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Colin Hinson

In the village of Blunham, Bedfordshire.

No. 85 TELEPRINTER PRINTING REPERFORATOR

ADJUSTMENT AND MAINTENANCE INSTRUCTIONS

(Issue No. 3 — March, 1953)

Creed & Company Limited

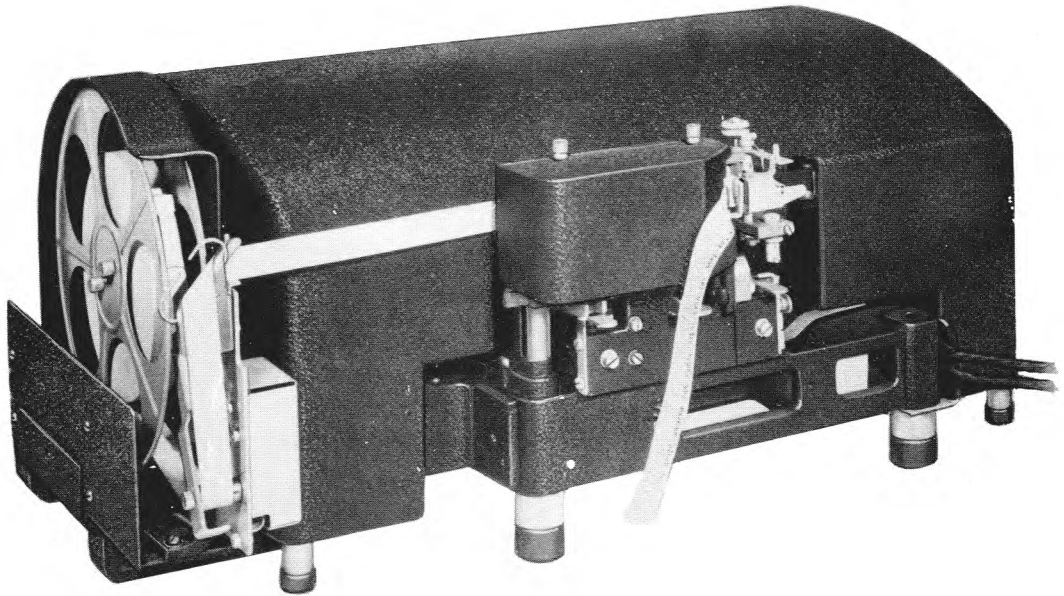
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THE No. 85 TELEPRINTER PRINTING REPERFORATOR.

No. 85 PRINTING REPERFORATOR

FOREWORD

This issue of Booklet No. 85 provides a complete set of adjustment instructions for the No. 85 Printing Reperforator. It also contains dismantling, assembling and lubrication instructions for all units on the No. 85 Reperforator which differ in any way from units on the No. 7 Teleprinter.

For an account of the theory of operation of the No. 85 Reperforator, reference should be made to Bulletin No. 23.

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ADJUSTMENT INSTRUCTIONS

NOTE: Do not touch the abutment screws. These are set to gauge in the factory and once they have been slackened cannot be readjusted without returning the unit to the makers.

A. OPERATING MAGNET AND CAM UNIT

1. OPERATING MAGNET (Figs. 1 and 3)
 - 1.1 Disconnect the operating magnet link. Loosen the clamp screw A (Fig. 3 for magnet unit S.1832B, Fig. 1 for magnet unit S.2848A), thereby releasing screw B.
 - 1.2 With no current in the operating magnet windings, adjust the field unit by means of the screw B, so that the force required to move the armature from side to side, measured in front of the armature stop plate, is the same for both directions.
 - 1.3A For Magnet Unit S.1832B. This should be between 8 and 12 ozs. (227 – 340 grams).
 - 1.3B For Magnet Unit S.2848A. Adjust the field strength by means of the knurled screw F, Fig. 1, until this force is
 - (a) 9 – 11 ozs. (255 – 312 grams) for double-current operation; and
 - (b) 7 – 9 ozs. (198 – 255 grams) for single-current operation.
 - 1.4 Tighten clamp screw A.
2. RECEIVING CAM SLEEVE
 - 2.1 Check that the cam sleeve rotates freely but without sufficient end play to be detected by hand. A more accurate measurement of the end play may be made by turning the machine by hand until the bellcrank lifting lever is fully operated, i.e. pressing on the tails of the bellcranks. In this position the cam sleeve is held by the bellcrank springs to the rear of the machine. The end play may now be measured between the cam sleeve and front thrust washer. This should not exceed .0015" (.038 mm.). If necessary, obtain this condition by adjusting the rear bearing adjusting nuts.
 - 2.2 Check that the pawls engage with their ratchets with a clean, lively action, and independently of one another. If this is not the case, check that the pawls are not distorted and that there is no dirt or grease causing the condition.
3. FINGER SETTING BLADE (VERTICAL ADJUSTMENT) (Fig. 4)

N.B.: If it is necessary to alter this adjustment, then adjustments 4 and 5 will also require attention.

 - 3.1 Check that the trip shaft is free in its movement but has a minimum amount of end play.

- 3.2 Connect the armature link, move the armature to the spacing position and commence to turn the machine slowly by hand. Immediately after the receiving cam is released, return the armature to the marking position and continue to turn until the blade H, Fig. 4, is just in contact with the setting pin G in front of the middle finger.
 - 3.3 Slacken screw E which clamps the trip shaft lever F to the trip shaft D. Adjust the height of the blade so that the centre of the blade strikes across the centre of the pin, ensuring, at the same time, that the armature is held to the marking stop while the trip shaft is being reset. Clamp screw E.
 - 3.4 Move the armature to the spacing stop, and continue to turn the machine by hand. Check that the blade H clears the pin G.
4. PILOT CAM DETENT (Fig. 5)
- 4.1 Slacken screw B. Slide plate assembly C along the trip shaft D until the clearance between the plate R and the screwhead Q is .010" – .020" (.25 – .51 mm.), i.e. dimension 'b'.
 - 4.2 With the armature held against the spacing stop, adjust the plate assembly radially on the trip shaft so that the pilot detent lever E clears the lug on the pilot cam A by
 - (a) .009" – .012" (.23 – .30 mm.) on receivers fitted with magnet unit S.1832B;
 - (b) .014" – .016" (.36 – .41 mm.) on receivers fitted with magnet unit S.2848A.
5. REACTION ON ARMATURE (Fig. 6)
- 5.1 Disconnect the biasing spring if it is in use. Then, if the operating magnet is adjusted to have no magnetic bias with the operating magnet link removed (see adjustment 1), it should require equal but slightly reduced forces to move the armature in each direction when the operating magnet link is replaced.
 - 5.2 If these forces are unequal, remove screws K and the upper blade guide. Apply a twist and/or set to the striker blade between the point L and the pivot, to equalise the forces.
 - 5.3 Check that the reaction of the blade does not reduce the force required to move the magnet armature by more than 2 ozs. (57 grams) in either direction.
6. RECEIVING CAM DETENT (Figs. 7 and 8)
- 6.1 Remove the gear cover. Set the sliding frame of the orientation device to mark 50 on the scale. Rotate the receiving cam until the pawls are fully engaged by the detent G, Fig. 8. Withdraw the detent from the pawls, allowing them to drop into engagement with the cam ratchets.

- 6.2 Slightly release the screw which holds the abutment lever E. Lift the sickle lever B, Fig. 7, clear of the lug on the retaining ring C and place a pin A of diameter .047" - .053" (1.19 - 1.35 mm.) between the lever and the lug, ensuring that the pin rests in the middle of the lug. Hold the pin on the retaining ring by pressing with one finger on the sickle lever.
- 6.3 By means of the screwdriver adjustment F, take up any play between the pawls D and the face of the detent G. Tighten the clamping screw and remove the pin A.

7. RETENTION LEVER (Figs. 9 and 10)

- 7.1 Disengage the detent from the pawls and rotate the cam slightly so that a spring balance may be applied to each pawl engagement face. It should require 3 - 4 ozs. (85 - 113 grams) to press the pawls back against the cam seating.
- 7.2 Complete the rotation of the cam until it is arrested by the detent. Slightly loosen nut L which holds the eccentric M. Depress the pawls by means of the thin blade of the Adjustment Tool TA.1123 provided in the tool kit, in the direction of the arrow, Fig. 9, and adjust the eccentric until an estimated clearance of .002" - .004" (.05 - .10 mm.), i.e. dimension 'e', is obtained between the pawls and the detent, without moving the cam. Tighten nut L, Fig. 10.

8. FINGER SETTING BLADE (HORIZONTAL MOVEMENT) (Figs. 6 and 11)

- 8.1 Turn the machine by hand and move the armature so that the blade strikes the pin, setting the five fingers in turn.
- 8.2 Slacken screw S, Fig. 6, and alter the position of the finger setting blade in relation to its cam lever, so that the clearance 'f', Fig. 11, between the fifth finger and either the stop plate or the resetting link, whichever is closer to the fingers, is .003" - .020" (.08 - .51 mm.). Clamp screw S.

9. SETTING PIN (Fig. 6)

- 9.1 Slacken the clamping screw O. Adjust the position of the setting pin P by sliding the bearing springs along the traversing link, so that the pin is central with each finger when it is at the fully set position. Tighten screw O.
- 9.2 Check that, in any selecting position, there is no danger of the pin fouling an adjacent unselected finger as it withdraws from pushing a finger forward.
- 9.3 Check also that, when the pin is pushed forward to its farthest extent, it will return freely. If it does not, make sure that it is horizontal and not fouling the edge of the slot in the traversing link.

Failure of the pin to return freely may cause distortion of the fingers and the finger block.

10. FINGER SPRINGS (Figs. 11 and 12)

- 10.1 Remove the righthand ribbon bracket. Rotate the machine by hand until the fingers are fully lowered. Remove the traversing link. A force of 3–5 ozs. (85–142 grams) should be required to set each finger inwards when applied in the direction of the arrow in Fig. 11.
- 10.2 If this condition is not satisfied, the springs should be checked. Place each spring on a flat surface so that its ends are touching the surface (see Fig. 12(b)). A force of 8–9 ozs. (227–255 grams) should be required to depress the centre flat. Replace the finger springs in the manner shown in Fig. 12(a). Replace the traversing link.

11. FINGER LIFT (Figs. 13 and 15)

- 11.1 Turning the machine by hand, set up the N combination, i.e. – 3 4 –. Continue turning until the fingers are in their uppermost position and the selected bellcrank has dropped into the slot in the discs.
- 11.2 Check whether the clearance between the bellcrank and the lefthand side of the slot (viewing the slot from the bellcrank lifting collar end of the combination head) is greater than .012" (.30 mm.) and between the bellcrank and the righthand side of the slot is greater than .006" (.15 mm.). If not turn the cam until the fingers are lowered. Release the clamp screw H, Fig. 13, and adjust the finger lift by means of the eccentric B.
- 11.3 Clamp the screw H and repeat the test until the correct adjustment is obtained. Check that the top of the square section at the lower end of the comb finger plunger clears the underside of the comb setting finger block, when the fingers are fully raised, by at least .006" (.15 mm.).
- 11.4 Turn the machine by hand and set up an all spacing combination. Continue to turn until the bellcrank lifting lever has just released the combs and the comb extensions have dropped. Slacken screw M, Fig. 15, allowing the comb stop plate N to drop. Raise the plate until the lower edges of the slots touch the undersides of all the comb extensions. Continue to raise the plate slightly to take up the weight of the extensions, and tighten screw M. Replace the righthand ribbon bracket.

12. FINGER RESETTING (Figs. 11 and 14)

- 12.1 Remove the transfer rocker bracket and the typehammer unit. Slacken the screws AF, Fig. 14. Adjust the plate AG so that, when the fingers are reset, there is a minimum gap of .015" (.38 mm.) between the fingers and the ends of the comb extensions, i.e. dimension 'g', Fig. 11.

12.2 Check that, when the fingers are fully reset, they have a further movement of at least .005" (.13mm.), i.e. dimension 'e', Fig.14. Replace the typehammer unit.

13. BELLCRANK LIFT (Figs. 15 and 16)

13.1 Set up the N combination on the fingers (– – 3 4 –), thereby allowing the top bellcrank to fall. Loosen clamping screw E, Fig. 16. With the bellcrank lifting lever on the straight part of the cam track, adjust the bellcrank lifting lever eccentric D to give a clearance of .006" – .008" (.15 – .20 mm.), i.e. dimension 'j', Fig. 15, between the fallen bellcrank A and the lifting collar B. Clamp the screw E, Fig. 16.

13.2 With the bellcranks fully lifted, lift each comb extension to see that the combs are free and return snappily under the action of their springs.

13.3 The force required to lift each bellcrank, applied at the typehead end, should be between 1 and 1¼ ozs. (28 – 50 grams).

B. PRINTING MECHANISM

14. TYPE RETAINING SPRINGS (Figs. 17 and 18)

14.1 Check that a force of 7 – 8 ozs. (200 – 255 grams), applied to a type in the direction of the arrow in Fig. 17, at the three positions marked in Fig. 18, will move the type 1/8" (3.18mm.) from its rest position.

14.2 If, at any point, the force required to move the type is too low, measure the tension of each spring. To extend each spring from 5/8" to 27/32" (15.87 to 21.43mm.) should require a force of 9 ozs. (255 grams).

14.3 If the force required to move the type is too high, it may be due to a bent type, bent type racks, rough edges or dirt.

