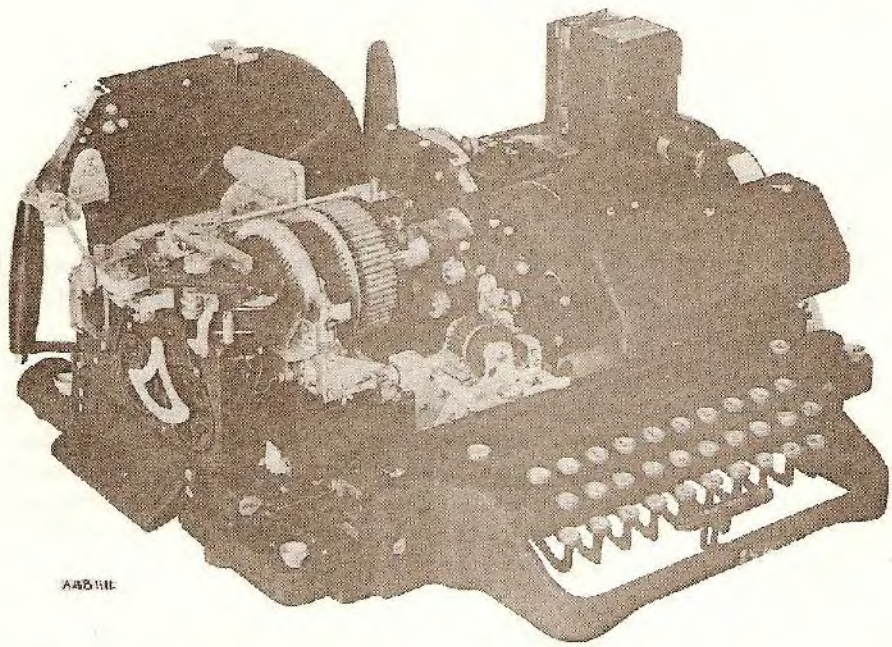
TELEGRAPH MACHINES - THE TELEPRINTER NO. 11

CONTENTS

INTRODUCTION

The Teleprinter No. 11 is a tape printing teleprinter and is the standard teleprinter used in the Teleprinter Automatic Switching System. Its speed of transmission is 50 bauds and it is designed to transmit and receive signals in accordance with the International Telegraph Alphabet No. 2.

Fig. 1 shows a picture of a Teleprinter No. 11 with the cover removed.



R 3335O

Fig. 1

The transmitter is designed to produce $7\frac{1}{2}$ unit signals i.e. a start signal of one unit and a stop unit of $1\frac{1}{2}$ units. The receiving mechanism is designed to accept 7 unit signals i.e. it will receive satisfactory signals with a minimum stop element of one unit duration.

The Telegraph Alphabet mentioned on the previous page is shown in Fig. 2.

START-STOP SIGNAL CODE.

A	–	O●●OOO●	P	0	OO●●O●●
B	?	O●OO●●●	Q	1	O●●●O●●
C	:	OO●●●O●	R	4	OO●O●O●
D	WHO ARE YOU	O●OO●O●	S	'	O●O●OO●
E	3	O●OOOO●	T	5	OOOOO●●
F	%	O●O●●O●	U	7	O●●●OO●
G	@	OO●O●●●	V	=	OO●●●●●
H	£	OOO●O●●	W	2	O●●OO●●
I	8	OO●●OO●	X	/	O●●O●●●
J	BELL	O●●O●O●	Y	6	O●O●O●●
K	(	O●●●●O●	Z	+	O●OOO●●
L	)	OO●OO●●	CARRIAGE RETURN		OOOO●O●
M	.	OOO●●●●	FIGURES		O●●O●●●
N	,	OOO●●O●	LETTERS		O●●●●●●
O	9	OOOO●●●	LINE FEED		OO●OOO●

R30288 SPACE OOO●OO●

KEY:- ● MARKING SIGNAL

O SPACING SIGNAL

Fig. 2

The Teleprinter No. 11 conforms to the C.C.I.T.T. recommendations, is of orthodox design and makes use of many of the mechanisms and principles of operation employed in the Teleprinter 7, in fact a large proportion of the parts are common to both machines.

The keyboard, described in more detail later, is a departure from previous designs being of the 'saw tooth' type. Depression of a key, in addition to releasing the transmitting mechanism, immediately positions the combination bars which determine the code to be transmitted. The merit of this arrangement lies in the fact that the keyboard is automatically locked against the depression of a second key without the need for a separate locking bar.

The transmitter is of the "striker" type, similar to that used on the Teleprinter No. 7 but with the components re-arranged to operate from the saw-tooth keyboard.

On the receiving side, the selecting mechanism embodies an orientation device which provides a means of checking and centralising the receiving margin. An improved typehead clutch has also been introduced.

Different manufacturing techniques and new materials (compared with Teleprinter No. 7) have been used. Great use has been made of zinc alloy (Mazdak) die castings for smaller parts. This process permits the manufacture of large numbers of parts to extremely close dimensional tolerances. In contrast to the Teleprinter No. 7, ball bearings are used for only four of the main bearings; oil impregnated sintered bronze bushes being used for the remainder and also for many of the minor pivots.

KEYBOARD AND TRANSMITTING MECHANISM

The Keyboard

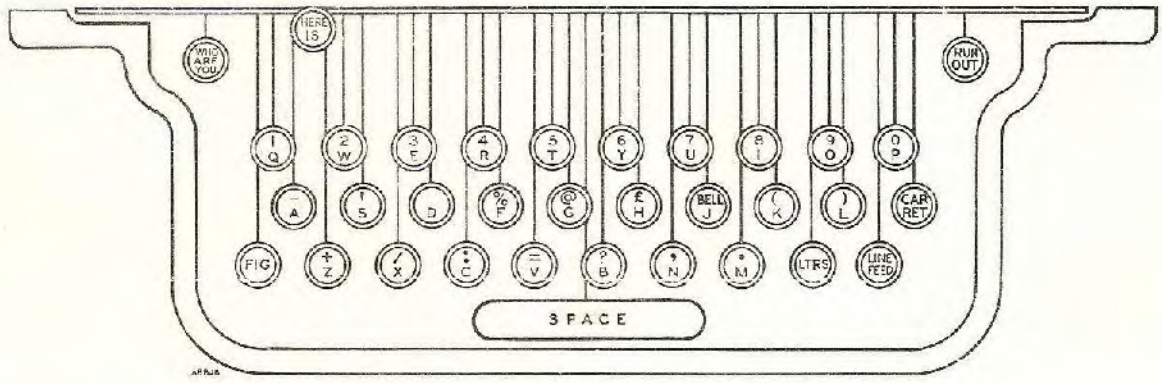


FIG. 7. TELEPRINTERS NOS. IIA & IIB-KEYBOARD LAYOUT.

R33352

Fig. 3

A plan of the layout of the keyboard is shown in Fig. 3. There are three rows of keys and, in addition, three auxiliary keys namely:

(1) The "Who are you" key which is used to obtain the answer back condition from the teleprinter to which it is connected.

(2) The "Run out" key which is used for testing purposes will, as long as it is depressed, cause a continuous repeat of the last signal combination transmitted.

(3) The "Here is" key which releases the answer back unit on the teleprinter so that the answer back code may be transmitted at will to the distant end of the circuit.

The "Carriage Return" and "Line Feed" keys are provided for use when the teleprinter is transmitting to a page printing teleprinter.

The principle of operation of the saw-tooth keyboard is illustrated in Fig. 4.

