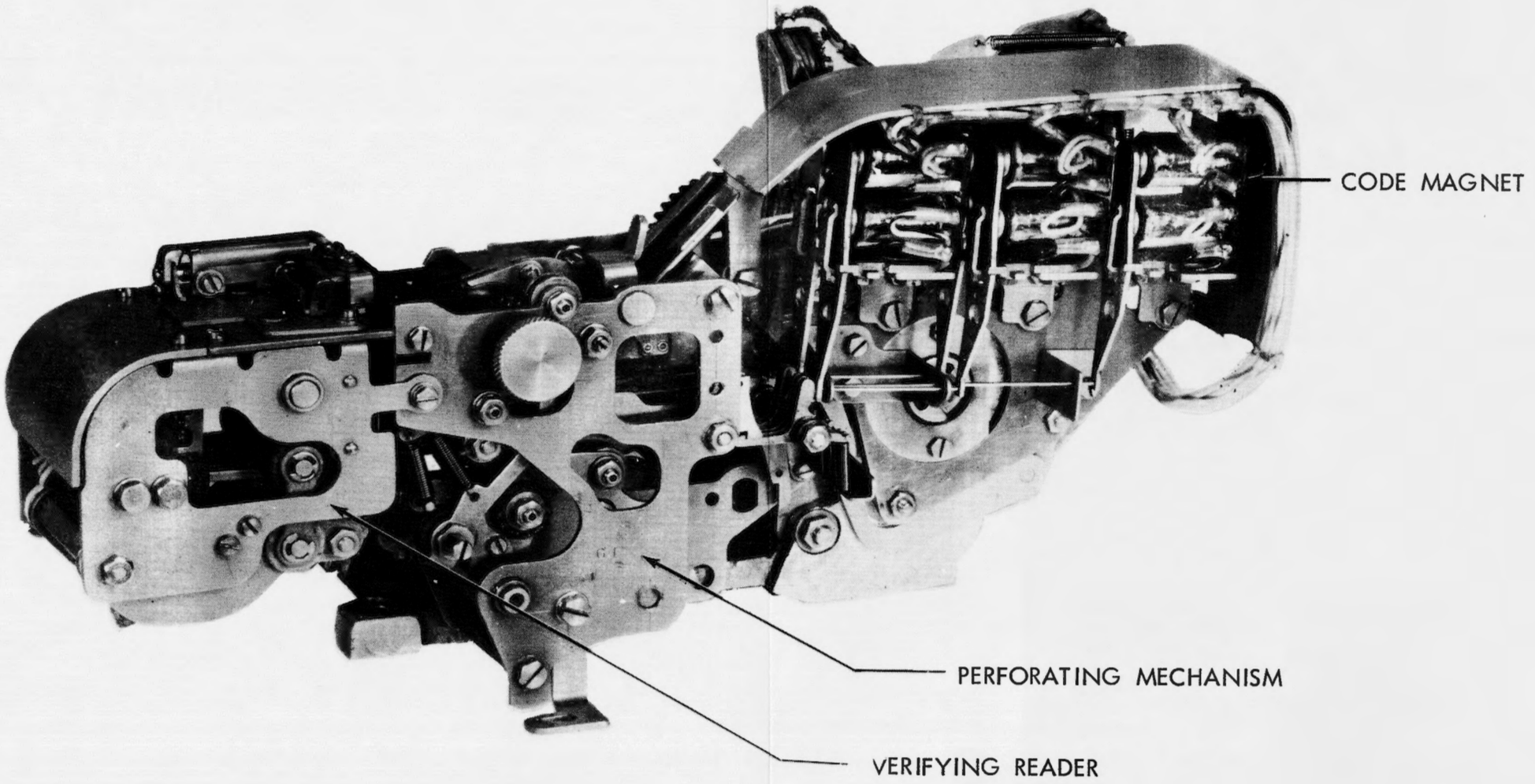

FIGURE 2, PERFORATOR UNIT

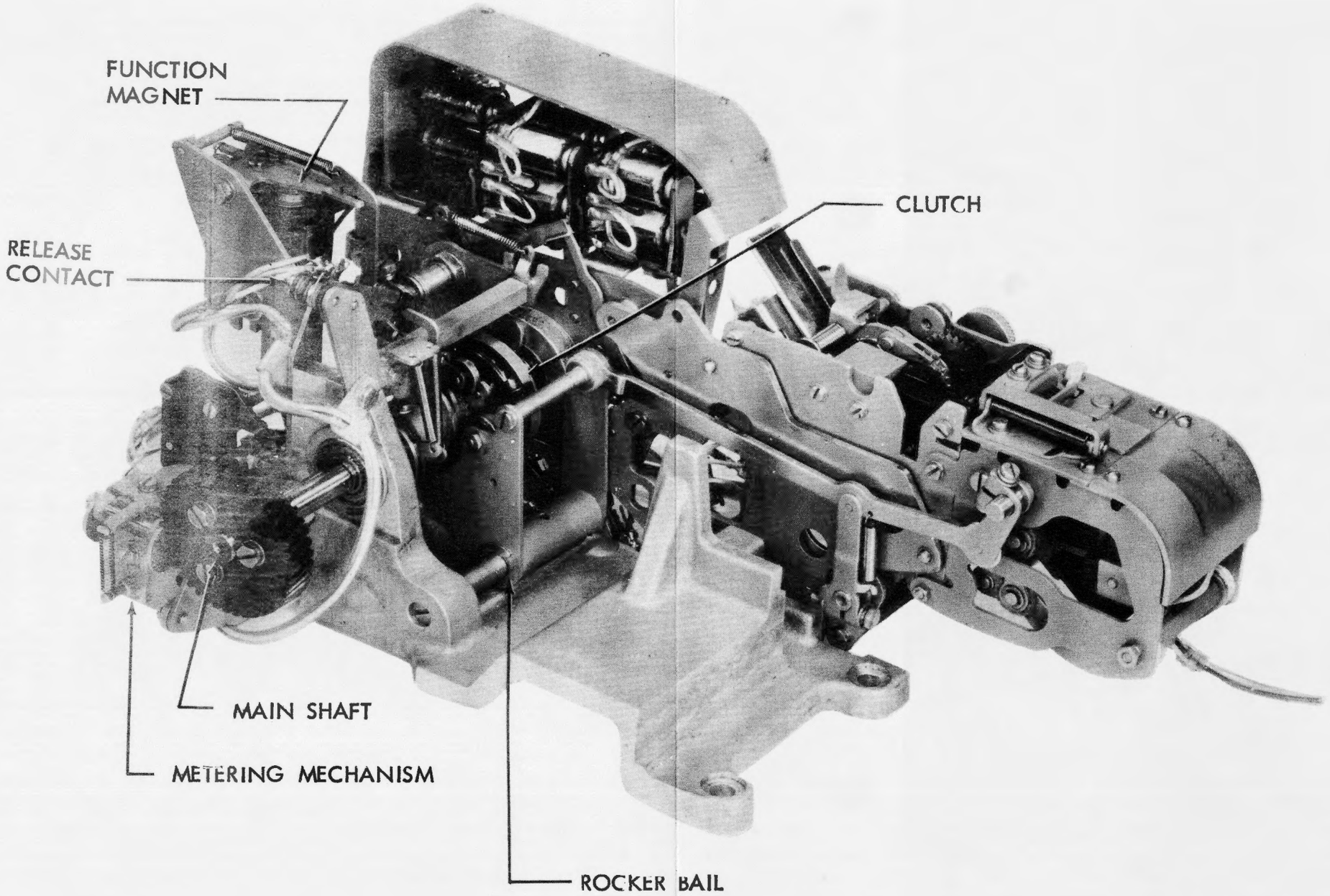