15. TYPEHEAD SUPPORT BRACKET (Fig. 17)

15.1 Check the amount of play between the face of the bearing bush in the bracket G and the shoulder on the typehead spindle F, i.e. dimension 'l'.

15.2 If this does not lie between .001" – .005" (.03 – .13mm.), add or remove shims at L until the correct end play is obtained. Not more than seven shims should be required.

16. TYPEHAMMER UNIT (Figs. 19 and 20)

16.1 Set up the N combination (– – 3 4 –) on the fingers, turn the machine by hand until the N bellcrank has fallen and then latch the typehead on this bellcrank.

16.2 Check the clearance 'k', Fig. 20, between the platen J and the face

N.B. The height of the transfer rocker bracket H is adjusted in the factory by means of the screws C. These are painted red and should not be touched

D. PERFORATOR UNIT

N.B. All the adjustments in this section are described viewing the perforator from the rear of the teleprinter.

22. LOCATION OF UNIT (Figs. 26 and 27)

N.B.: This adjustment should be performed only when a different perforator unit is fitted to the machine, at major overhauls, or when any of the parts affecting the adjustment are changed. It should not require attention at routine maintenance visits.

22.1 Replace the control unit on the machine and replace the transfer rocker assembly. Remove the setting arm rack and guard plate K, Fig. 26, from the perforator unit and assemble the unit to the main base, leaving the fixing screws N loose.

22.2 Release screw R, Fig. 27, and move the punch return frame D to its maximum position away from the punching levers.

22.3 Turning the governor by hand, set up a 'Letter Shift' combination, i.e. five marks, on the selecting fingers, and continue to rotate the machine to the stop position, i.e. so that the combs have dropped to their selected positions and the fingers are clear of the combs.

22.4 Slowly raise the perforator unit until the transfer push rods G, Fig. 26, depress the setting levers O, thereby moving punching bars J until they are in the bottom of the rack I. Continue to move the unit upwards until a gap appears between each pair of setting levers of .003" - .012" (.08 - .30 mm.), i.e. dimension 'c'.

22.5 Ensure that the unit is square on the machine and tighten fixing screws N. Turn the machine by hand until the fingers and combs are at maximum lift. Adjust abutment screws M to bear against abutment plates L, and ensure that there is a minimum clearance of .003" (.08 mm.), i.e. dimension 'b', Fig. 26, between the upper edge of the slot in the push rods and the upper surface of the lower rack F. Lock with locknuts on abutment screws M.

22.6 Turn the machine by hand until the comb extensions are in their lowest position. The setting lever spring should then take control and disengage the punch bars from the punching levers, i.e. the punch bars should move to the non-punch position. Remove the unit from the machine and replace the setting arm rack and guard plate K, ensuring that the setting arms are free to move and do not foul the guard plate when the setting levers O are depressed. Remove the transfer rocker assembly. Replace the typehead, typehead support

bracket, typehammer overthrow stop, typehammer, transfer rocker assembly and righthand ribbon bracket. Replace the perforator unit.

23. RETENTION LEVER (Fig. 27)

N.B.: This adjustment should be checked when the machine is overhauled, or when any of the parts affecting the adjustment are changed but should not require attention at the routine maintenance visits.

23.1 Ensure that the retention lever L, Fig. 27, is retaining the camshaft in its rest position by turning the camshaft in a clockwise direction until arrested.

23.2 Release nut U and, by means of eccentric V, adjust the rest position of the camshaft so that the nose of the resetting lever S is resting on the top of the reset cam T, the fall-away faces of both cam and lever being .020" - .030" (.51 - .76 mm.) apart from each other, i.e. the fall-away face of the lever must be approximately coincident with the commencement of the flat on the periphery of the reset cam. Lock nut U.

24. PUNCH RETURN FRAME (Figs. 27 and 28)

24.1 With the machine in the stop position, i.e. with the receiving cam pawls arrested by the detent, and with screw R, Fig. 27, loose, withdraw lever S clear of the cam T.

24.2 Loosen screws I, Fig. 28, so that the feed sector J is free to move. Ensure that the camshaft K is being retained by the retaining lever L. (This can be done by turning the camshaft clockwise by hand, when it will be arrested by the lever L).

24.3 Press the punch return frame D, Fig. 27, against the punching bars and, at the same time, push in the lever S until it touches the cam; then turn the perforator camshaft anti-clockwise by hand until the fall-away face of the cam is beyond the fall-away face of the resetting lever S. Tighten screws I, Fig. 28, and screw R, Fig. 27. (This adjustment ensures that the punching bars are fully withdrawn by the punch return frame, and that the resetting lever does not bear too hard on the reset cam).

25. RESETTING LEVER STOP (Fig. 22)

25.1 Loosen screw C, Fig. 22, and move the plate B to the right so that the pin X is well clear of the lever S. Rotate the camshaft by hand until the punch return frame D is moved to the maximum righthand position by the punching levers.

25.2 Adjust plate B so that the pin X is clear of lever S by .003" - .005" (.08 - .13 mm.) (one thickness of tape). Clamp screw C.

26. PUNCHING BAR RACK (Fig. 29)

- 26.1 Turn the machine by hand and set up an 'All Space' combination. In this condition, all the bars will be in the forward position, with the exception of the feed hole punch bar.
- 26.2 Slacken the screws B and move the rack A so that it is as far away as possible from the punch bars.
- 26.3 Move the rack to the rear until the punch bars just clear the bottom of the slots in the rack. Check on all bars. Tighten screws B. (This adjustment ensures that the punch bars can move freely and have adequate engagement with the punches).

27. PUNCHING DEPTH (Figs. 22, 28 and 31)

- 27.1 Slacken screws I, Fig. 28, turn the machine by hand and select the letter shift combination. This will set the punching levers in the marking or back position.
- 27.2 With the machine in the stop position, loosen screws D and E, Fig. 31, and screw F, Fig. 22. Move the whole punching cam assembly to the left as far as it will go.
- 27.3 Insert a length of tape in the punching head and turn the punching camshaft by hand until the top punching bar is moved to the right as far as it will go. In this condition and without moving the camshaft, move the complete punching cam assembly to the right until checked by the punch abutting against the paper.
- 27.4 Continue to turn the punching camshaft by hand until the punches are withdrawn. Measure the gap between the righthand edge of the lower plate and the mounting pillar E, Fig. 22, i.e. dimension 'd'. Move the punching cam assembly to the right until this gap is reduced by .010" - .015" (.25 - .38 mm.). Clamp screws D and E, Fig. 31, and screw F, Fig. 22.
- 27.5 Turn the punching camshaft by hand, causing the punches to penetrate a length of tape inserted in the punch head. Feed out the tape and observe whether the feed hole is cleanly cut and the lids not torn at the point where they hinge to the paper. The correct adjustment is with the minimum penetration of the feed hole punch, as the message punches, being slightly longer, will penetrate further. The message holes must be in the same condition as the feed hole.
- 27.6 If any of these conditions is not satisfied, adjust the punching cam assembly again, using the gap between the lower plate and the mounting pillar E, Fig. 22, as a measure of the depth of punching.

28. FEED PAWL OVERSHOOT STOP (Figs. 28 and 31)

- 28.1 Loosen screw I, Fig. 31, and move pin M, Fig. 28, away from the cam as far as it will go. Rotate the machine by hand until the striker

pin is opposite the fifth finger and the striker blade is fully forward.

28.2 Exert a slight pressure on the punching camshaft in a clockwise direction to ensure that the shaft is being arrested by the retaining lever L, Fig. 28. Maintaining this pressure, place the feed pawl N so that it is fully engaged in the bottom of the cam tooth nearest the overshoot stop pin M. Hold the pawl in place, move the pin M until it touches the nose of the feed pawl N and tighten screw I, Fig. 31.

29. CAM DRIVING SECTOR (Figs. 28 and 30)

29.1 Withdraw the feed pawl N, Fig. 28, from the pin M until a .004" (.1mm.) feeler gauge (permissible thickness is .003" - .005" (.08 - .13mm.), i.e. dimension 'e') can be inserted between them.

29.2 Simultaneously exert the following pressures with the left hand:-

(1) With the forefinger, exert a clockwise pressure on the punching camshaft (arrow F, Fig. 30).

(2) With the second finger at the back of the cam driving sector J, urge the sector in a clockwise direction (arrow G, Fig. 30), thereby holding the feeler gauge against the pin M.

(3) With the thumb, press the trunnion O to the right, thereby urging the feed lever dog P as far as it will go to the right (arrow H, Fig. 30).

29.3 Maintaining these three conditions, tighten screws I, Fig. 28.

N.B.: The purpose of the method of pinching together the driving sector J, the trunnion O and the feed lever dog P, described in 29.2 above, is to take up all the backlash in the system, viz.:-

(1) the backlash between the cam driving sector J and its pinion;

(2) the backlash between the trunnion O and the feed lever dog P;
and

(3) the backlash in the cam unit.

Special attention must be given to ensuring that all this backlash is taken up before tightening screws I.

30. TAPE FEED PAWL (Figs. 22, 28 and 31)

30.1 Turn the machine by hand until the striker pin is opposite the first finger and the striker blade is right back.

30.2 Slacken screw A, Fig. 22, and, while pressing the feed pawl back as far as it will go, move the plate Y to the right until the cut-away portion of the feed pawl touches the ratchet wheel H.

30.3 Release the pressure on the feed pawl and retract the plate Y slowly until the feed pawl drops behind the next tooth on the ratchet wheel, making sure that the jockey roller is in full engagement with a tooth on the click wheel.

- 30.4 Press the feed lever Q, Fig. 28, to the left to take up all backlash, and again move the plate Y, Fig. 22, slowly to the right so that it is in full engagement with the ratchet tooth without moving the ratchet H. Tighten screw A.
- 30.5 Slacken screw H, Fig. 31, and move pin G away from the feedpawl F. Adjust the position of pin G so that, when the machine is turned by hand and the feed pawl is withdrawn, it is allowed to drop into full engagement with the tooth for the next feed. Tighten screw H.

NOTE

If it is noticed that the holes in the perforated tape are ragged, the punches may be sharpened in the following way –

1. Remove the punching block from the perforator unit and remove the punches from the punching block.
2. Insert the punches individually in the lapping block TA.1112 provided in the tool kit, and sharpen on a fine stone until a keen edge is restored.
3. Check the length of the punches. It is essential that the five message punches shall be the same length within .001", and that the feed punch shall be between .006" and .008" shorter than the message punches.
4. Examine the die plate. If it is badly worn, it should be replaced.
5. Replace the punches in the punch block and reassemble the punch block to the perforator unit.
6. Check the punching depth adjustment. (Adjustment Instruction 27).

N.B.: Care should be taken to distinguish between 'ragged' holes in the tape, which are due to worn punches, and holes which are slightly torn at the hinges of the lids, a fault caused by incorrect adjustment of the punching depth.

E. TAPE ROLL HOLDER UNIT

31. TAPE RETAINER (Figs. 32 and 33)

- 31.1 Loosen the fixing screws A, Fig. 32, and adjust the tape retainer until the tape is horizontal by eye and passes freely, i.e. without touching either top or bottom, through the paper guide plate.
- 31.2 Loosen fixing screws B, Fig. 33, and adjust the angle of the tape retainer so that, when the tape is pulled by the feed roller, it will not run up the slope of the retainer and bind against the guard at C. Tighten fixing screws B.

32. TAPE PULL (Figs. 34 and 35)

- 32.1 To check the pull on the paper tape, release spring E, Fig. 34, slacken the set collar D and remove the pressure roller assembly.

- 32.2 Attach a loop of wire to the paper tape with insulating or gummed tape, as illustrated in Fig. 35, and, with a spring balance on the loop, measure the pull required to move the tape. This should not exceed 1½ ozs.
- 32.3 Disconnect the tape and replace the pressure roller assembly. Tighten the set collar D and replace spring E.
33. PAPER EXHAUST ALARM (Fig. 36)
- 33.1 Set the alarm so that, when the follower arm roller B is on the diameter corresponding to the warning line printed on the tape roll, or some other predetermined diameter, the alarm should be on the point of being released.
- 33.2 To adjust, loosen the screw D, Fig. 36, and move the follower arm to the required diameter. With the contact lever E tripped, slowly raise the contact lever until its edge is just touching the edge of the latch A. Maintaining this condition, tighten fixing screw D.

F. MOTOR, GOVERNOR AND STARTER SWITCH

34. STARTER TRIP (Figs. 37 – 40)
- 34.1 With the starter trip lever B, Fig. 37, engaged in the electromagnet link C (see inset), move the armature so that the spring extension D to the trip lever is in its righthand position viewed from the front of the machine.
- 34.2 With the weight-arm pin fully engaged in the hole in the worm wheel, check that the end of the trip spindle P, Fig. 39, projects through the support M, Fig. 38, in such a way that it touches but does not set the leaf spring N. If this is not so, adjust the spindle longitudinally after unscrewing the screw O, Fig. 39. When reclamping, make sure that the screw is located on the flat provided on the spindle. Note particularly that the tip of the spindle P is not binding on the sides of the clearing hole in the support bracket M, owing to the presence of dirt or grease.
- 34.3 Unscrew F, Fig. 38. With the weight-arm pin R, Fig. 40, engaged in a hole in the worm wheel E, Fig. 38, and the armature in a marking position, slide the trip boss G along the spindle until dimension 'x' is .005" – .010" (.13 – .25 mm.). Clamp screw F, taking care that its end is located on the flat provided on the spindle.
35. STARTER WEIGHT (Figs. 37 and 40)
- 35.1 With the weight at the bottom of its drop, check that the weight-lifting arm is free to move either side of dead centre without any tendency to bind or jam on the link. This is to ensure that the weight-lifting arm pin will not fail to engage with a hole in the disc in cases where

the weight-lifting arm, in dropping, reaches dead centre or passes beyond it.