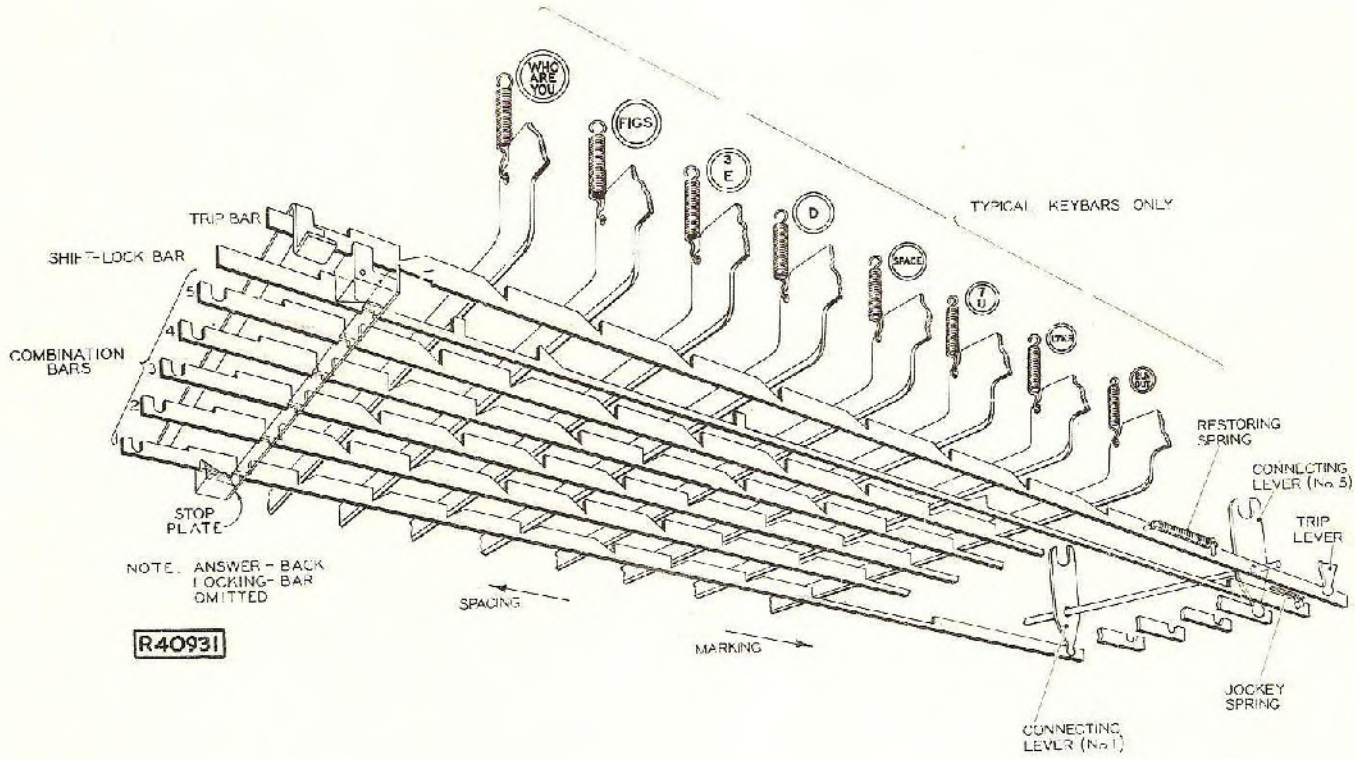


Fig. 4

Transmitting Mechanism

When a keyboard is depressed, the combination bars are immediately moved to the left or right determined by the projections on the combination bars immediately beneath the keyboard. Fig. 5 shows the principle involved when a 'D' or 'E' character keyboard is depressed. The five unit code for D is MSSMS and for E is MSSSS.

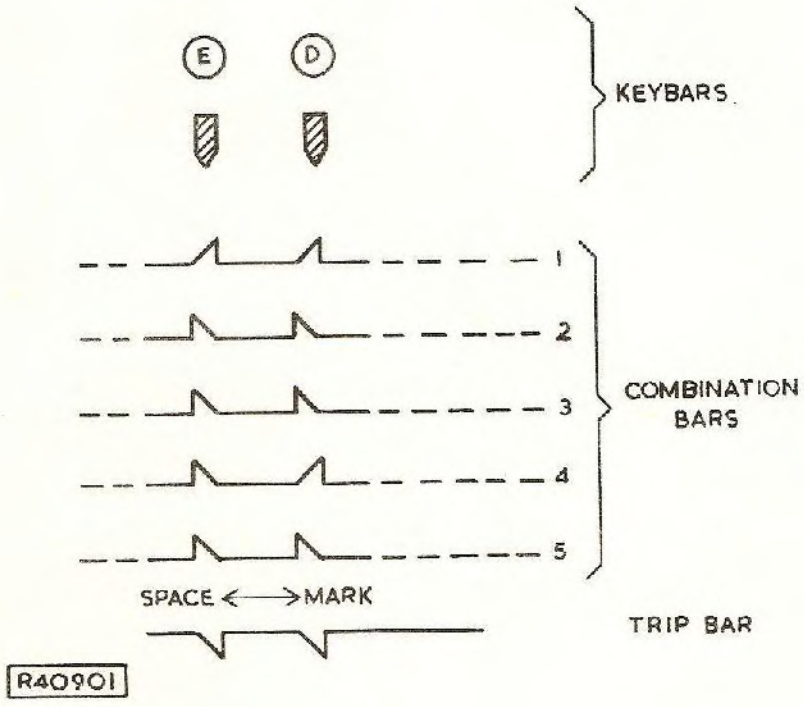


Fig. 5

Depression of any key will also cause the trip bar, which is normally held to the right against a stop by a spring (see Fig. 6), to move to the left. This causes the trip lever to move about its pivot in a clockwise direction. A pin fixed in the top arm of the trip lever, engages with a forked extension of the detent operating lever which is free to rotate about the detent control shaft and therefore is turned in an anticlockwise direction. Fig. 6 gives an isometric sketch of the transmitter trip mechanism.

Examination of the diagram shows that the latch carrier is pinned to the detent control shaft and carries on its right hand extremity the pivoted detent release latch. A step on the underside of this latch lies in the path of the upper arm of the detent operating lever. Thus the anti-clockwise movement of the detent operating lever is communicated to the detent control shaft via the latch and latch carrier.

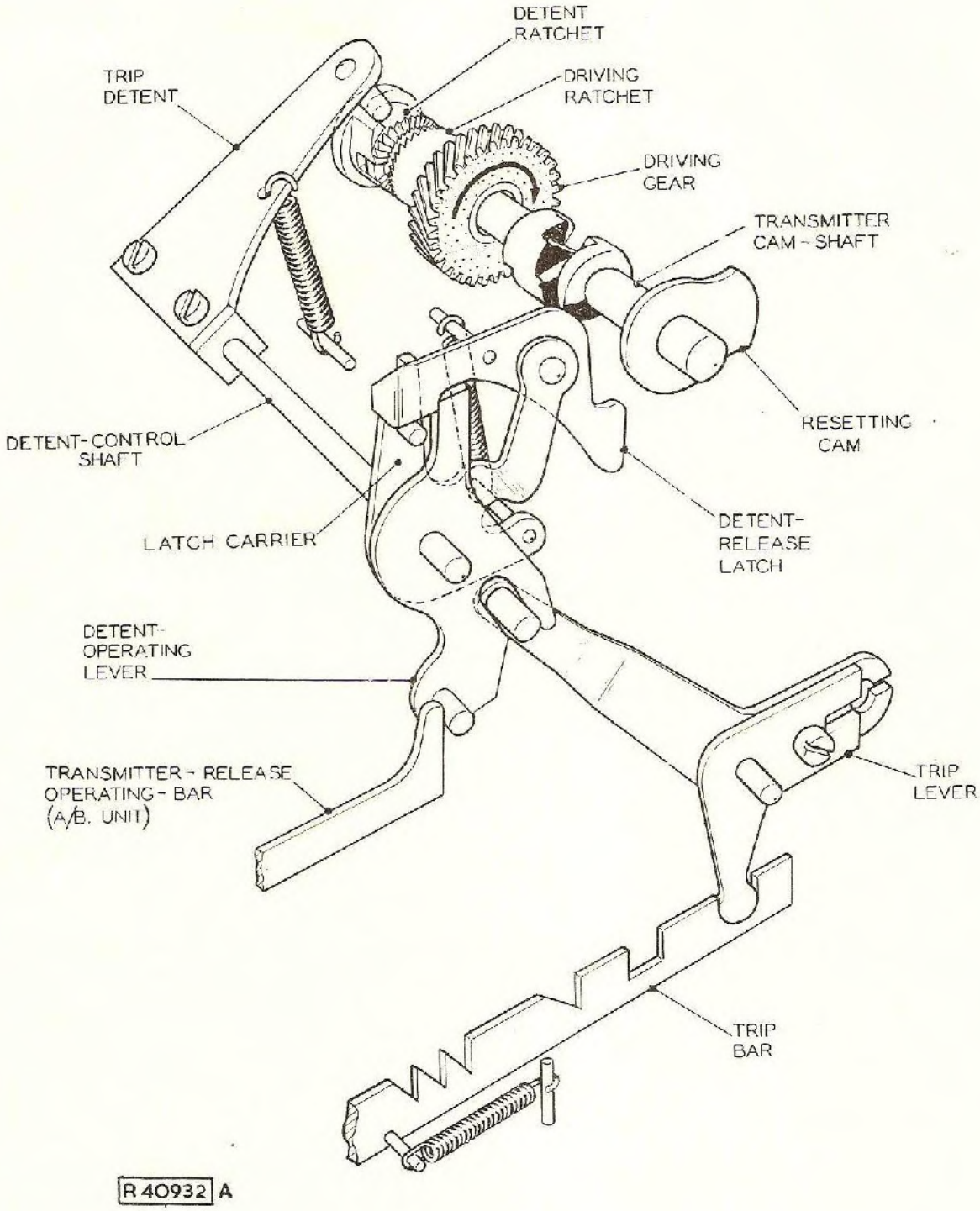

DETENT RATCHET
TRIP DETENT
DRIVING RATCHET
DRIVING GEAR
TRANSMITTER CAM - SHAFT
RESETTING CAM
DETENT-CONTROL SHAFT
LATCH CARRIER
DETENT-RELEASE LATCH
DETENT-OPERATING LEVER
TRANSMITTER - RELEASE OPERATING - BAR (A/B. UNIT)
TRIP LEVER
TRIP BAR
R 40932 A