FIGURE 3, REPERFORATOR UNIT

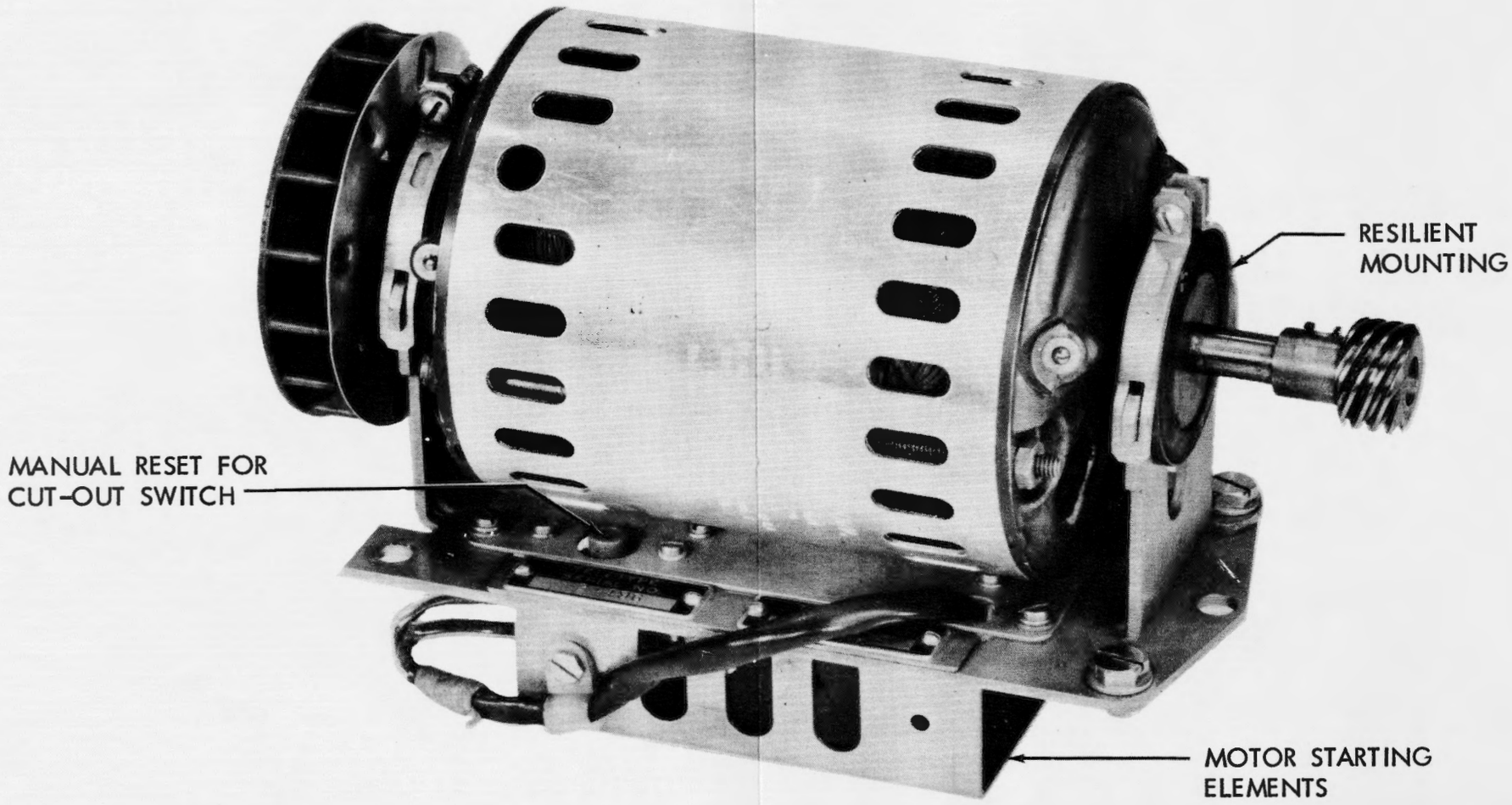

FIGURE 4, MOTOR UNIT