- 35.2 Check that, as the motor is switched off, the pin of the weight-lifting arm is clear of the shroud S, Fig. 40, and that the hole immediately under that in which the pin rests is just emerging from behind the shroud. If the switch is breaking too early, slacken clamping screw T, and move the weight-lifting arm down the rod and reclamp. Slacken screw X and lower the positioning collar Y to rest on the top of the weight and reclamp. If the switch is breaking too late, move the collar up a little, and raise the weight accordingly.
- 35.3 Check that, with the weight-lifting arm AA in its lowest position, the spring extension D, Fig. 37, passes freely into the slot in the boss A. If this is not so, set the lever B slightly by means of a pair of pliers.

36. FORCE TO TRIP STARTER (Figs. 38, 39 and 40)

- 36.1 Check that the trip spindle is clear of dirt and grease.
- 36.2 Lift the weight and engage the weight-lifting arm pin R, Fig. 40, in the hole exposed at the top of the shroud. Check that the force required to disengage the pin from the worm wheel and so allow the weight to drop, when applied at the end of the trip spindle P, Fig. 39, lies between 2 and 3 ozs. (57 – 85 grams).
- 36.3 Check that, when the end thrust spring N, Fig. 38, is removed, the force does not exceed $\frac{3}{4}$ oz. (21 grams). If a force greater than this is required, it indicates that the trip spindle is not perfectly free in its guides.

37. MOTOR GOVERNOR BRUSHES

- 37.1 If the governor brushes are new, check that they are set so that the tip of the back of the governor brush spring, when the governor is removed, is $\frac{3}{4}$ " (1.9 cm.) from the motor support plate. Check also that the governor brush backing spring lies flat against the governor brush spring.
- 37.2 If the governor brushes are worn, check the force which they exert on the governor slip rings. This should be $4\frac{1}{2}$ – $5\frac{1}{2}$ ozs. (128 – 156 grams). The pressure of the brushes will fall as they wear and the springs must be set slightly to compensate for this. This may be done by measuring the distance between the tip of the back of the worn governor brush spring and the motor support plate, removing the governor, and pushing back the brush by means of a spring balance to the position it occupies when in contact with the governor.
- 37.3 Replace the governor, ensuring that it is pushed on to the motor shaft as far as it will go.

38. GOVERNOR CONTACTS – SERIES GOVERNING (Fig. 41)

- 38.1 Using the governor contact adjusting clamp TA.1110, extend the governor spring A until the contact arm saddle E is just touching the stop face of the contact arm stop spring D.
- 38.2 Slacken screw C just enough to free contact screw F and adjust the contact screw F to give dimension 'I', .015" – .020" (.38 – .51 mm.). Tighten screw C.
- 38.3 Relax the governor spring A and remove the adjusting clamp.

G. ADJUSTMENTS WITH THE MOTOR RUNNING

39. STARTER THROW-OUT BRACKET

- 39.1 Allow the weight to operate the switch and set the motor running. Check that, when the motor has switched off, the leading edge of the throw-out bracket is clear of the weight-lifting arm by .005" – .010" (.13 – .25 mm.). If this is not so, slacken the screws which secure the bracket and move it to the required position. Lock in this position with the fixing screws.
- 39.2 Test the foregoing adjustment by removing the switch cover and short-circuiting the motor contact blades in order to make the switch inoperative. (Unless an insulated screwdriver is available, this should be done by depressing the rear spring stirrup). Check that, as the weight-lifting arm encounters the cam face of the throw-out bracket and disengages the weight-lifting arm pin from the worm wheel, it thereby allows the weight to drop. This must occur before the switch arm and the weight-lifting arm link become jammed. Replace the switch cover.

40. CLUTCH TORQUE

- 40.1 Select the letter 'J' on the combination head so that the typehead clutch latches on the J bellcrank with the large gap in the types uppermost.
- 40.2 Apply a 0 – 12 oz. spring balance to the typehead by placing the hook of the balance over the J type and tension the balance to 6 ozs. (160 grams). Hold the balance firmly in this position.
- 40.3 Depress the space bar, or operate the magnet armature to space. The spring balance should now give a reading between 7 and 9 ozs. (198–255 grams).
- 40.4 When a new lining is fitted, the spring balance will give a reading which is too high. Before the machine is restored to service, it should be run continuously until the clutch pressure is reduced to within the limits specified in 40.3.

41. RIBBON CHANGEOVER MECHANISM

- 41.1 Remove the ribbon spools and check that each feed change rod falls freely into contact with the feed change spindle.
- 41.2 Hold the electromagnet armature on the spacing contact, switch on the motor and allow the machine to 'run away'. Check that the ribbon driving shaft alternates between its two positions due to both rods having fallen. If it does not do so, check whether there is an accumulation of dirt or grease round the feed change rods, wear at their lower ends, binding of the rods or stiffness of the change rod bell-cranks.

DISMANTLING AND ASSEMBLING INSTRUCTIONS

N.B.: Do not touch the screws which are painted red. These are abutment screws which have been set to gauge, and once they are slackened they cannot be readjusted without returning to the factory.

A. TO DISMANTLE THE TELEPRINTER INTO UNITS

1. **KEYBOARD UNIT**
 - 1.1 Withdraw the two keyboard fixing screws, and remove the keyboard together with the coupling disc.
2. **PERFORATOR UNIT**
 - 2.1 Remove the two perforator fixing screws; lift the bellcrank depression lever, and withdraw the unit from its locating plates.
3. **TAPE ROLL HOLDER UNIT**
 - 3.1 Remove the four screws securing the tape guard plate, and remove the plate.
 - 3.2 Remove the two screws securing the base of the tape wheel guard and the two screws securing the tape wheel bracket.
 - 3.3 Remove the tape wheel complete with guard and tape failure alarm mechanism.
4. **OPERATING MAGNET UNIT**
 - 4.1 Disconnect the electromagnet link from the armature.
 - 4.2 Withdraw the two magnet unit fixing screws, and remove the operating magnet unit.
5. **MAIN SHAFT AND STARTER SWITCH CONTROL UNIT**
 - 5.1 Remove the gear covers over the main shaft.
 - 5.2 Remove the screw which secures the main shaft bearing to the cam unit.
 - 5.3 Remove the two screws which fix the control unit plate to its casting.
 - 5.4 Slacken the screw in the starter switch weight which holds the starter rod, and remove the mainshaft with starter control unit and the motor coupling disc.

N.B.: Do not, unless necessary, remove the starter switch stop plate from the front of the base, as the spring stirrup on the switch may jump out of engagement. If this happens, remove the tape roll holder brackets and the switch cover at the side of the base casting, and withdraw the three screws which fix the starter switch to the casting. Replace the spring with its stirrup and reclamp the starter switch. Replace the cover, and tape roll holder brackets.

6. GOVERNOR UNIT AND MOTOR UNIT

- 6.1 Slacken the screw which holds the governor on the motor shaft and remove the governor.
- 6.2 Slacken the clamping screw on the righthand motor support plate. Remove the motor complete with lefthand motor support plate, taking care not to damage the governor brushes.

7. RIBBON FEED BRACKETS

- 7.1 Disengage the ribbon from the ribbon jumper.
- 7.2 Withdraw the two fixing screws from each bracket and remove the brackets.

8. TYPEHAMMER UNIT

- 8.1 Remove the two screws and spring washers from the transfer rocker assembly, and remove the assembly complete.
- 8.2 Remove the typehammer pivot fixing screw and washer, and the set collar securing the hammer link bearing.
- 8.3 Remove the typehammer unit.

9. TYPEHEAD UNIT

- 9.1 Withdraw the screw which holds the typehead support bracket.
- 9.2 Remove the support bracket complete with ribbon jumper and remove the shims.
- 9.3 Remove the typehead unit.

10. CAM UNIT

- 10.1 Remove the three cam unit fixing screws.
- 10.2 Disengage the ribbon feed pawl from the ratchet wheel and slide the cam unit away to the right.

11. CONTROL LEVER UNIT

- 11.1 Remove the screw securing the lefthand end of the typehammer overthrow stop to the support attached to the combination head casting.
- 11.2 Withdraw the two control lever unit fixing screws, and remove the unit with the typehammer overthrow stop attached to it.

12. COMBINATION HEAD UNIT

- 12.1 Detach the spring of the answer-back rockshaft from its anchor.
- 12.2 Withdraw the screw which secures the shaft bearing plate and remove the shaft from the machine. (When reassembling, care must be taken not to damage the bearing end of the shaft when inserting it into the frame of the combination head).

12.3 Withdraw the two unit fixing screws and remove the combination head.

13. RIBBON DRIVING SHAFT UNIT

13.1 Withdraw the four fixing screws which hold the driving shaft bearings and remove the assembly.

B. TO DISMANTLE INDIVIDUAL UNITS

N.B.: Dismantling Instructions for those units of the machine which are common to the No.7 Teleprinter are given in Booklet No.78 (11th Edition), pages 75 to 78.

PERFORATOR UNIT

1. Remove the three screws X, Fig. 42, securing the punch block assembly to the perforator unit casting. Remove the screw L, with its washer and spring washer. Remove the punch block assembly, taking care in disengaging the punches from the punching bars H.

(When reassembling, make sure that the punching bars engage correctly with the cut-out portions of the punches).

2. Slacken the two screws W, Fig. 42, and remove the setting arm rack and guard plate S.
3. Remove spring J, Fig. 42. Remove the two screws T and the tape pawl rack R.
4. Remove the punching cam assembly (capstan headed) fixing screws A, Fig. 42, with their washers and spring washers. Lift the punching cam assembly off the perforator casting, gently easing the punching bars H out from between the tines of the setting arms G.

(When reassembling, slowly lower the assembly on to the casting as the punching bars are eased between the tines of the setting arms. DO NOT FORCE this assembly.

It is not normally necessary to remove and dismantle the setting lever assembly. If, however, this assembly is removed and dismantled, care should be taken in re-assembling to ensure that the setting bellcranks move freely in their rack).

Dismantle the Punching Cam Assembly as follows:-

5. Remove the six punching bars H, Fig. 42, by swinging the punch block end of the bars towards the punching lever assembly and sliding the tails of the bars out from their rack. Keep the punching bars in the order in which you remove them. Note: The feed punching bar is the third from the top and has a longer tail than the code punching bars.

(When reassembling, make sure that the punching bars are free to move in the rack and that their tails are correctly located in the recesses of the punching levers AK, Fig. 43).

6. Remove the three screws AE, Fig. 43, and remove the top plate AD, taking care not to lose the shims on the top of the cam shaft E.
7. Slacken the screw AC, Fig. 43, securing the feed adjusting lever AB, and move that lever to the right so that the end of the tape feed pawl D, is clear of the feed lever casting B. Slacken screw Z and swing the keep plate AA to one side. Disengage the tape feed pawl D from its pin on the feed adjusting lever AB and remove the pawl D.
8. Remove the two screws securing the abutment plate and punching bar rack AF, Fig. 43, and remove the plate and rack.
9. Slacken the capstan-headed screw AG, Fig. 43, and swing the resetting lever AH away from its cam. Disengage the spring AJ from the retention lever AL. Swing the punching levers AK to the right so that they are free from their rack, and remove the punching and resetting lever assembly, together with the sickle-shaped retention lever AL.
10. Remove the cam shaft C.P., E, Fig. 43, and the cam feed pinion Y.
(When reassembling, take care to mesh the teeth of the pinion correctly with the cam driving sector C. The last tooth on each side of the cam driving sector should engage with the corresponding last tooth on the pinion so as to produce the maximum movement of the pinion.)
11. Remove the tape guide roller F and the cam feed lever B.

Dismantle the Punch Block Assembly as follows:—

12. Remove spring P, Fig. 42, and disengage the torsion spring N from the pressure arm latch O.
13. Remove the set collar M, Fig. 42, together with the torsion spring N. Remove the pressure arm latch O, noting the number of washers beneath it.
(When reassembling, make sure that the set collar screw locates on the flat on the collar mounting pin.)
14. Slacken the set collar retaining the twin pressure roller frame Q, Fig. 42, and remove the frame and set collar.
15. Remove the set collar and screw V, Fig. 42, retaining the jockey roller U. Remove the jockey roller and spring, and the spacing collar behind it.
16. Remove the two screws securing the paper guide plate K, Fig. 42, and remove the plate.
17. Remove the two screws securing the platen retaining plate. Remove the retaining plate and the platen.
18. Remove the two screws H, Fig. 44, which secure the paper laying mounting block M to the punch mounting C.P., L. Remove the paper laying mounting block by easing it off its steady pins.
(When reassembling, press the punches through against the paper layers to ensure that they can freely enter the die plate, before tightening the block securing screws).