Fig. 6

The trip detent is screwed to its control shaft and is normally urged in a clockwise direction by a spring so that the cylindrical projection on its end engages with a radial cam surface on the clutch ratchet; the latter is thus held out of engagement with the driving ratchet. The driving ratchet is fixed to the driving fear, which is free to rotate on the transmitting cam-shaft and is driven in a clockwise direction as shown.

When the detent is raised, the clutch ratchet is forced, by a spring, into engagement with the driving ratchet, and this causes the transmitting cam shaft to rotate in a clockwise direction. This is shown in Fig. 7.

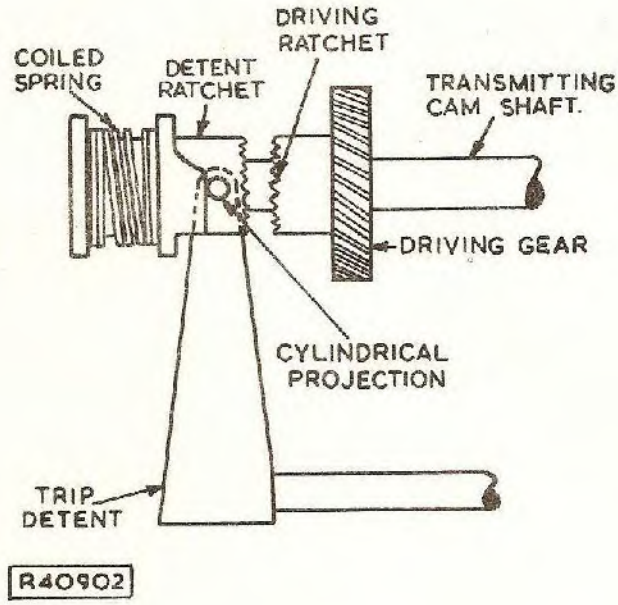


Fig. 7

Immediately after the transmitting cam shaft has commenced to rotate, the retention lever, Fig. 8, rides out of the notch in its cam.

When the transmitter cam shaft has rotated through parts of a revolution, (see Fig. 6) the right hand end of the latch is moved to the left by its cam and the stop on the underside of the top arm of the latch is disengaged from the detent-operating lever. The latch carrier is then free to move independently of the detent-operating lever and is rotated clockwise by the detent spring; thus, the cylindrical projection on the end of the detent is lowered into the path of the radial cam surface on the clutch ratchet, in readiness to disengage the ratchet at the end of the revolution of the transmitting cam shaft. This will occur even if the keyboard is held down indefinitely and the trip lever is held operated.

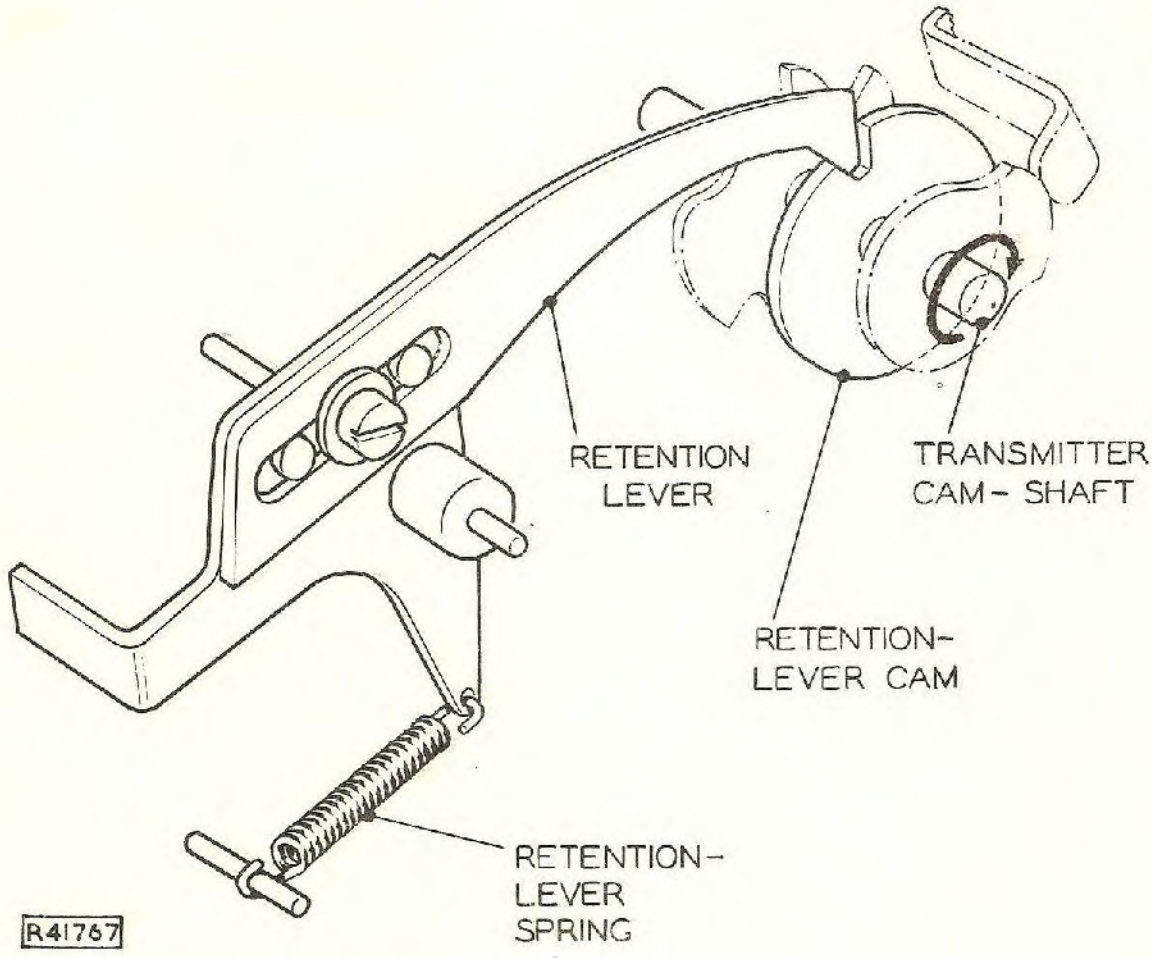


Fig. 8

After the clutch ratchet is disengaged from the driving ratchet, the transmitting cam shaft continues to rotate for a small fraction of a revolution until it is arrested by the retention lever as the latter drops in to the notch in its cam (Fig. 8).

Upon the release of the key, the trip bar is restored by its tension spring to its normal right hand position and the trip lever rotates in an anti-clockwise direction. The detent-operating lever is thereby rotated clockwise until the vertical arm of the lever is again caught by the latch.

Run-out facility

To provide the facility of transmitting one combination continuously a RUN OUT key is provided. The RUN OUT key, when depressed, engages with an extra-long indentation of the trip bar (see Fig. 4) thus imparting more movement to the trip bar than is given by the character keys. This has the effect of rotating the latch carrier (and therefore, the detent) through an angle greater than normal (see Fig. 6). When, however, the latch is disengaged from the detent-operating lever by its cam, the latch carrier is prevented from returning to its normal position because the pin on the latch carrier engages with the edge of the detent operating lever. Consequently, the detent will he held away from the ratchet so

long as the RUN OUT key is held depressed; the combination transmitted being that corresponding to the last character key depressed since the combination bars will still be in the positions to which they were moved by the operation of that key-bar.

Transmission of a Character

It has been explained that the depression of a key sets up a code combination on five combination bars and also causes the transmitting cam shaft to make one revolution. The mechanism for converting the code set up on the keyboard combination bars into a sequence of accurately-timed mark and space signal elements will now be described.