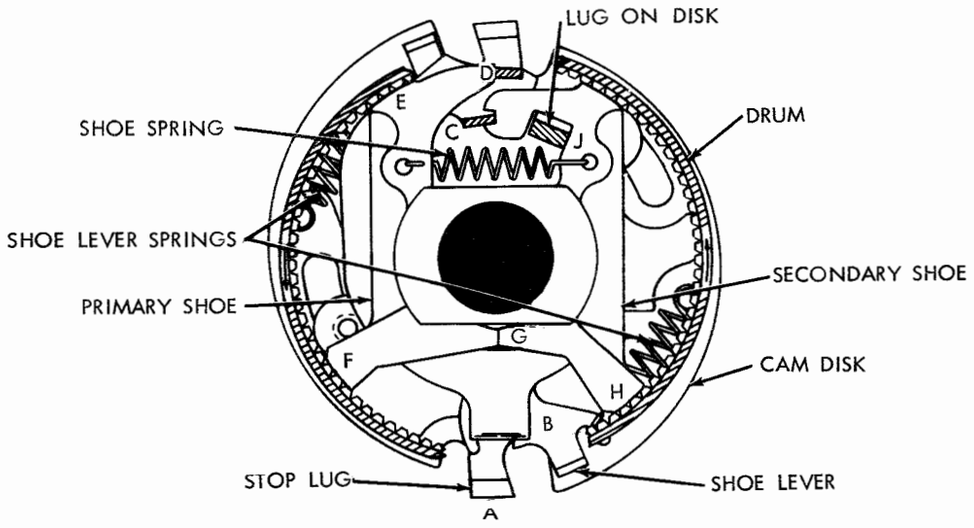

FIGURE 5. CLUTCH ENGAGED

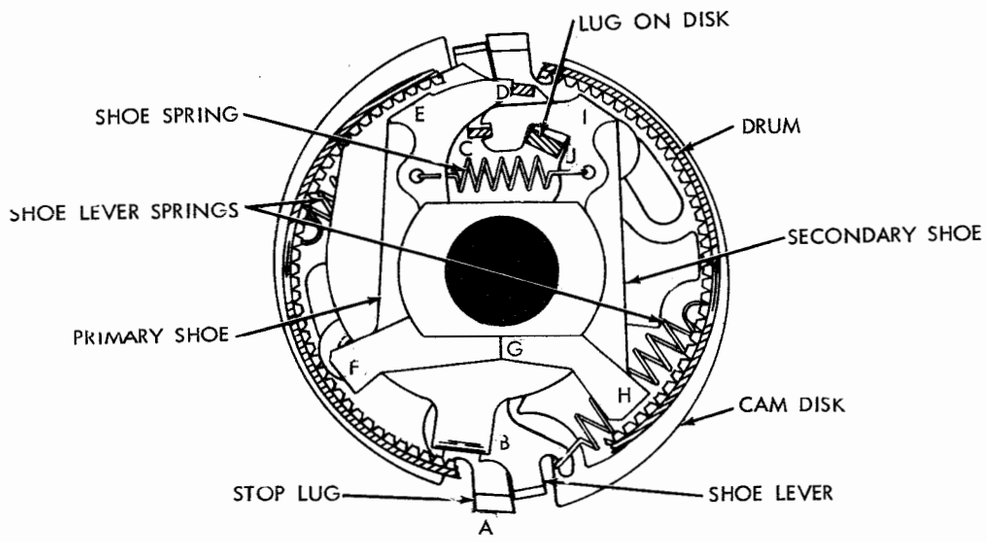