19. Remove the two screws securing the platen block. Remove the block, the shims behind it, and the platen block location plate.
20. Remove the six punches B, Fig. 44, noting their order. Remove screws A and remove the front and rear punch guide plates C and G.
(When reassembling, adjust the rear guide plate C so that the punches are perfectly free, before tightening the plate securing screws).
21. Remove the two screws D, Fig. 44, and remove the layer guide plate F.
22. Remove the small layer stop plate by removing the two screws which secure it. Remove the six paper layers E, Fig. 44, noting their order and taking care not to lose their springs. Remove the die plate J.
(When reassembling, before tightening the screws D, the plate F should be adjusted until the paper layers are perfectly free).

SPRING TENSIONS

N.B.: References to Part List 1085 below apply to the 1st Edition.

SPRING NO.	PART LIST No. 1085 REFERENCE	METHOD OF MEASUREMENT	TENSION
PERFORATOR UNIT			
PG.7028	Fig. 8, AC	Force to give an extension of $\frac{1}{2}$ " (12 $\frac{3}{4}$ mm.)	14 – 16 ozs. (397 – 454 grams)
PG.7069	Fig. 9, AN	Force to give an extension of $\frac{31}{64}$ " (12 $\frac{1}{4}$ mm.)	15 – 17 ozs. (425 – 482 grams)
PG.7176	Fig. 10, AO	Force to give an extension of $\frac{5}{16}$ " (8 mm.)	10 – 12 ozs. (283 – 340 grams)
PG.7314	Fig. 12, U	Force to give an extension of $\frac{1}{10}$ " (2 $\frac{1}{2}$ mm.)	1 $\frac{3}{4}$ lbs. (794 grams)
PG.5073	Fig. 13, AK	Force to give a compression of $\frac{3}{64}$ " (1 $\frac{1}{4}$ mm.)	7 – 8 ozs. (198 – 227 grams)
PG.7355	Fig. 13, BC	Force to give an extension of $\frac{5}{16}$ " (8 mm.)	21 – 27 ozs. (595 – 765 grams)
TAPE ROLL HOLDER			
PG.7209	Fig. 15, AD	Force to give an extension of $\frac{19}{32}$ " (14 mm.)	12 – 14 ozs. (340 – 397 grams)
PG.7054	Fig. 15, AQ	Force to give an extension of $\frac{15}{16}$ " (24 mm.)	4 ozs. (113 grams)
PG.5059	–	Force to give a compression of $\frac{1}{8}$ " (3 $\frac{1}{4}$ mm.)	4 – 5 ozs. (113 – 142 grams)

LUBRICATION INSTRUCTIONS

N.B.: Lubrication Instructions for those parts of the machine which are common to the No.7 Teleprinter are given on page 79 of Booklet 78 (11th Edition).

AFTER EACH 100 HOURS OF OPERATION

No. 2 LUBRICANT

Lubricate the following parts of the perforator unit:

- (a) Cam Feed Pawl Pivot.
- (b) Tape Guide Roller (large).
- (c) Trunnion Block Pivot.
- (d) Spring anchor plate pivot on tape feed pawl.
- (e) Tape Feed Pawl Pivot.
- (f) The bearing bush of each lever on the spindle of the punch and resetting lever assembly, and the ends of the levers where they engage with the rack.
- (g) The punching bars where they engage with the racks and the setting levers, and where they make contact with the punches.
- (h) The bearings of the setting arms and setting bellcranks and where they engage with the rack.
- (i) Guide plates and die plate.
- (j) Spindle of the tape guide roller (small).
- (k) Bearings and pressure roller bearings of the pressure roller frame.
- (l) Pivot and roller of the jockey roller arm.
- (m) Top and bottom bearings of the pressure arm latch.

Lubricate the following parts of the Control Unit:

- (a) Transfer push rods at the racks and where they make contact with the transfer rockers and setting bellcranks.
- (b) Transfer rockers (saturate oil pad).
- (c) Each bearing of the bell lever.
- (d) Hammer pivots and the point of contact with the overthrow stop.

Apply a few drops to the selector push rods on the combination head unit where they engage with the racks, and at the points of contact with the combs and the transfer rockers.

No. 4 LUBRICANT

Smear the following parts of the perforator unit with grease:

- (a) Teeth of the cam shaft pinion.

(b) Teeth of the cam driving sector.

(c) Ratchet teeth and jockey roller wheel of the tape feed spindle.

Smear the end of the trip plate on the control unit with grease where it makes contact with the trip bellcrank.

APPENDIX

This Appendix provides additional adjustments for the "Who Are You?" suppression mechanism which was introduced on the Reperforator after the main body of this booklet had been completed.

AMENDMENT No. 1

On page 15, delete adjustment 30.5.

AMENDMENT No. 2

Add the following instructions after adjustment 30:—

30A. TAPE PAWL GUIDE (Fig. 45)

- 30A.1 Turn the motor by hand until the feed pawl C is in the fully fed position.
- 30A.2 Slacken the extractor screws B and the pawl guide clamping screw D, and pull the pawl guide away from the pawl.
- 30A.3 Measure the gap between the front end of the pawl and the punch block casting with feeler gauges. Note this dimension.
- 30A.4 Continue to turn the motor until the feed pawl drops back into the preceding tooth on the ratchet wheel.
- 30A.5 Insert feelers having a total thickness equal to the dimension obtained in 30A.3 plus .040" between the front end of the feed pawl and the punch block casting.
- 30A.6 Holding the feelers in position, adjust the pawl guide pin to press the pawl lightly against the feelers, and tighten the clamping screw D.

30B. PAWL EXTRACTOR (Fig. 45)

- 30B.1 With the pawl resting against the pawl guide pin, and the throwout lever K resting against the unit casting at H, adjust the pawl extractor A to bear lightly against the end of the throwout lever K. Tighten the extractor clamping screws B.

30C. PAWL THROWOUT LEVER (Fig. 45)

- 30C.1 Turn the motor slowly by hand, selecting the "D" letter combination, and continue to turn until the "D" bellcrank falls.
- 30C.2 With the "D" bellcrank fallen, the WRU lever C resting against the end of the bellcrank at J, and the throwout lever K resting against the Perforator unit casting, slacken screw E and adjust lever F so that it clears the WRU lever G by .030 – .035" (.76 – .89 mm) i.e. dimension 'f'. Tighten clamping screw E.

N.B.: The levers G and F should move freely on their pivots, and lever K should not bind in its guide rack.

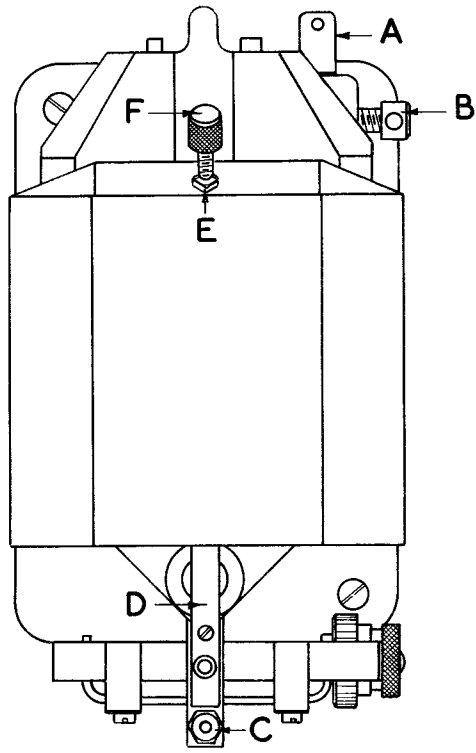


FIG. 1.

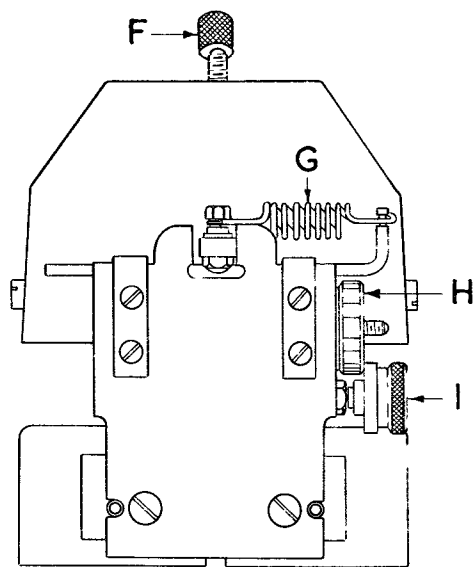


FIG. 2.

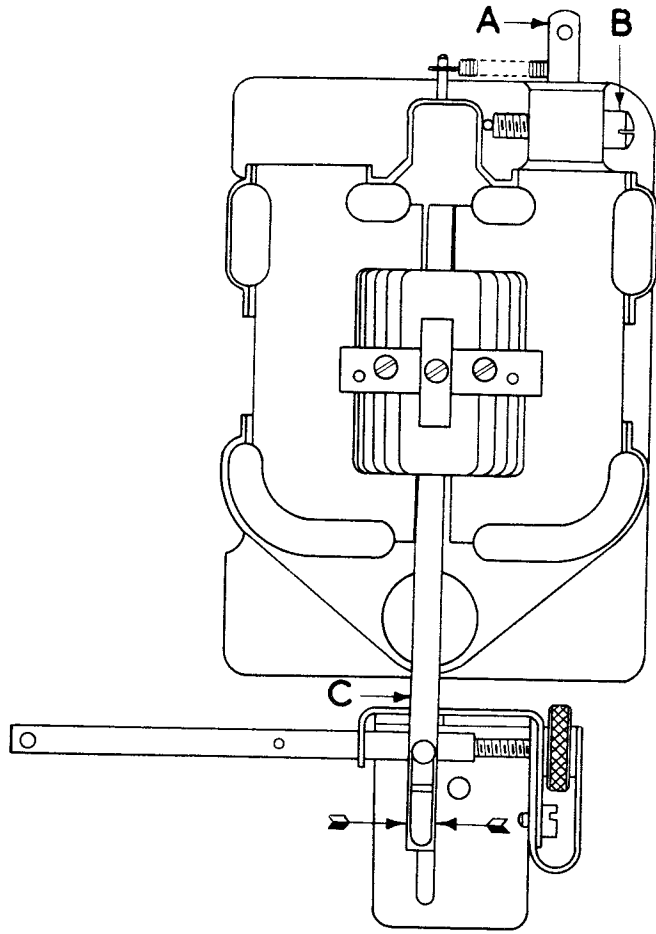


FIG. 3.

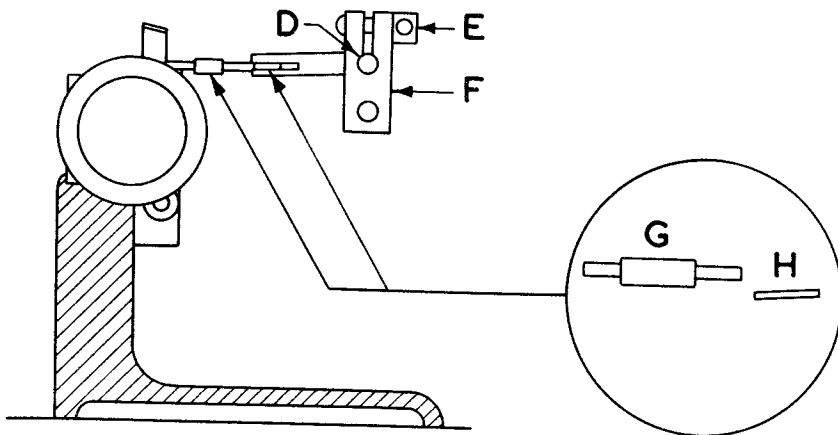


FIG. 4.

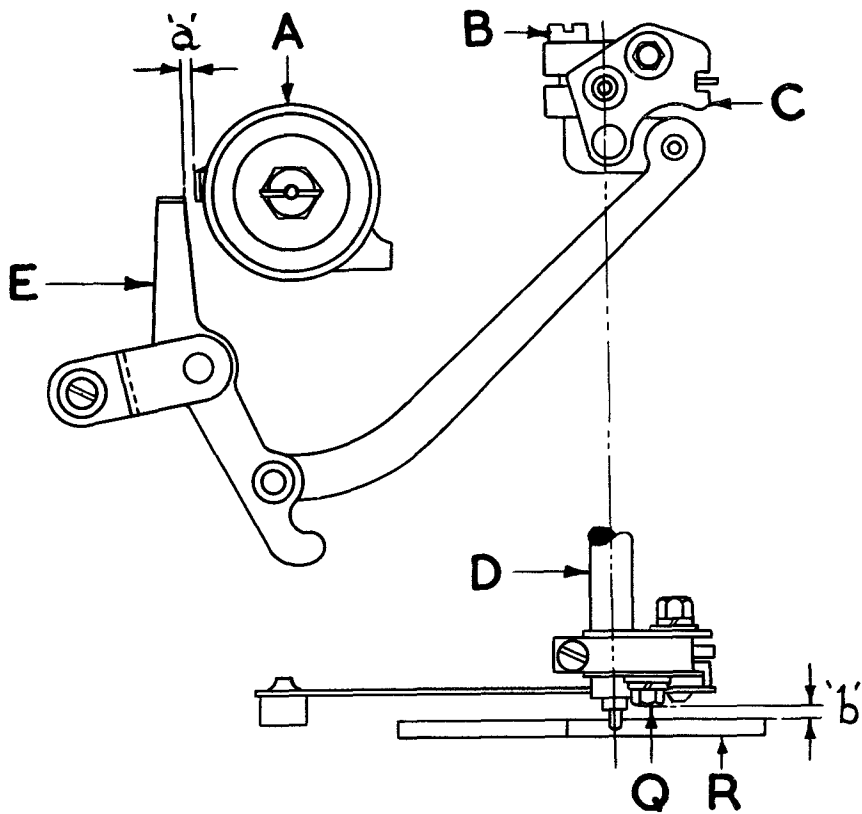


FIG. 5.