Figs. 9 and 10 are diagrams of the transmitting signal generating mechanism.

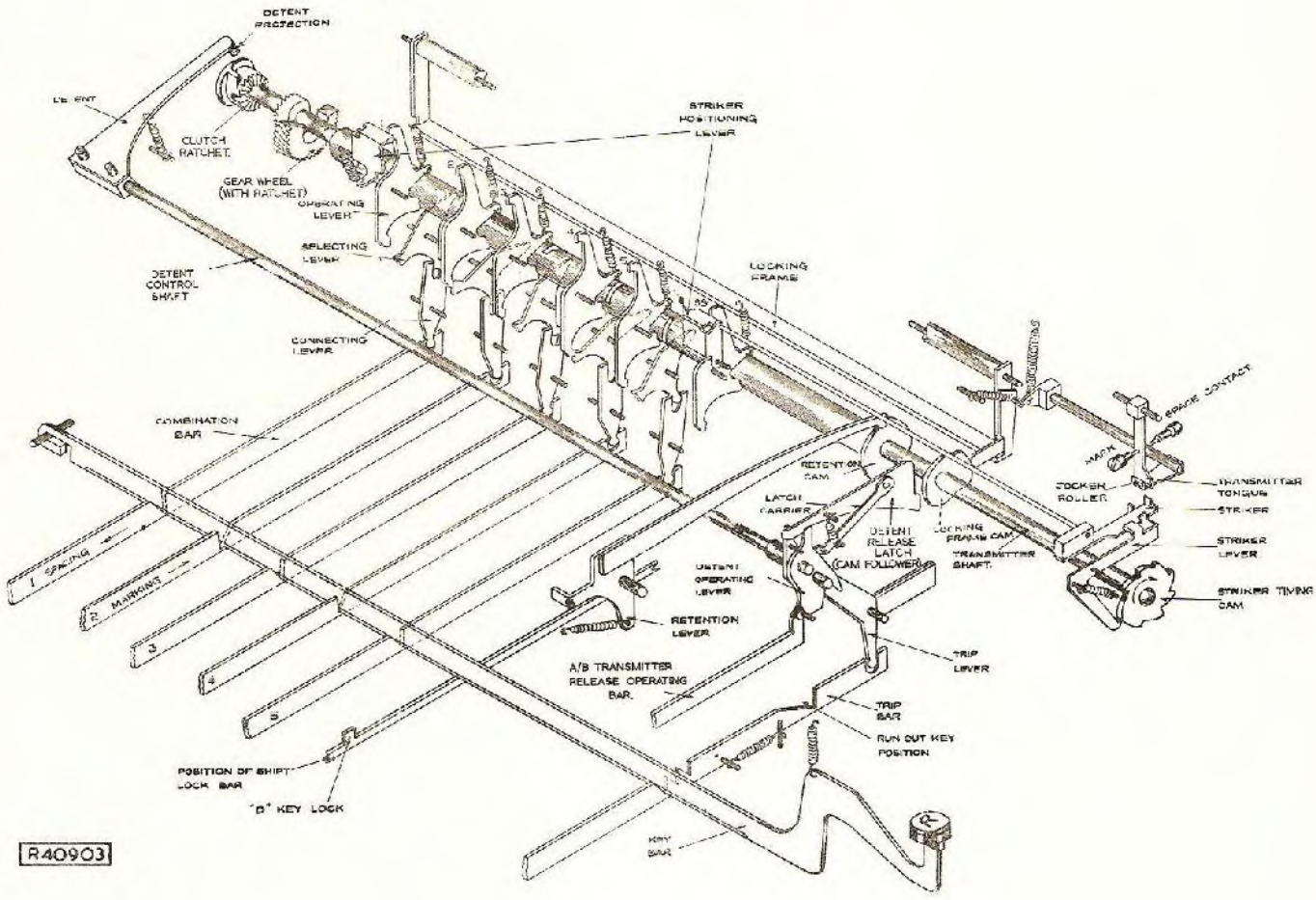


Fig. 9

Fig. 9 shows the set up when the 'R' key is depressed while Fig. 10 shows the cut away positions of the transmitter cam with the relative positions of the striker and selecting levers.

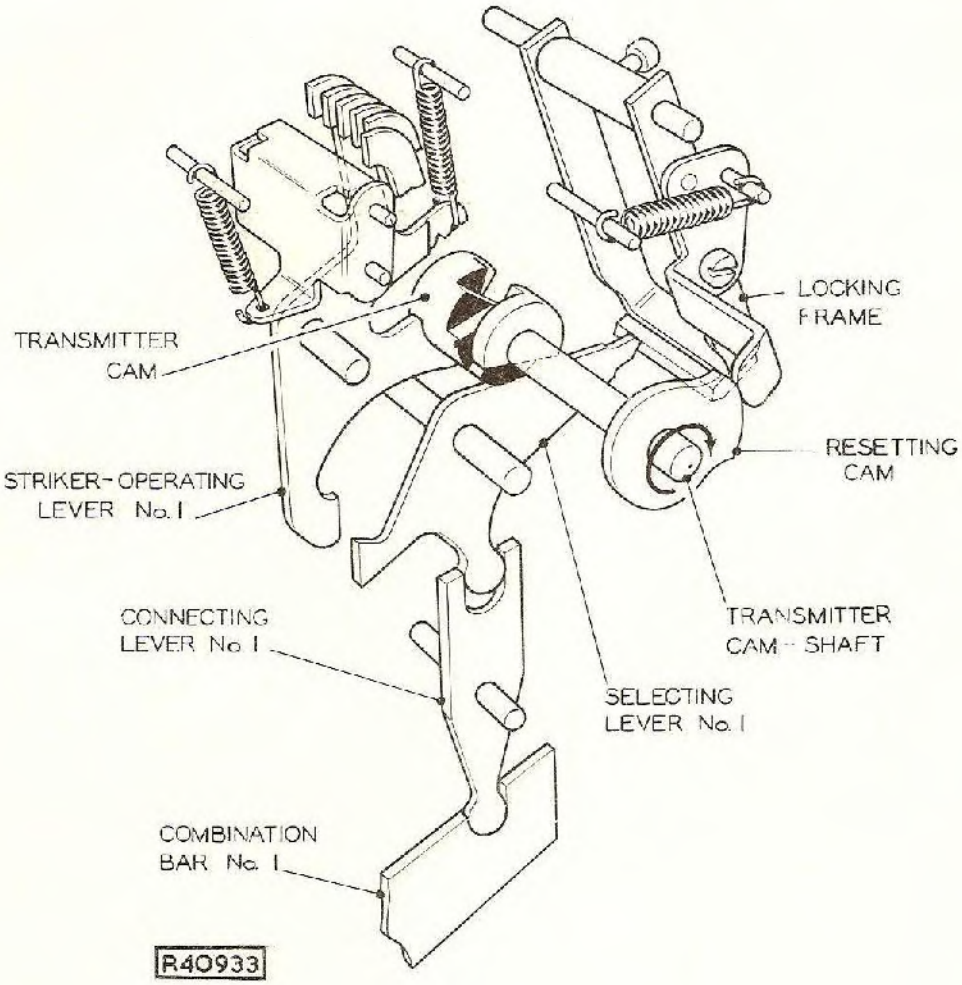


Fig. 10

The signal generating mechanism consists essentially of

(1) Selecting levers
(2) Striker operating levers
(3) Transmitting cam

(1) There are five selecting levers and each selecting lever has three projections:- The lower projections are engaged by the five connecting levers which are operated by the keyboard combination bars. The left-hand horizontal projections are used to control the movement of five striker operating levers and the right-hand horizontal projections for locking the keyboard combination bars in position as soon as the key is depressed.

(2) There are six striker-operating levers, one for each element of the character combination and one common to the start and stop elements. Each lever is mounted adjacent to the other levers on a common spindle (see Fig. 9) and each lever has three operational arms namely:-

(a) A horizontal arm extending to the right, which rides on the periphery of the transmitting cam;

(b) A lower vertical arm which acts in conjunction with the selecting levers.

(c) A upper vertical arm which acts on the common striker positioning lever.

(3) The transmitting cam has six flats cut into it. The flats are arranged sequentially and are located so that the horizontal arms of the striker operating levers ride on them one after the other when the respective positions of the corresponding selecting levers allow them to do so. When an operating lever rides on to its flat, its upper vertical arm is moved to the left against the striker positioning lever.