FIGURE 6. CLUTCH DISENGAGED

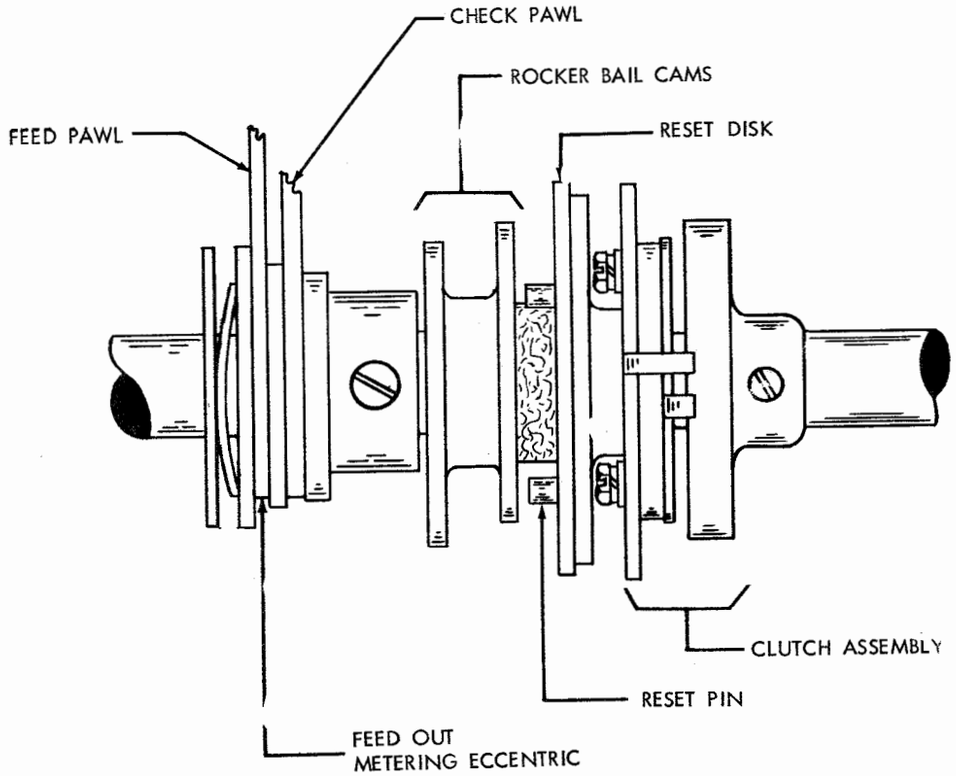