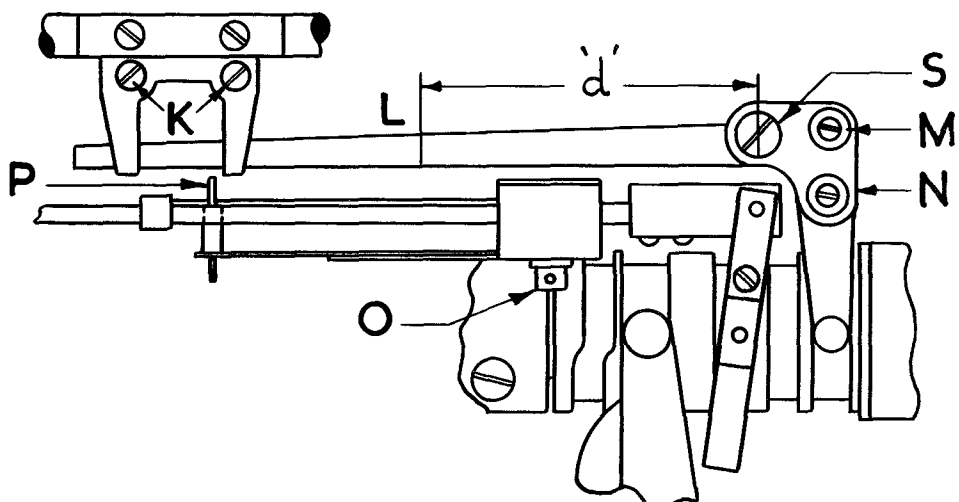


FIG. 6.

DIMENSIONS

'a' - see text. 'b' = $\begin{cases} .010 - .020 \text{ in.} \\ .25 - .51 \text{ mm.} \end{cases}$ 'd' = $\begin{cases} 2.0 \text{ in.} \\ 51.0 \text{ mm.} \end{cases}$

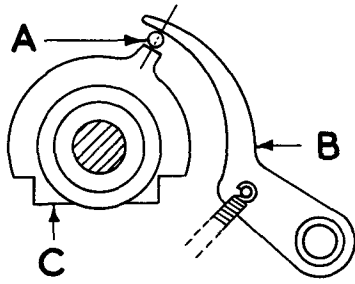


FIG. 7.

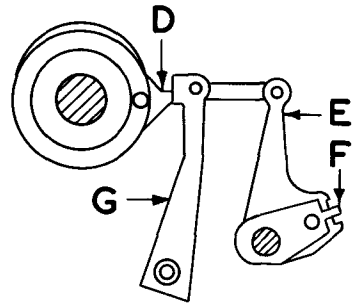


FIG. 8.

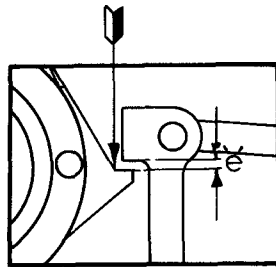


FIG. 9.

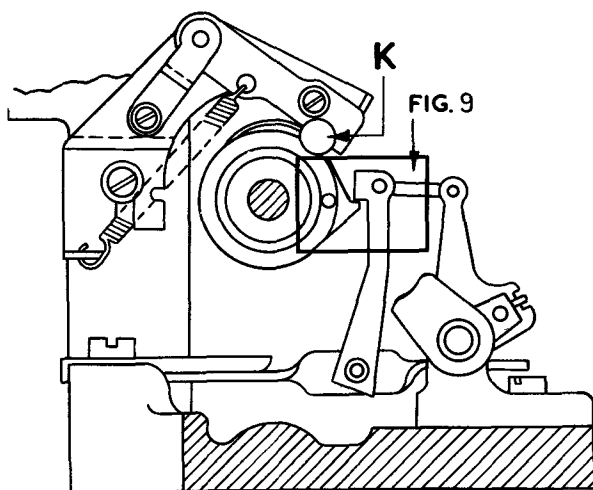


FIG. 10.

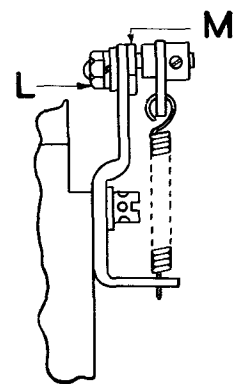


FIG. 10A.

DIMENSION

$$e = \begin{cases} .002 - .004 \text{ in.} \\ .05 - .10 \text{ mm.} \end{cases}$$

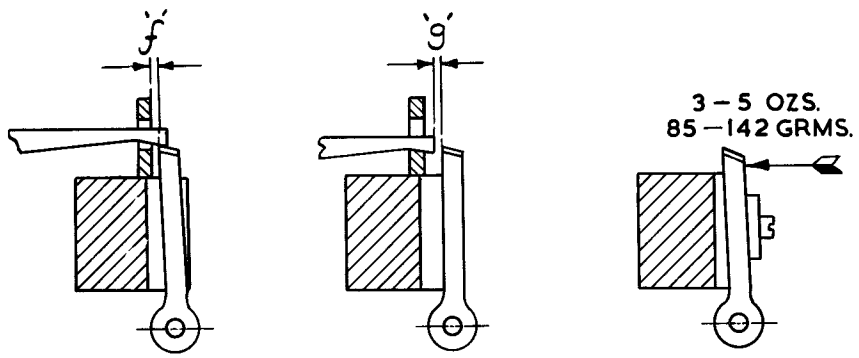


FIG. 11.

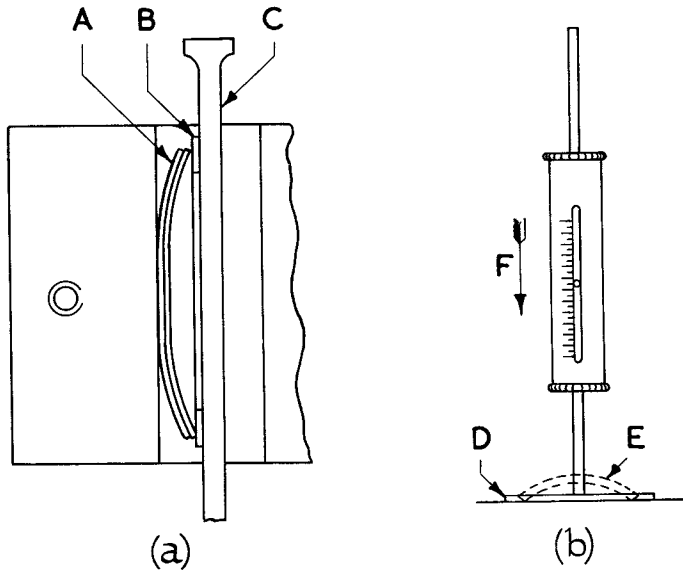


FIG. 12.

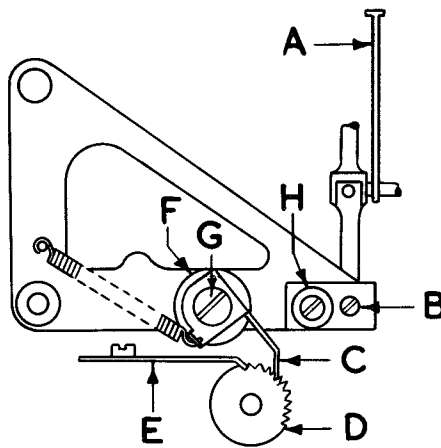


FIG. 13.

DIMENSIONS

$$'f' = \begin{cases} .003 - .020 \text{ in.} \\ .08 - .51 \text{ mm.} \end{cases} \quad 'g' = \begin{cases} .015 \text{ in.} \\ .38 \text{ mm.} \end{cases}$$

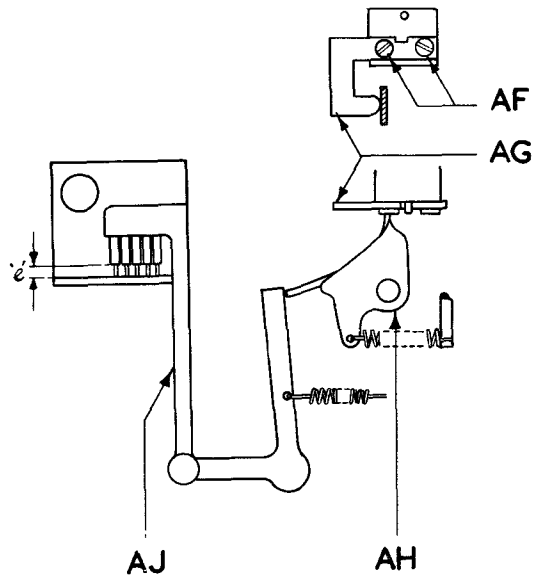


FIG. 14.

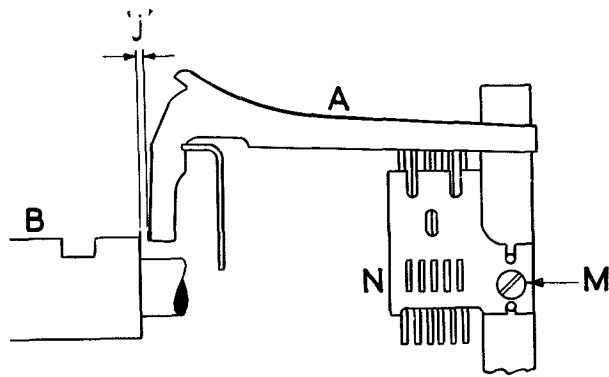


FIG. 15.

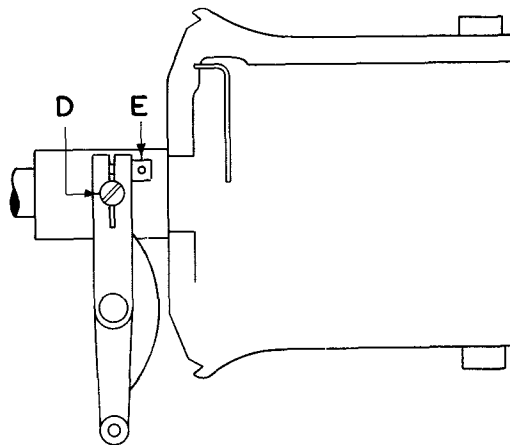


FIG. 16.

DIMENSIONS

$\pm \left\{ \begin{array}{l} .005 \text{ in.} \\ .006 - .008 \text{ in.} \end{array} \right.$

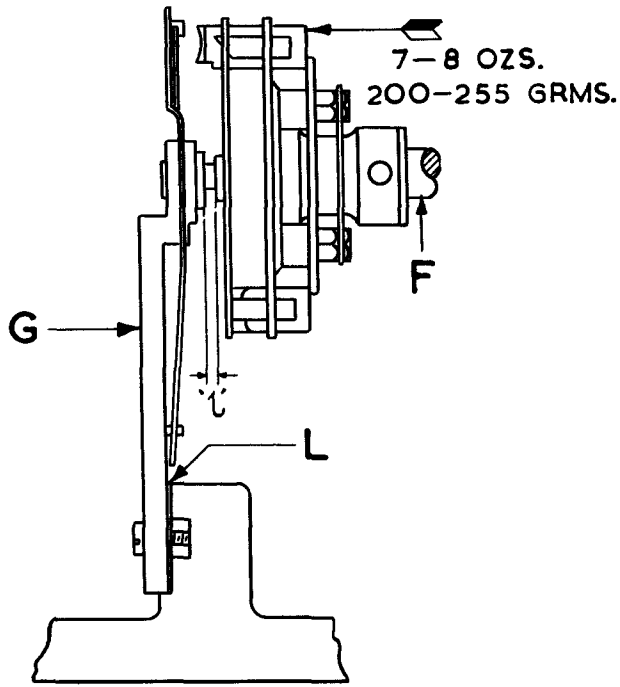


FIG. 17.

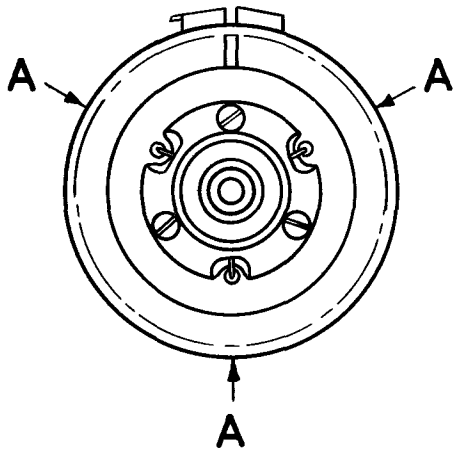


FIG. 18.