The Transmitter Tongue

The transmitter contact tongue is a small lever, fitted with contacts. The lever is mounted vertically and pivoted at its upper end on the contact-block assembly. The tip of the tongue is bevelled to form a knife edge which is divided into two sections by a slot. The striker operates on one section and the jockey roller on the other. The contact tongue plays between two contact screws which are adjustable on their mounting blocks. The left hand (mark) contact is connected to the negative battery supply and the right hand (space) contact to the positive battery supply.

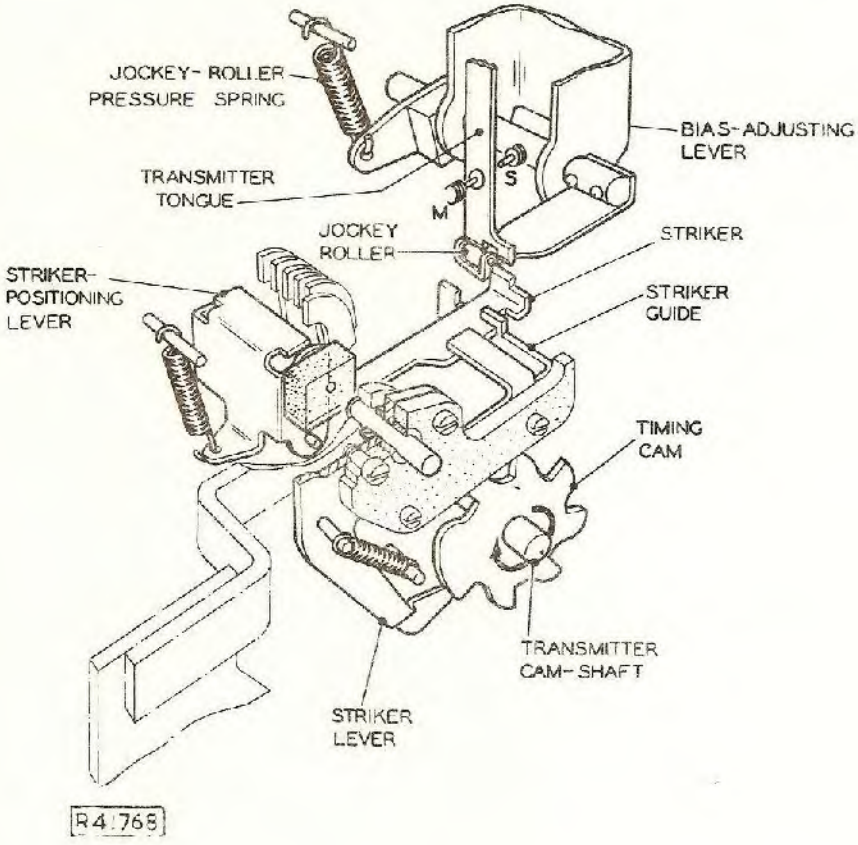


Fig. 11

The Jockey Roller

The jockey roller is pivoted at the end of an arm attached to a spindle (see Fig. 11). A spring attached to an arm at the other end of the spindle holds the jockey roller against the knife edge on the contact tongue. The complete assembly is pivoted so that it can be moved laterally, thus providing one adjustment for bias. The jockey roller is provided to give adequate contact pressure, small transit time and freedom from bounce.

The Locking Frame

The locking frame is actuated by a cam on the transmitting shaft immediately the shaft commences to rotate (see Fig. 9). The knife-edges at the ends of the right-hand projections of those selecting levers which have been set to the marking positions will lie below the knife edge of the locking frame (those levers set to the spacing position will lie above). The knife edge of the locking frame thus moves between the right hand projections of the selecting levers and locks them in these positions until the transmission of the character is completed, when the transmitting shaft again comes to rest and the locking frame is withdrawn by its cam. The action of locking the selecting levers ensures correct transmission of the character combination and also, via the connecting levers, locks the keyboard combination bars in position, thus preventing the operation of a second key whilst the transmission of the character is in progress.

Summary of Operations When Transmitter Cam Shaft Commences to Rotate

(i) The retention lever rides out of the notch in its cam (see Fig. 9).

(ii) The locking frame is operated by its cam so that its knife-edge moves in the lock the selecting levers into the position they have been moved into by the depressed keybar.

(iii) The start-stop operating lever causes the striker to move to its spacing position.

(iv) As the cam continues to rotate, the flats on the cam are presented to each of the operating levers in sequence, and, if the selecting levers permit, the operating levers will move in an anti-clockwise direction; these elements will be spacing elements. The upper vertical arms of the operating levers will under these conditions move the striker positioning lever to the left so that on operation of the striker lever the striker pushes the transmitter tongue to space.

(v) After the sequence of operation for sending the fifth code element are completed the transmitting cam will have rotated to a point at which a flat portion is not presented to any of the operating levers and the striker takes up its normal position. Thus the striker is in the marking position and when it is moved upwards, a marking current is transmitted for the stop signal.

Just as the start-stop operating lever commences to ride on to its flat on the transmitting cam, the clutch ratchet is withdrawn by the detent projection, the retention lever drops into the notch in its cam thus preventing further rotation. The locking frame is withdrawn from the selecting levers and the keyboard is freed for the depression of another key.

Fig. 12 shows schematically the timing of the various cams. The relative positions of the various cam operations during a revolution of the transmitting cam can be clearly seen.