FIGURE 7. MAIN SHAFT

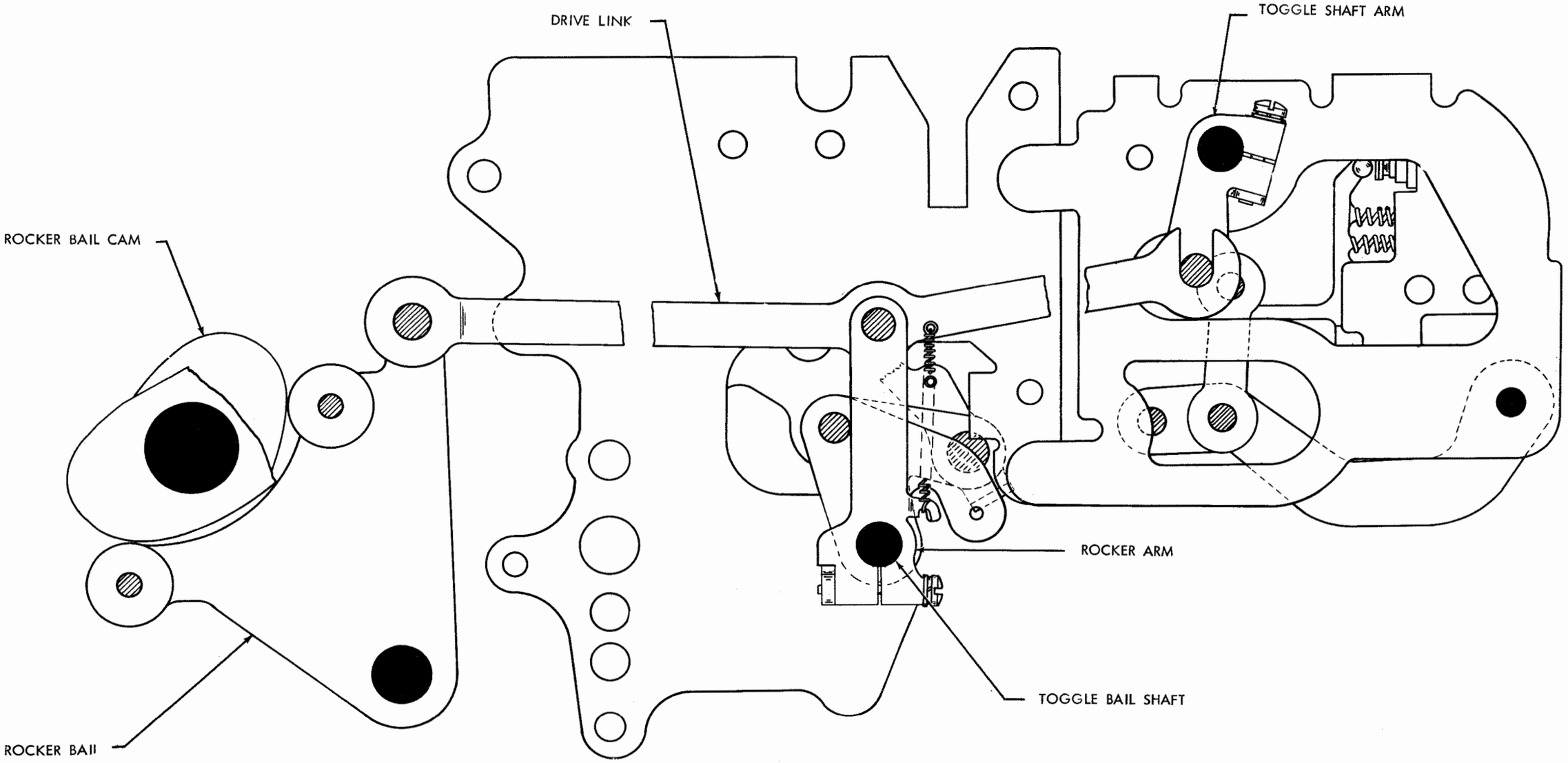

FIGURE 8. ROCKER BAIL CONNECTIONS