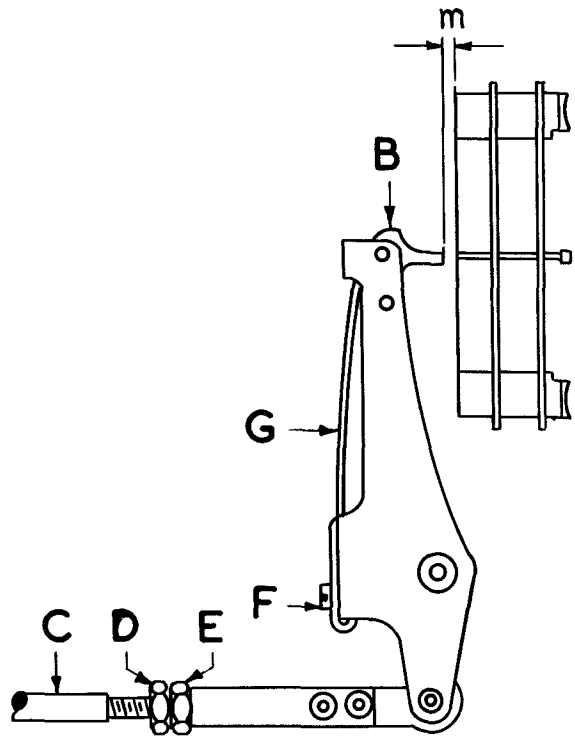


FIG. 19.

DIMENSIONS

$$\begin{array}{l}
 'l' = \begin{cases} .001 - .005 \text{ in.} \\ .03 - .13 \text{ mm.} \end{cases} \quad 'm' - \text{ see text.}
 \end{array}$$

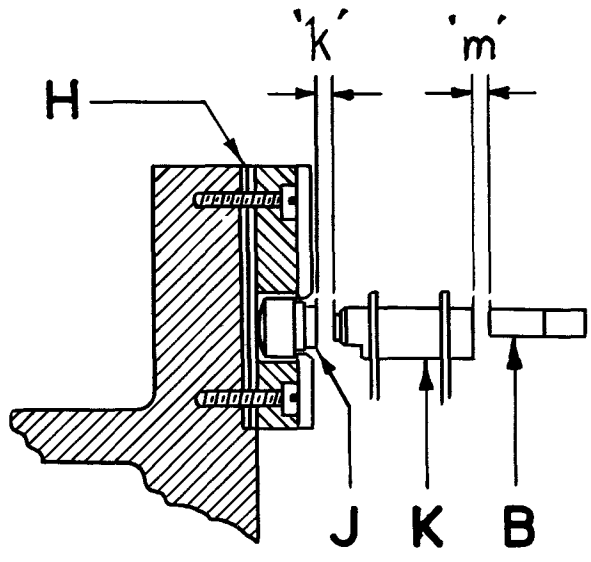


FIG. 20.

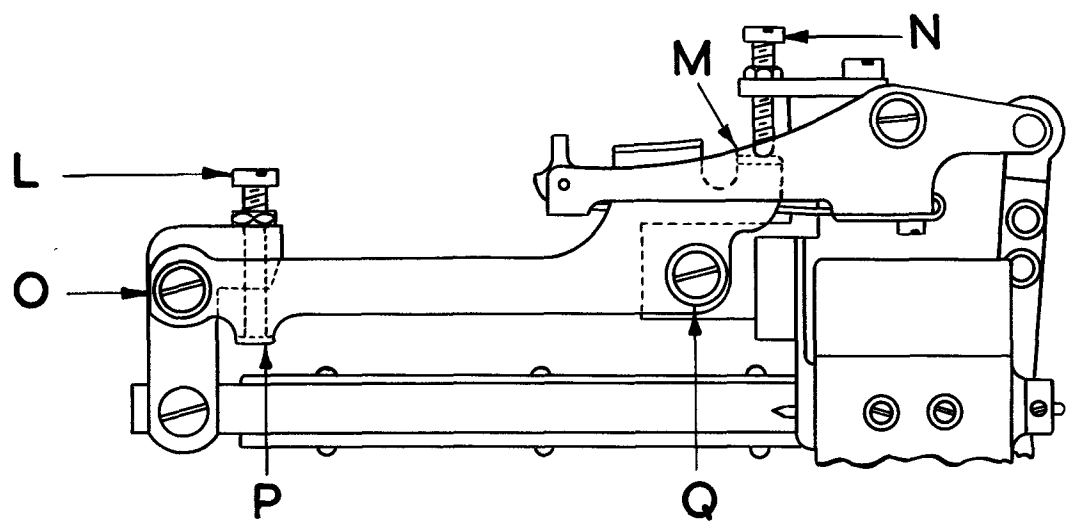


FIG. 21.

DIMENSIONS

'k' and 'm' - see text.

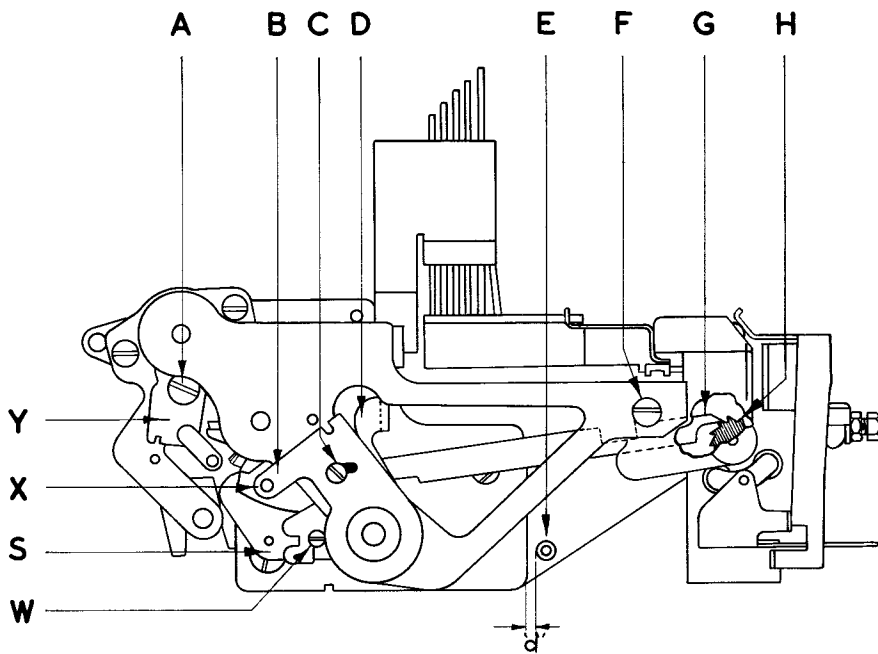


FIG. 22.

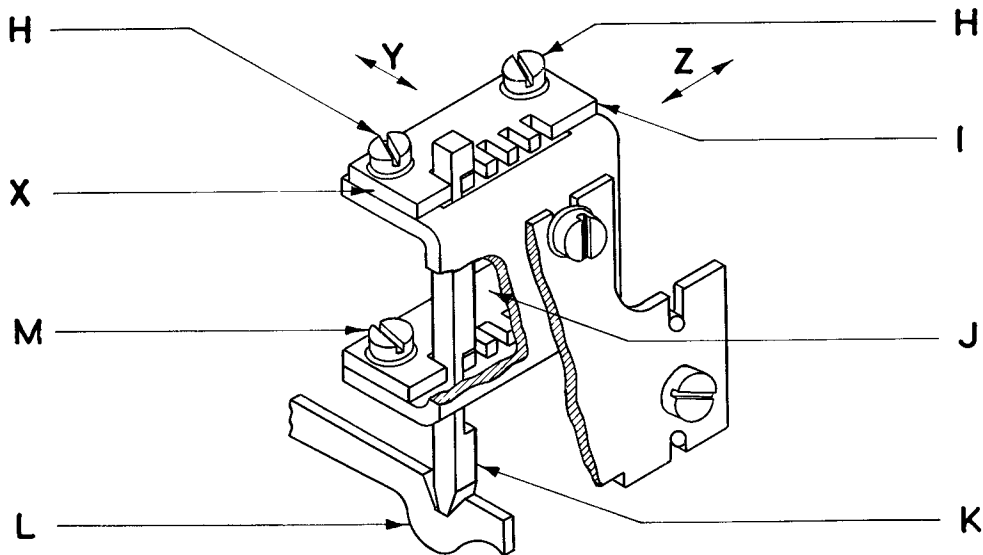


FIG. 23.

DIMENSION

'd' - see text.

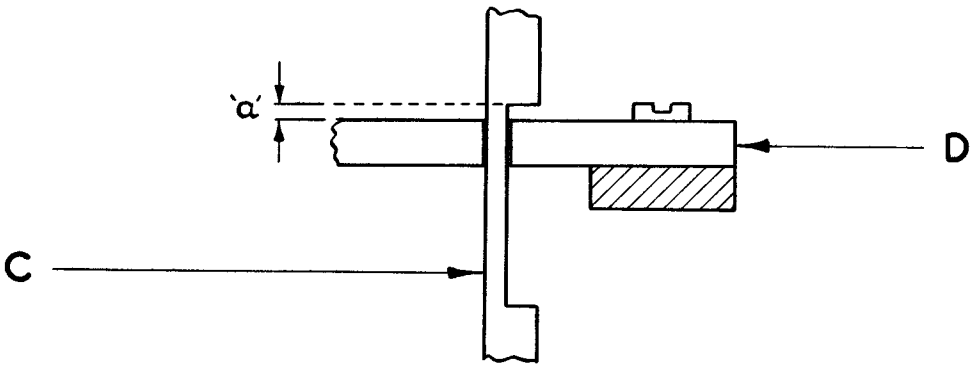
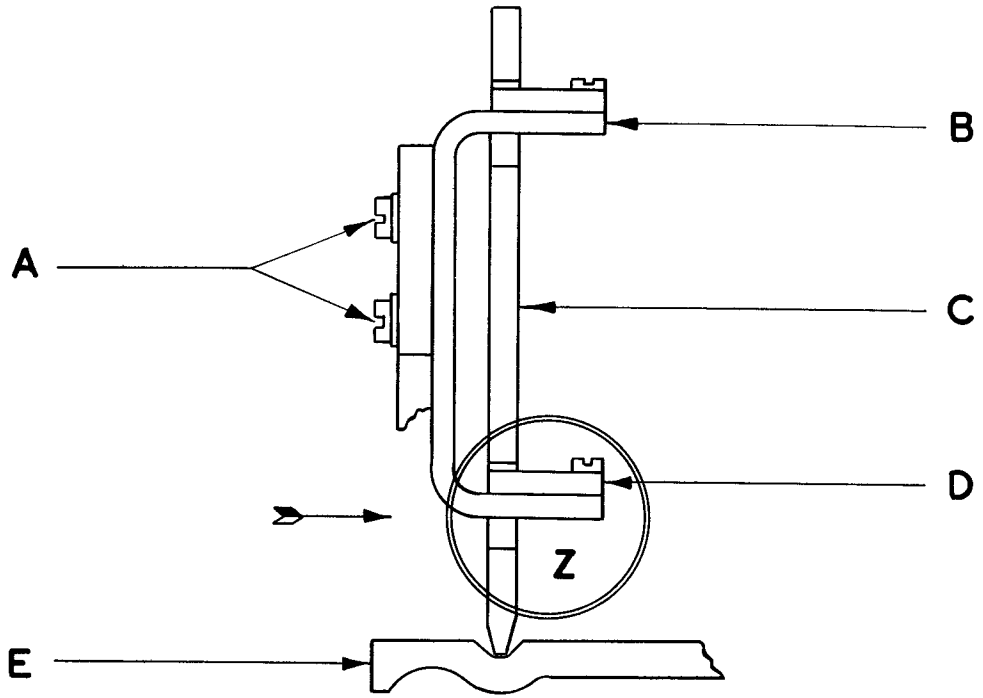


FIG. 24.

DIMENSION

$$'a' = \begin{cases} .005 - .010 \text{ in.} \\ .13 - .25 \text{ mm.} \end{cases}$$

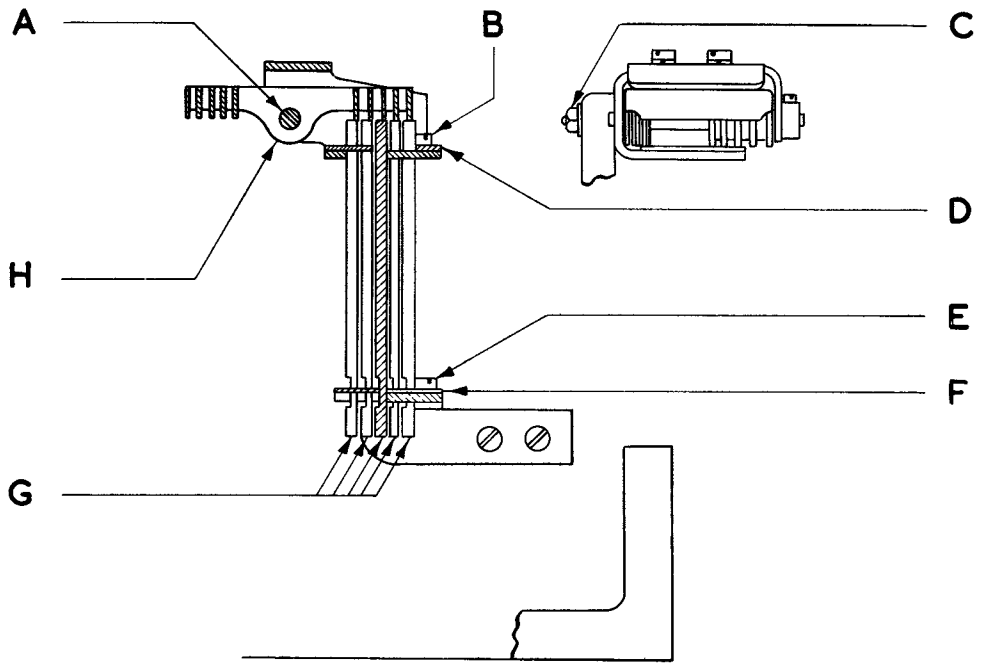


FIG. 25.