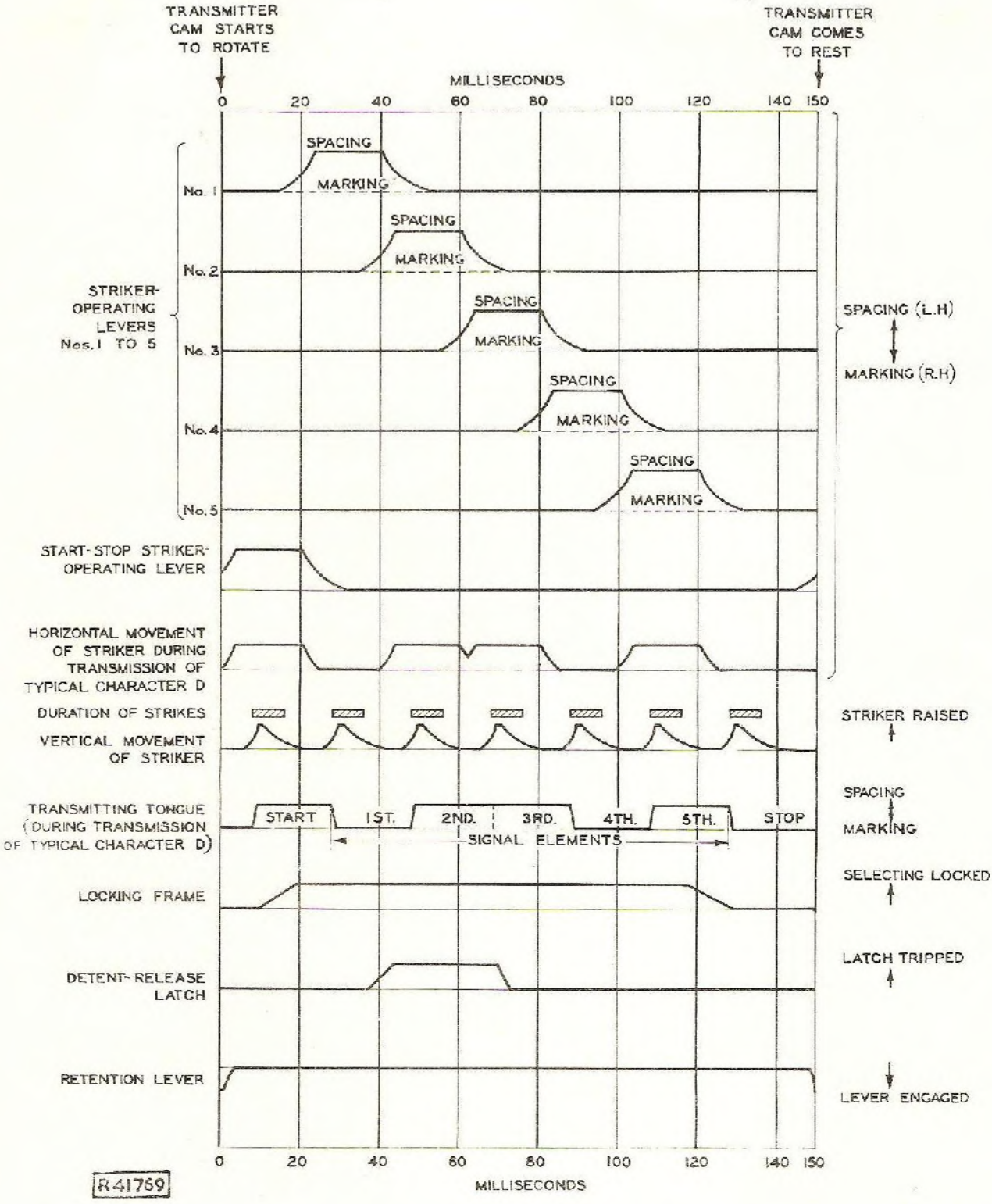

TRANSMITTER CAM STARTS TO ROTATE
TRANSMITTER CAM COMES TO REST
MILLISECONDS
0 20 40 60 80 100 120 140 150
STRIKER-OPERATING LEVERS Nos. 1 TO 5
No. 1
No. 2
No. 3
No. 4
No. 5
SPACING
MARKING
SPACING (L.H)
MARKING (R.H)
START-STOP STRIKER-OPERATING LEVER
HORIZONTAL MOVEMENT OF STRIKER DURING TRANSMISSION OF TYPICAL CHARACTER D
DURATION OF STRIKES
VERTICAL MOVEMENT OF STRIKER
STRIKER RAISED
TRANSMITTING TONGUE (DURING TRANSMISSION OF TYPICAL CHARACTER D)
START
1ST.
2ND.
3RD.
4TH.
5TH.
STOP
SIGNAL ELEMENTS
SPACING
MARKING
LOCKING FRAME
SELECTING LOCKED
DETENT-RELEASE LATCH
LATCH TRIPPED
RETENTION LEVER
LEVER ENGAGED
R41769

Fig. 12

RECEIVING AND SELECTING MECHANISM

The Electromagnet

The electromagnet is shown in Fig. 13. It consists essentially of a U shaped permanent magnet with laminated pole pieces and a laminated armature. The movement of the laminated armature and its extension is limited by two stops. The two coils of the electromagnet almost completely enclose the armature which passes through them as shown.

The magnetic circuit of the electromagnet is such that a marking signal causes the armature to move over to the mark stop while a spacing signal causes the armature to move over to the space stop /Figs. 13(b) and (c)/.

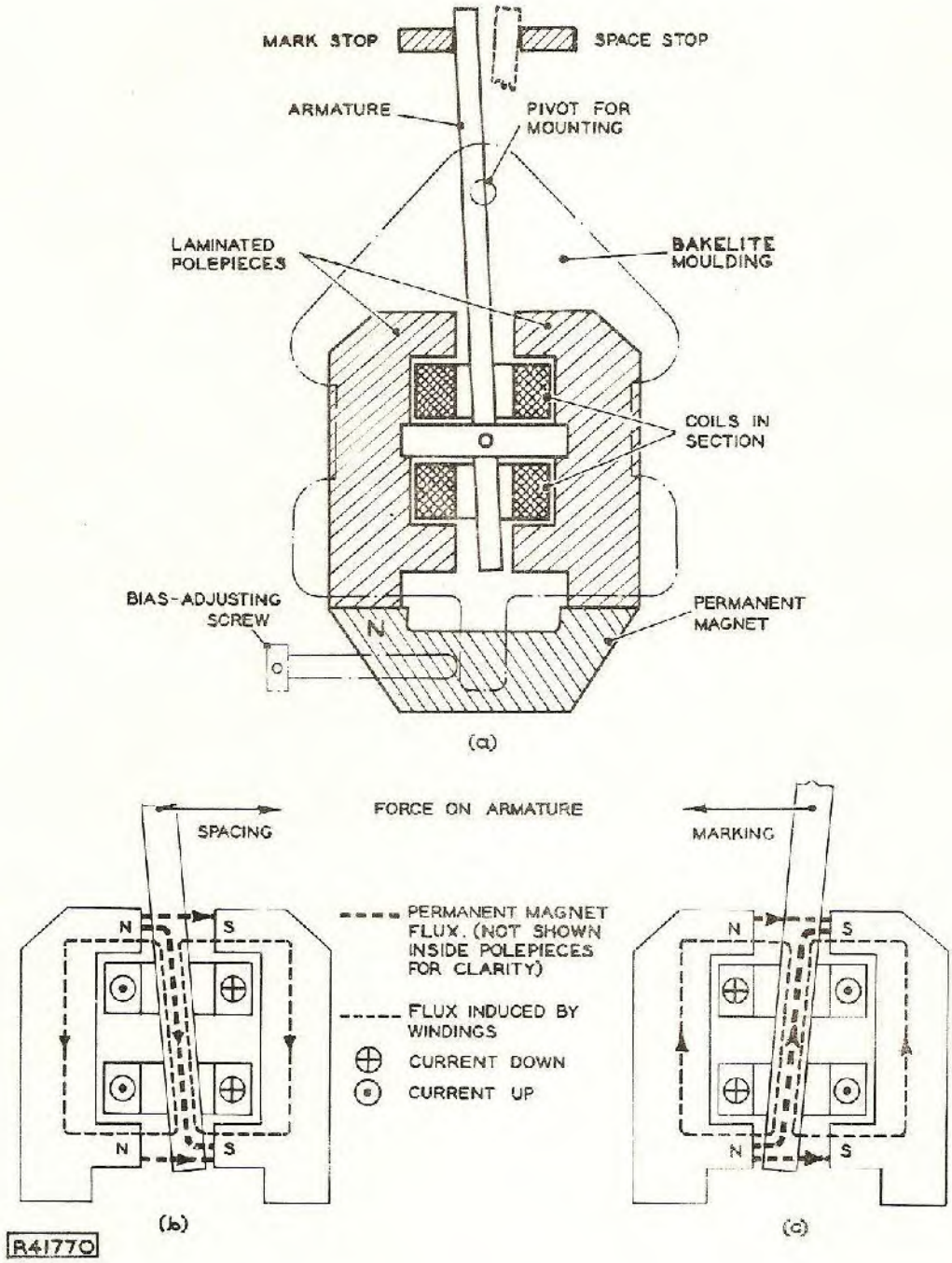


Fig. 13

The Orientation Facility

The receiving cam unit includes an orientation facility whereby the instants at which the selections for the five code elements take place can be varied with relation to the commencement of the start signal. The orientation facility enables the margin of the receiving mechanism to be adjusted for the best reception of the signals. This is very useful as a maintenance check of the performance of the receiver and in B.P.O. practice the orientation device is employed to adjust for equal amounts of 'early' and 'late' margin, since the effects of distortion in double-current signalling systems are just as liable to cause signal transitions to be early as late. The adjustment is achieved by means of an adjusting block which determines at what point in time the receiving cam shall commence its rotation. With the orientation device set midway, the teleprinter receiving mechanism is in the position of maximum equal margin.

In addition to its use for setting the receiving mechanism in its optimum position the orientation facility can be used to check that the receiving mechanism is in good order. The overall margin can be measured by feeding the electromagnet with undistorted signals and progressively moving the setting of the orientation adjustment, first in one direction and then in the other until the reception fails; the overall margin is found by subtracting the two readings, one from the other.