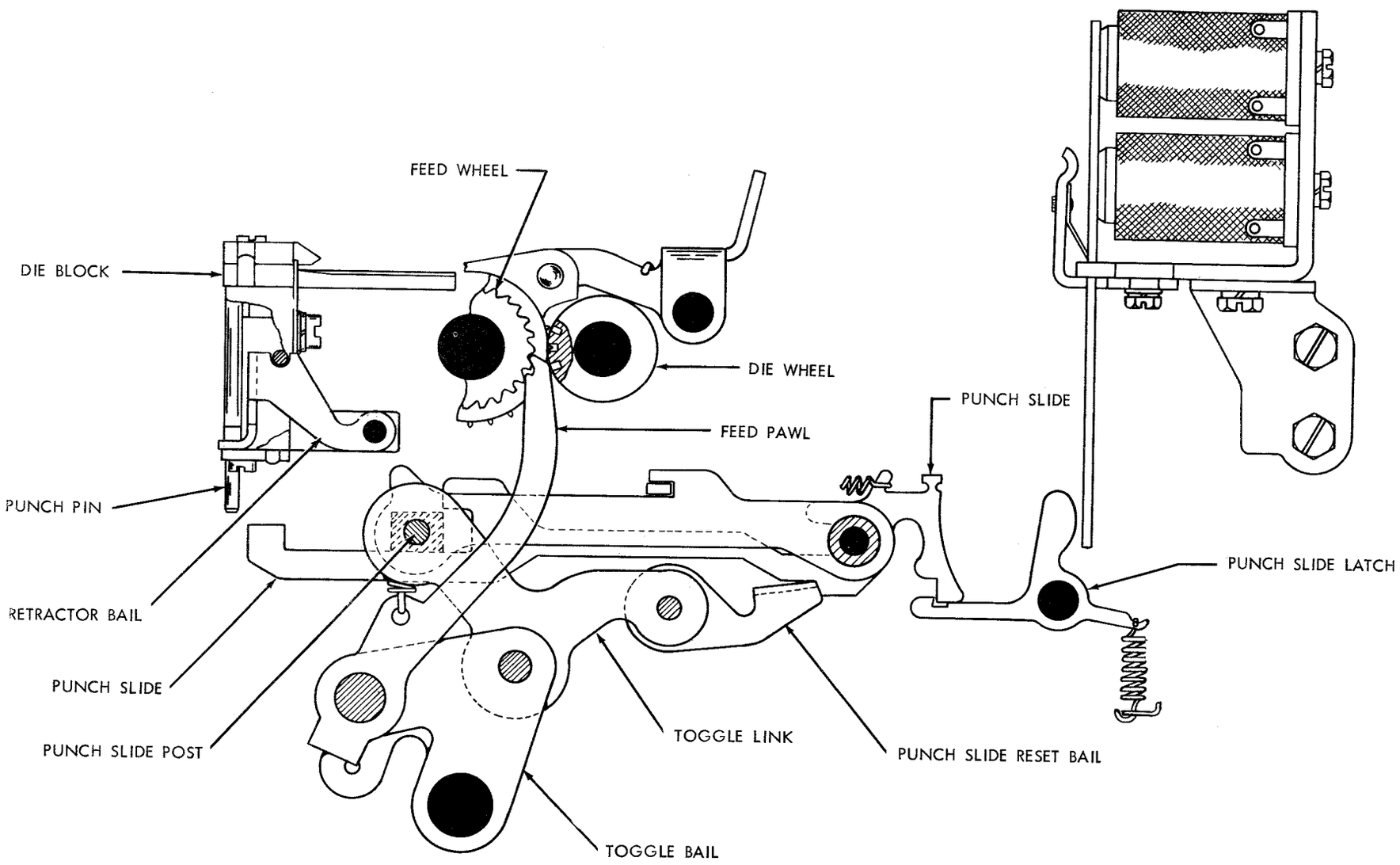

FIGURE 9. PERFORATING MECHANISM

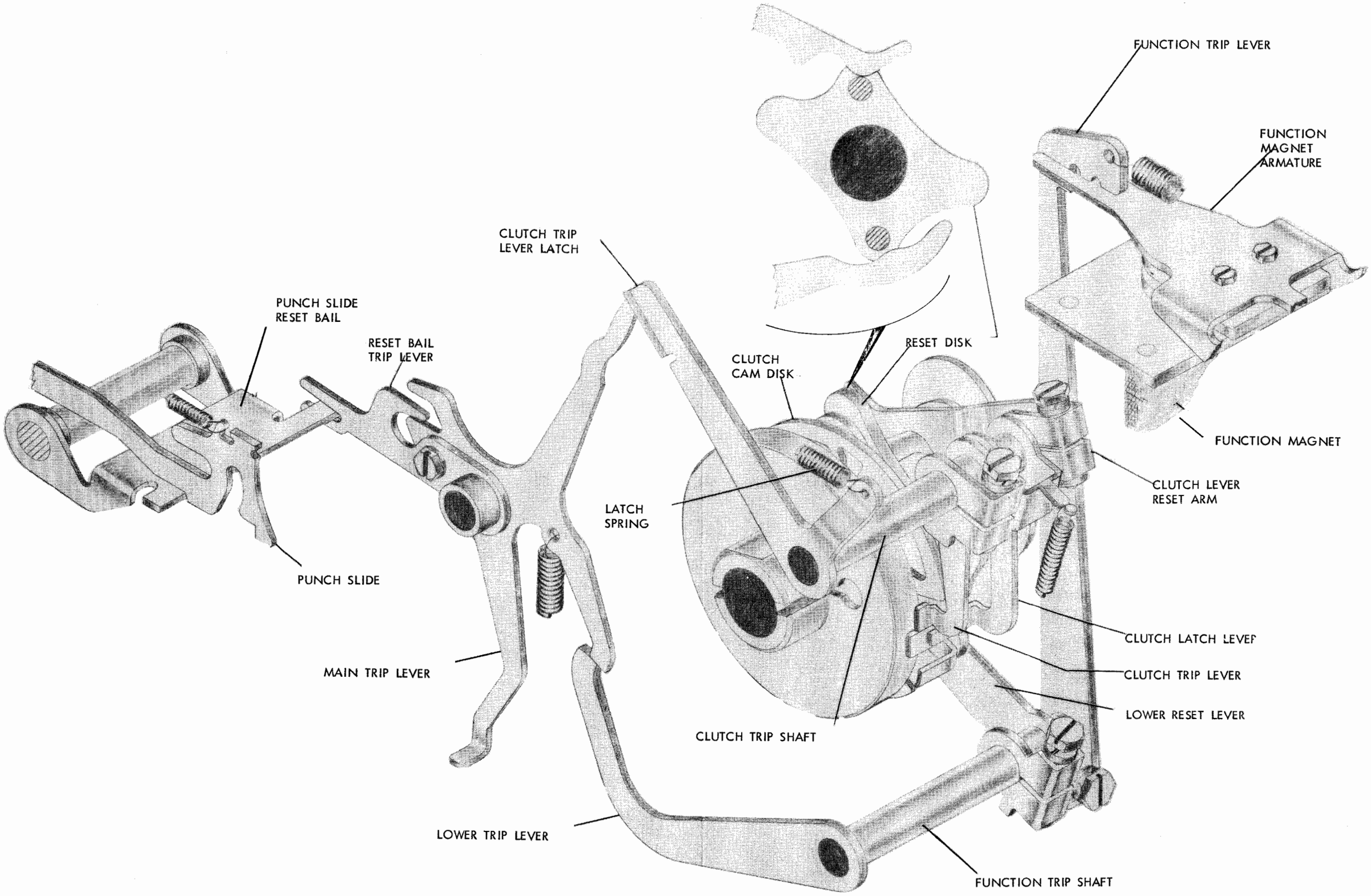