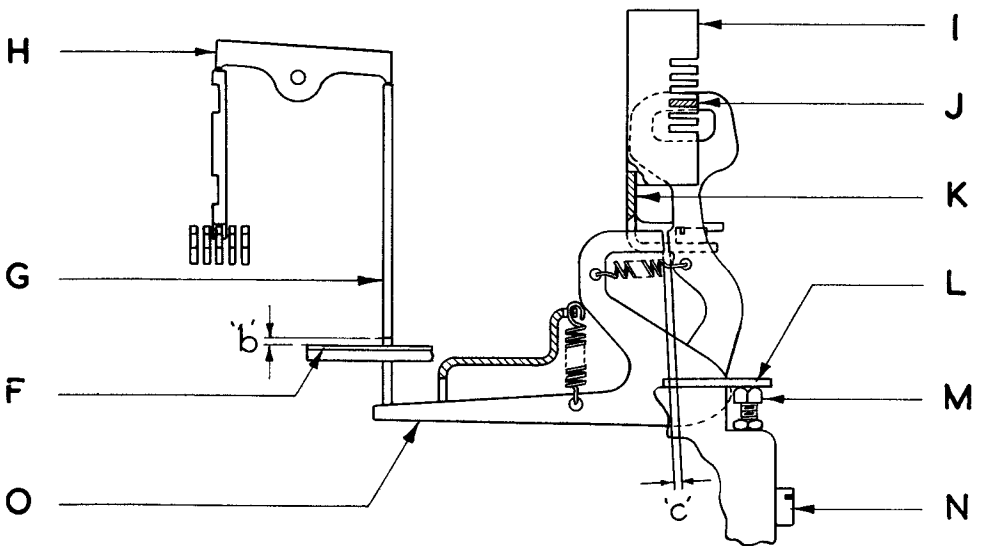


FIG. 26.

DIMENSIONS

$$'b' \neq \begin{cases} .003 \text{ in.} \\ .08 \text{ mm.} \end{cases} \quad 'c' = \begin{cases} .003 - .012 \text{ in.} \\ .08 - .30 \text{ mm.} \end{cases}$$

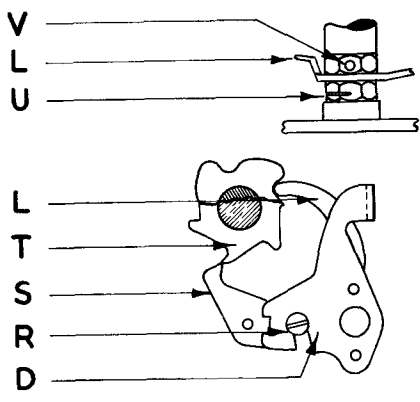


FIG. 27.

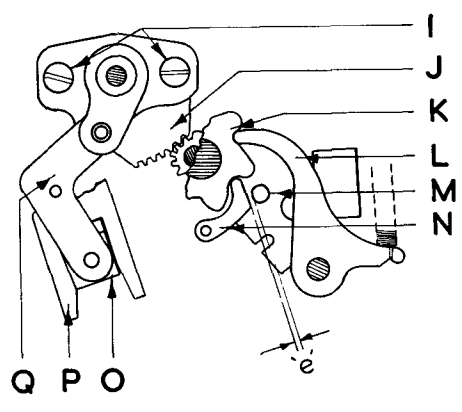


FIG. 28.

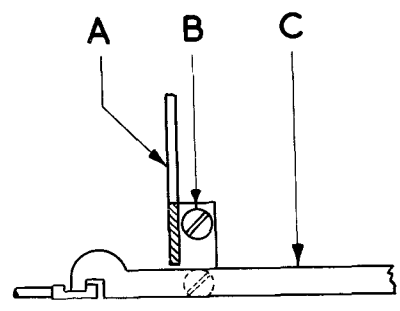


FIG. 29.

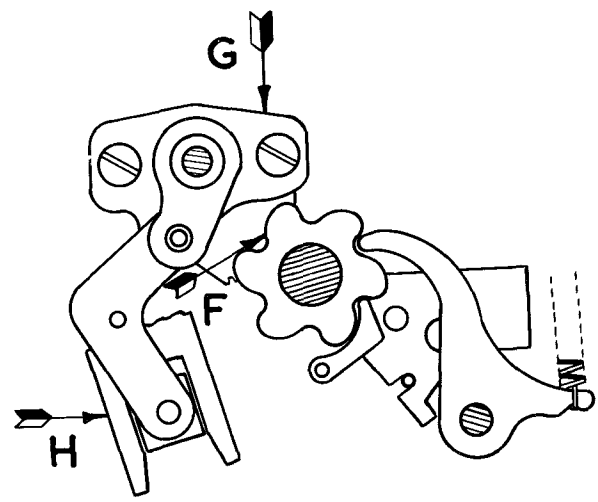


FIG. 30.

DIMENSION

$$e' = \begin{cases} .003 - .005 \text{ in.} \\ \dots \end{cases}$$

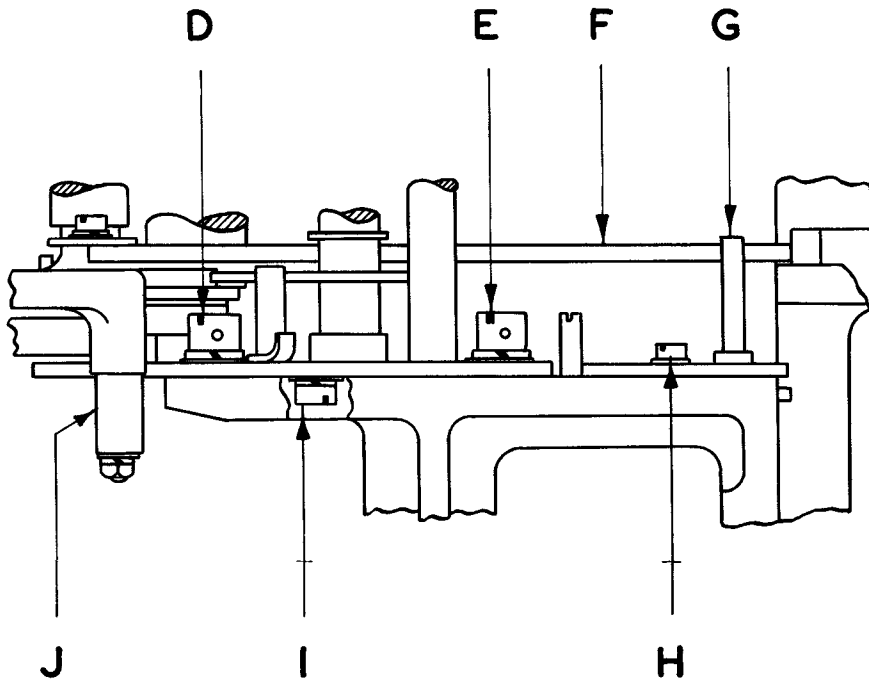


FIG. 31.

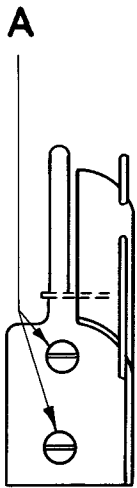


FIG. 32.

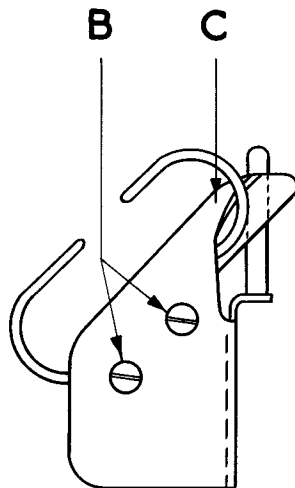


FIG. 33.

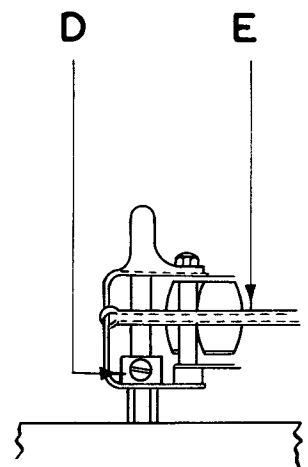


FIG. 34.

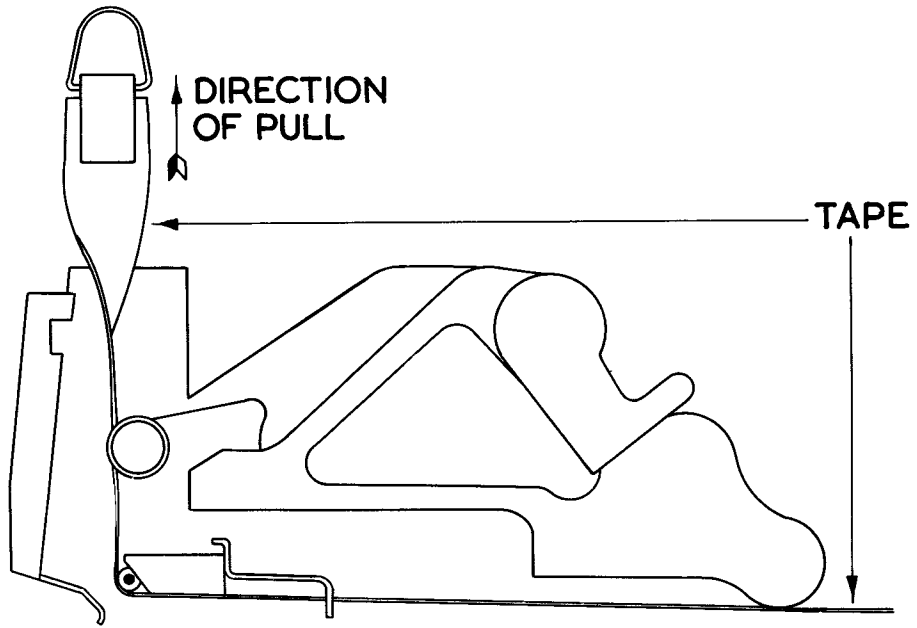


FIG. 35.

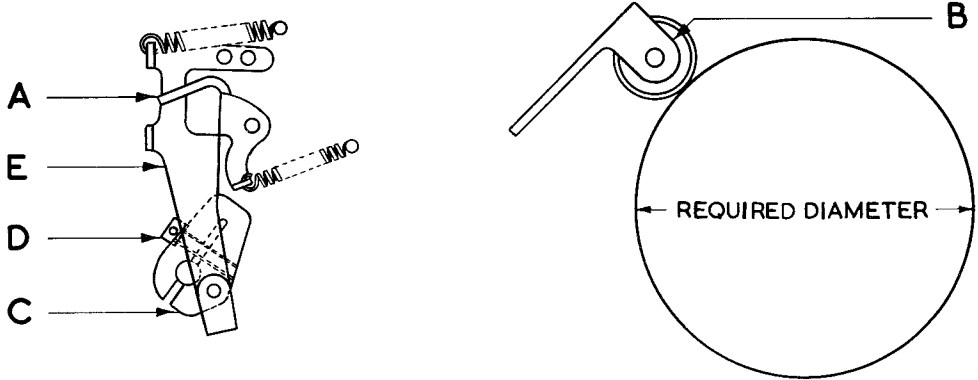


FIG. 36.

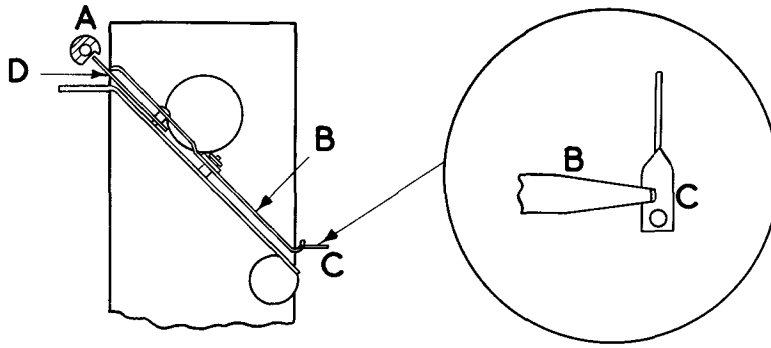


FIG. 37.

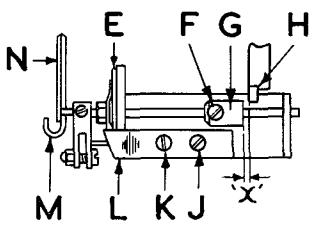


FIG. 38.

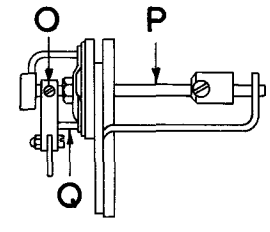


FIG. 39.