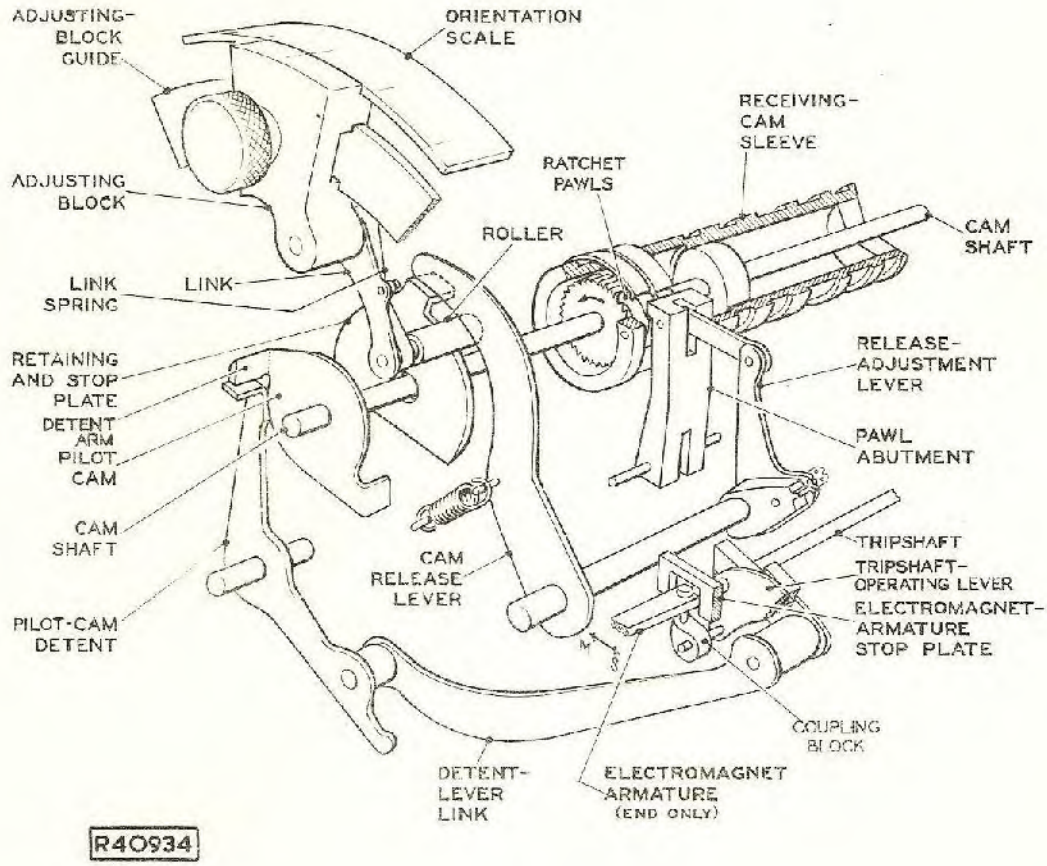


Fig. 14

Fig. 14 shows the additional mechanism for providing the orientation adjustment facility, it consists of the following.

(1) The pilot cam driven from the receiving cam shaft by means of a friction clutch.

(2) A pilot cam detent which is coupled to the trip shaft and which controls the starting and stopping of the pilot cam.

(3) The adjusting control block by means of which the instant of engagement between the pilot cam and the orientation link may be varied. The block is adjustable on a guide plate and may be locked in position by a knurled screw compressing a locking spring. A scale, calibrated from 0 to 100, is provided adjacent to the path of the block which has a pointer fixed to its upper surface. Pivoted at the lower end of the block is the orientation link which is deflected in an anticlockwise direction by the cam through a shock absorbing spring.

(4) A release lever assembly (see Figs. 14 and 15) consisting of the cam release lever and release adjustment lever both of which are fixed to the same spindle. When the cam deflects the orientation link, the cam release assembly is operated and the receiving cam pawl abutment is also operated. The instant of operation is dependent upon the setting of the orientation adjustment block. Fig. 15 shows the pilot cam trip mechanism.

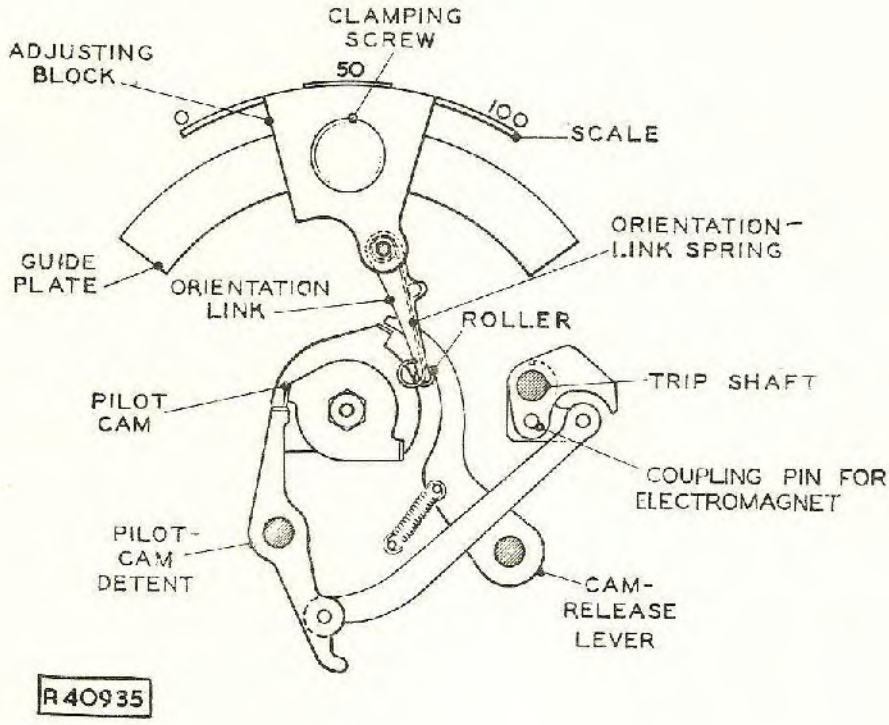


Fig. 15

Sequence of operations

When the start signal of a character is received, the armature of the receiving magnet moves to its space position and thus causes the trip shaft to be tilted anticlockwise. A movement is now conveyed to the pilot cam detent via the detent lever link, and the cam detent is withdrawn from engagement with the pilot cam which then rotates under the action of a friction clutch. (see Fig. 15).

The pilot cam makes one revolution in 130 ms before it is again arrested by the detent when it is restored due to the electromagnet armature being moved to the marking stop on receipt of the stop signal. During its rotation, the cam engages

with the orientation link spring which moves the orientation link against the receiving cam release lever; this in turn allows the ratchet pawls to engage with the rotating ratchet and the receiving cam sleeve thus commences to rotate.

The receiving cam unit is identical with that of the cam used on the Teleprinter 7B except that its rest position has been advanced 60°. This means that in this position the finger setting pin is opposite the first selecting finger instead of the third selecting finger. Thus, the operations which in the Teleprinter No. 7B occur during the start signal, namely the resetting and lowering of the fingers now take place during the period between the selection of the fifth element and the end of the rotation of the cam.

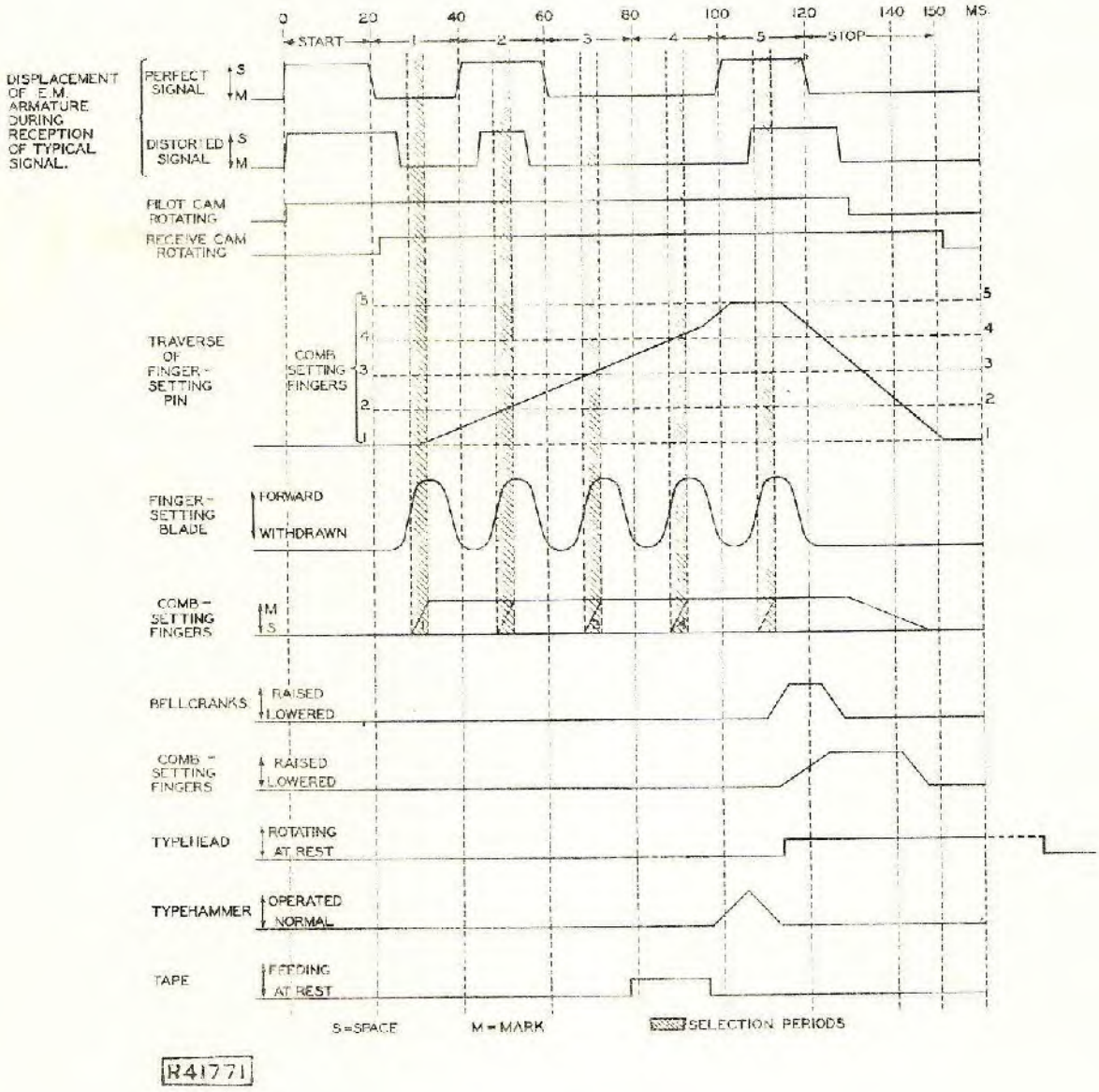


Fig. 16

A general timing diagram of the sequence of operations of the receiving mechanism is given in Fig. 16. Examination of this shows the operations of the various components relative to one another.