FIGURE 10. FUNCTION TRIP MECHANISM

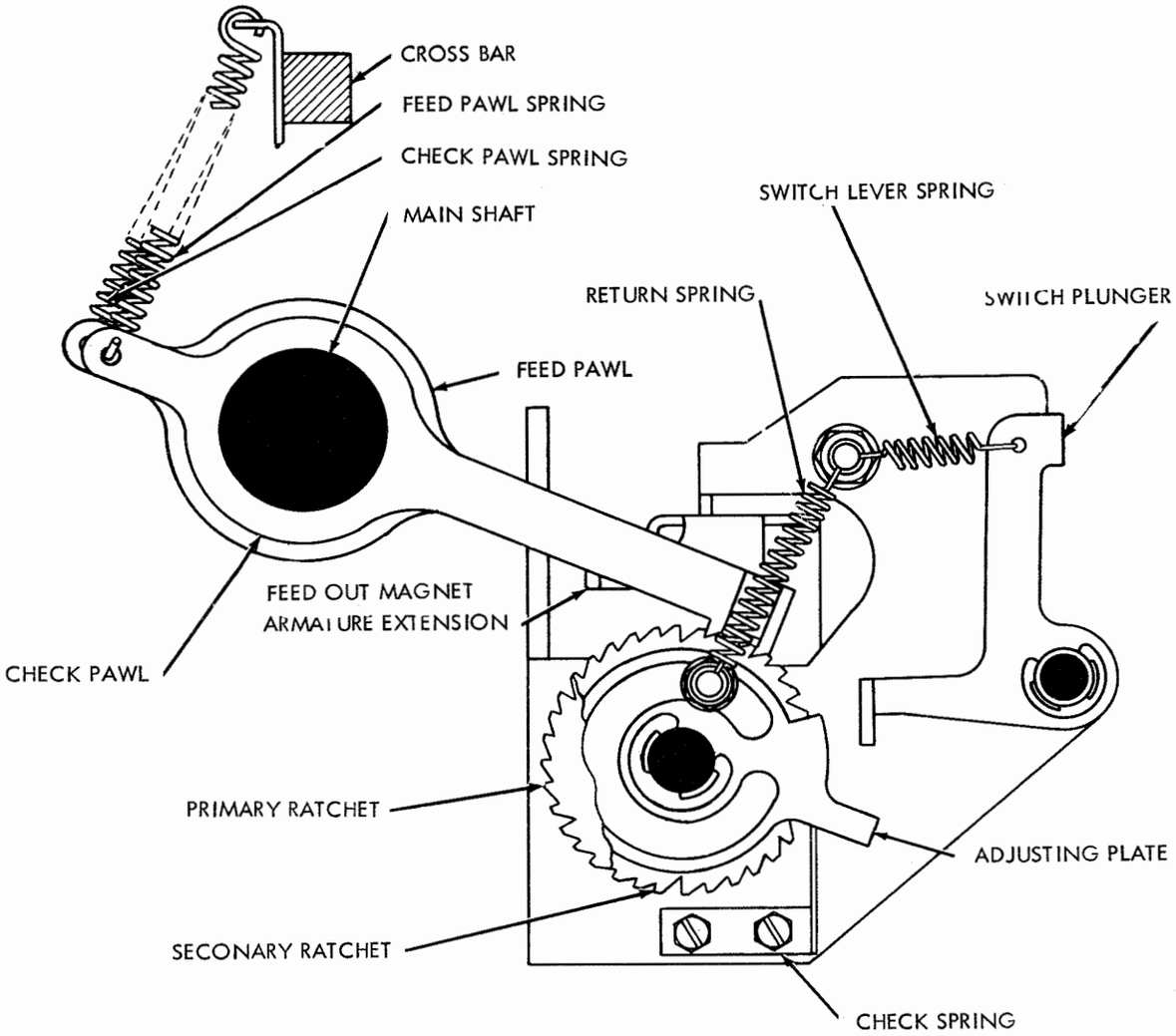