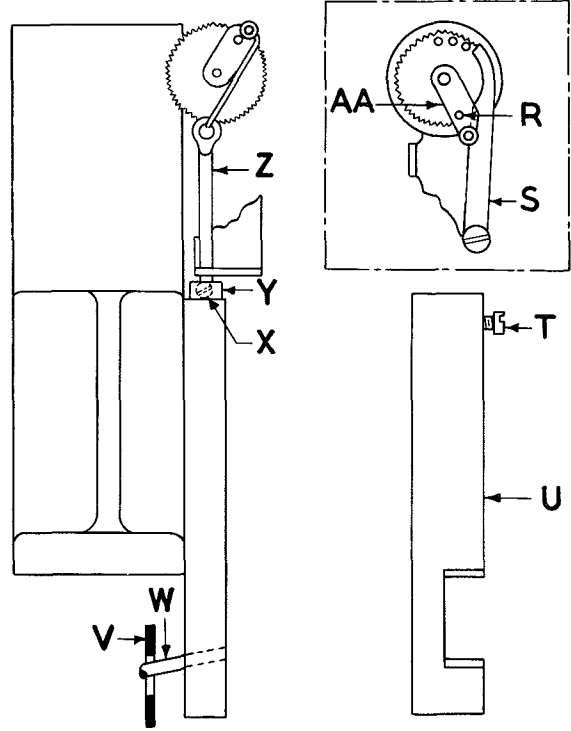


FIG. 40.

DIMENSION

$$'x' = \begin{cases} .005 - .010 \text{ in.} \\ 13 - 25 \text{ mm} \end{cases}$$

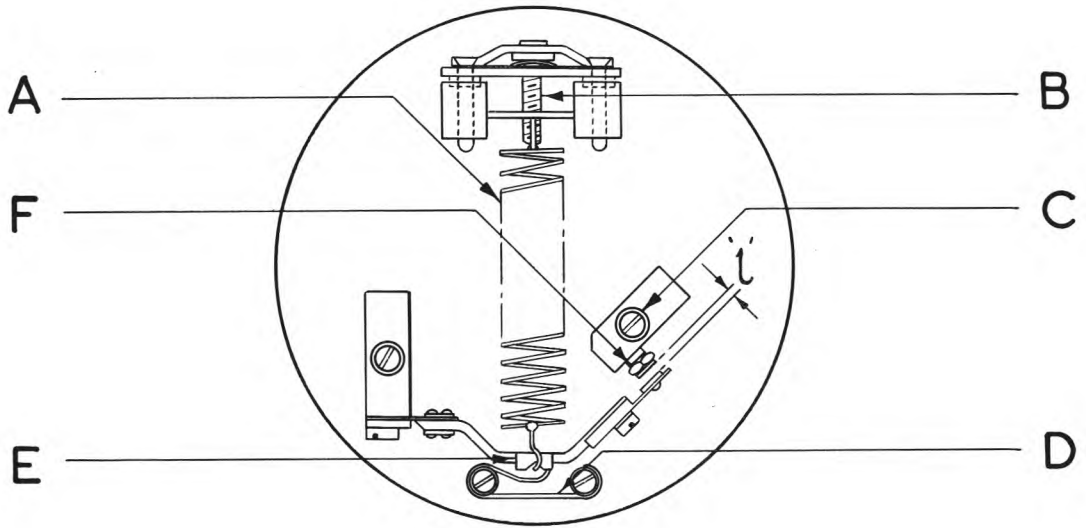


FIG. 41.

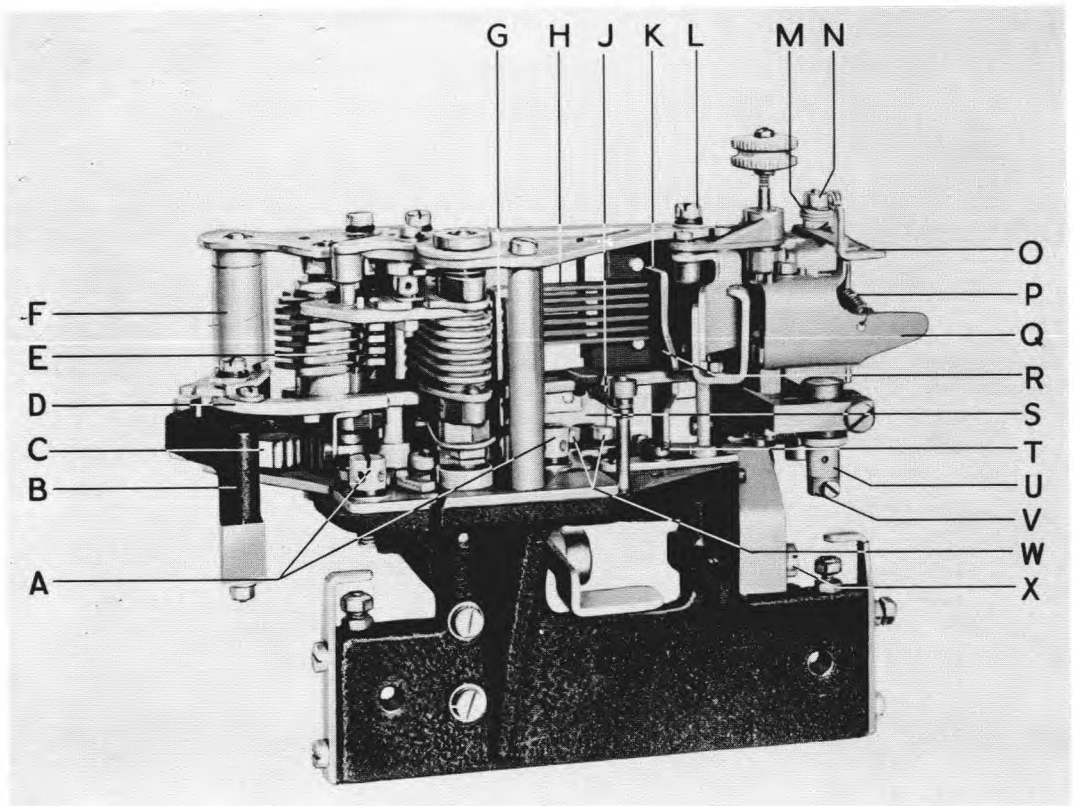


FIG. 42.

DIMENSION

$$'l' = \begin{cases} .015 - .020 \text{ in.} \\ .38 - .51 \text{ mm.} \end{cases}$$

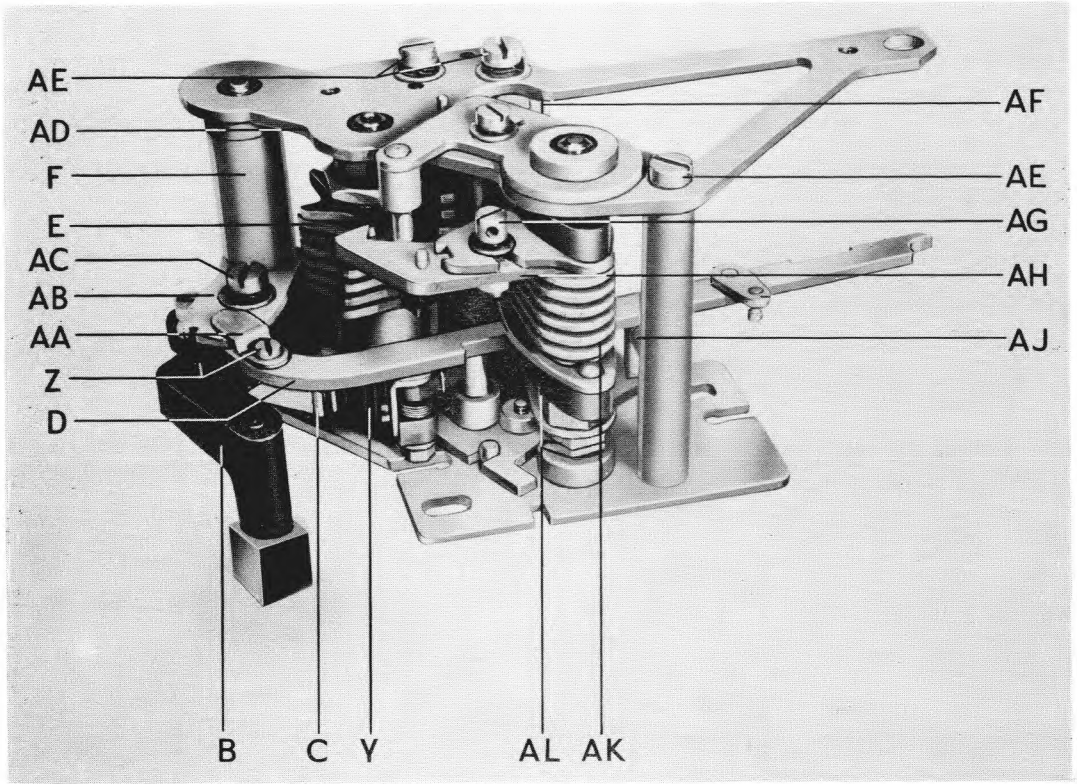


FIG. 43.

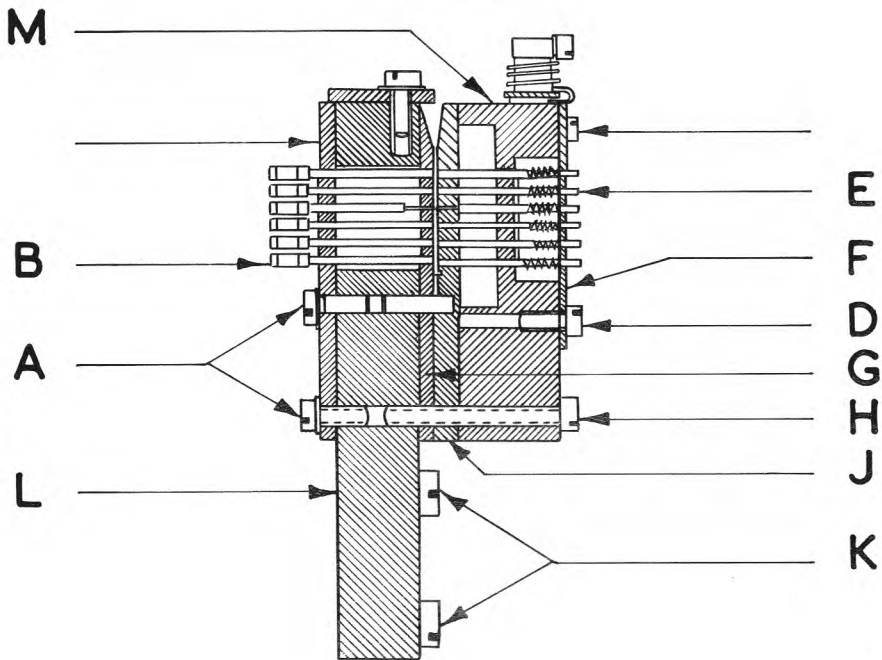


FIG. 44.

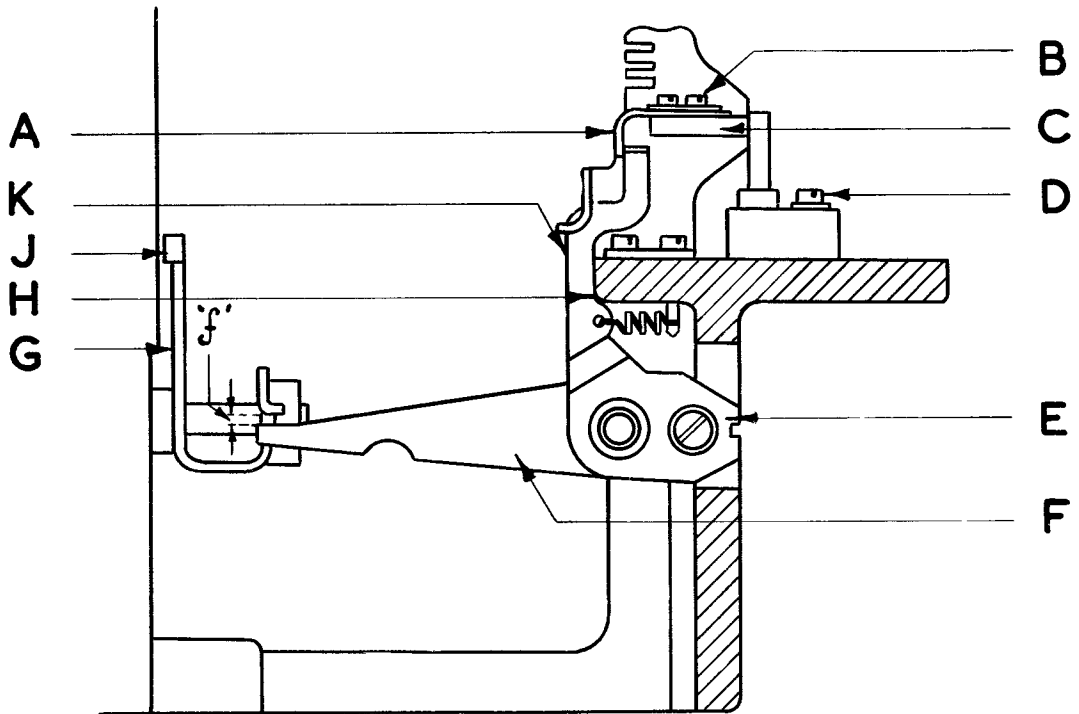


FIG. 45.

DIMENSION

$$'f' = \begin{cases} .030 - .035 \text{ in.} \\ .76 - .89 \text{ mm.} \end{cases}$$