FIGURE 11. METERING MECHANISM

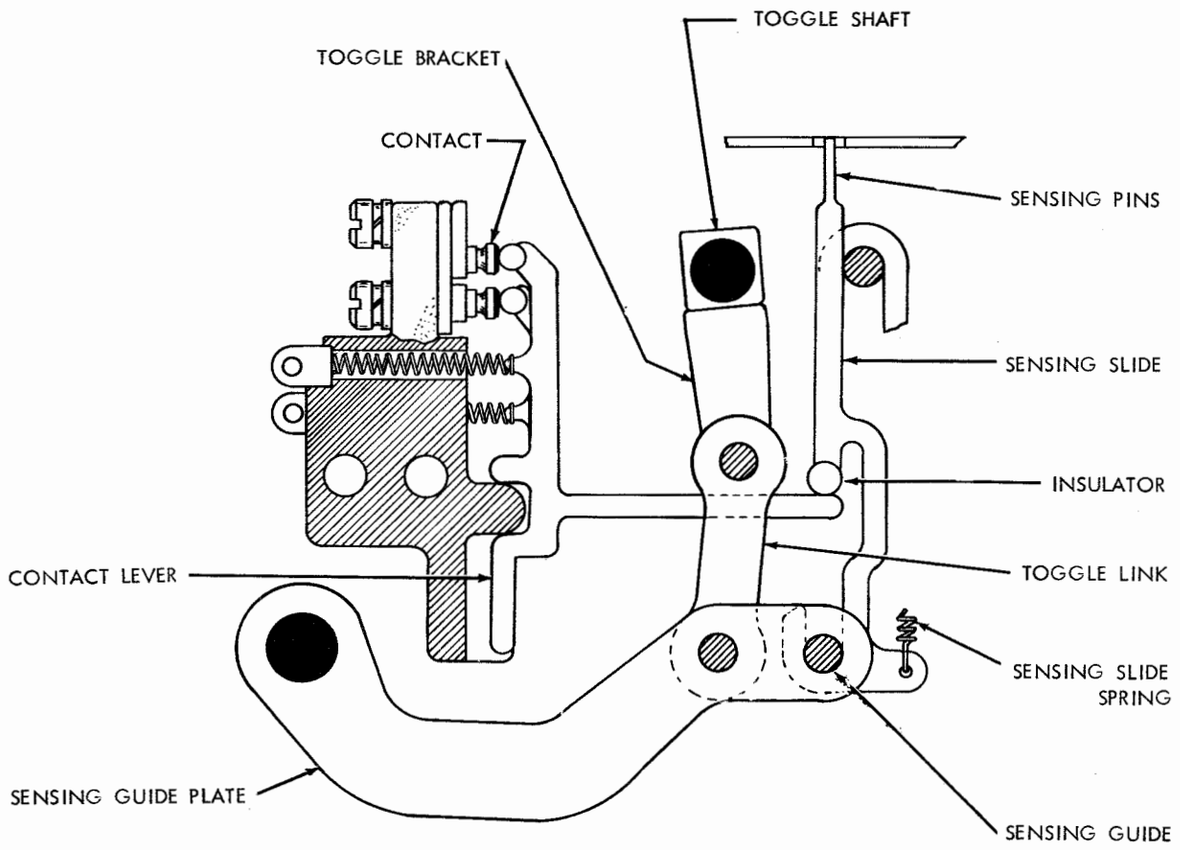

FIGURE 12. VERIFYING READER MECHANISM