Fig. 17 gives a schematic diagram of the receiving and selecting mechanism when it is at rest. It should be noted that the finger setting pin lies opposite the 1st comb-setting finger when the mechanism is at rest (N.B. Fig. 17 is an isometric sketch and at first glance it might appear to the student that the finger setting pin is opposite the 3rd comb setting finger. Closer examination, however, reveals that as the finger setting pin strikes the comb setting finger at a point midway between the block and top of the comb setting finger the finger setting pin is actually opposite the 1st finger).

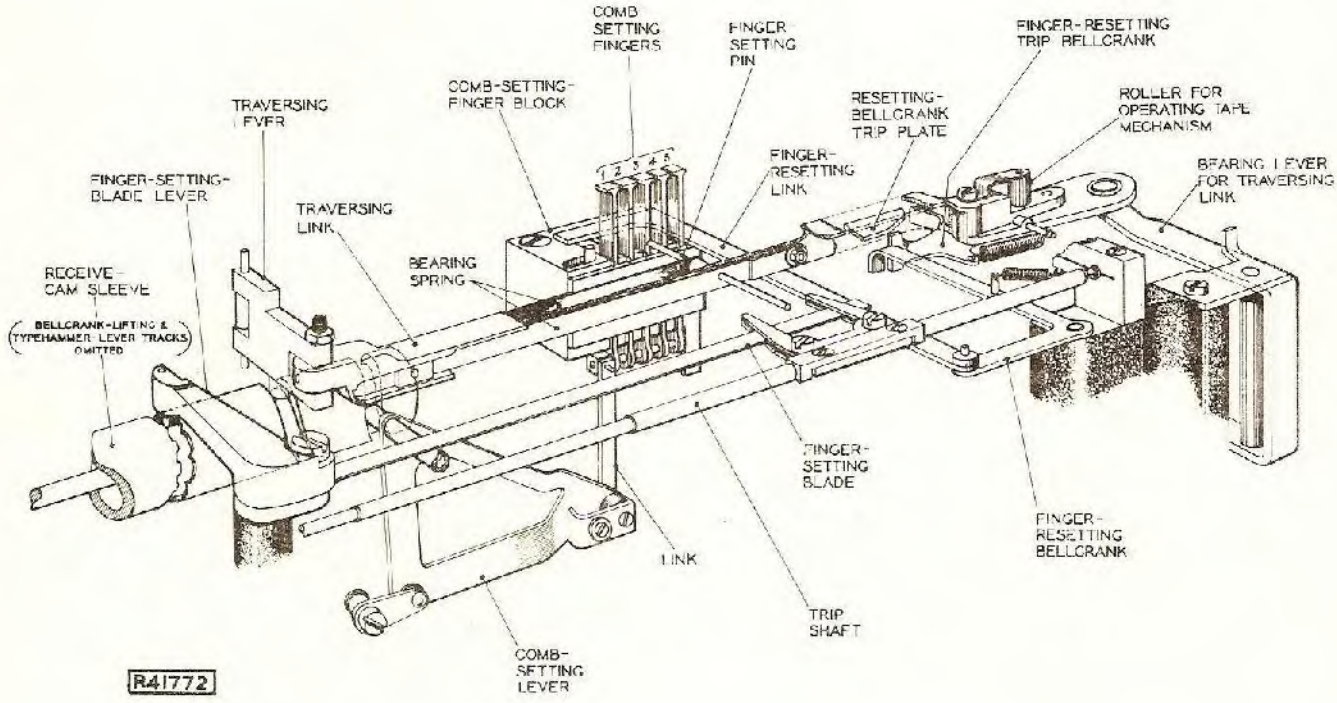


Fig. 17

As the principle of operation of the receiving cam unit and selecting mechanism is the same as for the Teleprinter No. 7, no further description will be given.

The Combination and Typehead Units

The principle of operation of the combination head is the same as that of the Teleprinter No. 7 and is explained in E.P. TELEGRAPHY 4/1. Certain signal combinations i.e. "Letter Shift", "Figure Shift" and "All Space" have special control levers which are associated with the respective bell cranks and these in conjunction with the feed throw-out lever prevent any feeding of the paper tape when these combinations are received.

The typehead

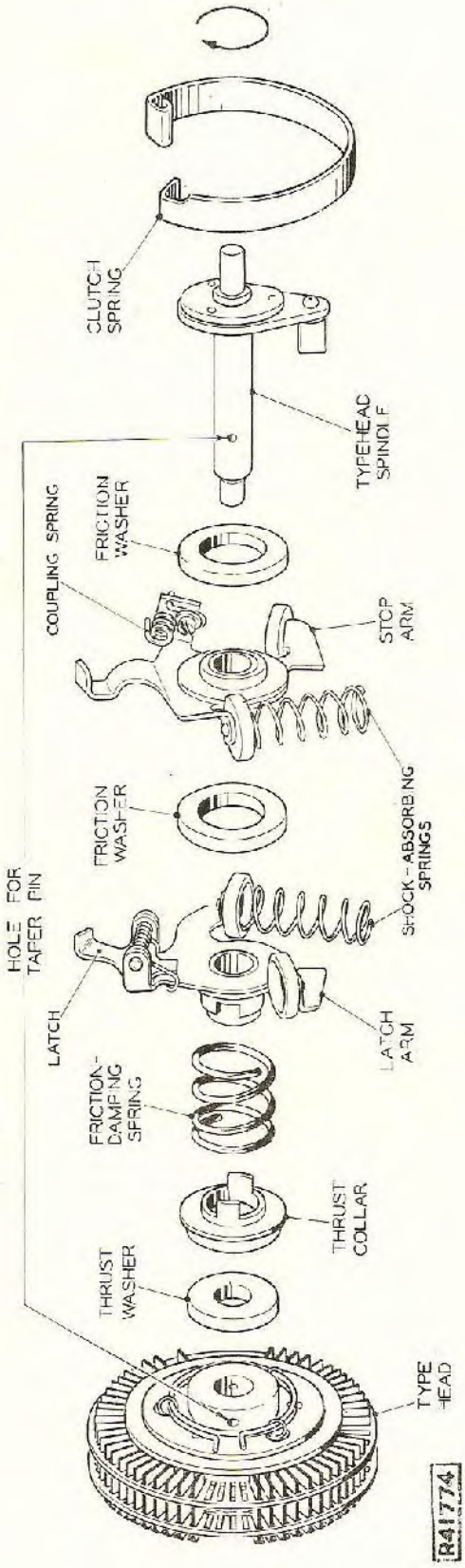


Fig. 18

The construction of the driving clutch and the latch mechanism is shown in the exploded and assembled views in Figs. 18 and 19.

The stop arm and the latch arm are assembled scissor fashion on the typehead spindle together with oilite friction washers the whole being sandwiched together by the stout axial compression spring. Two shock absorbing springs are inserted between the cups mounted in the two arms. When released the typehead is driven by a clutch on the conventional drum type which slips when the typehead is latched to a selected bellcrank. In the latched position the bellcrank is gripped between the stop face of the stop arm and the latch on the latch arm while the rear ends of the two arms grip a projection on the typehead spindle and thus locate the type racks. The initial shock, of the impact between the stop arm and the selected bell crank is absorbed by the shock absorbing springs. After impact the two arms make two or three oscillations about their common axis before coming to rest gripping the bell cranks.

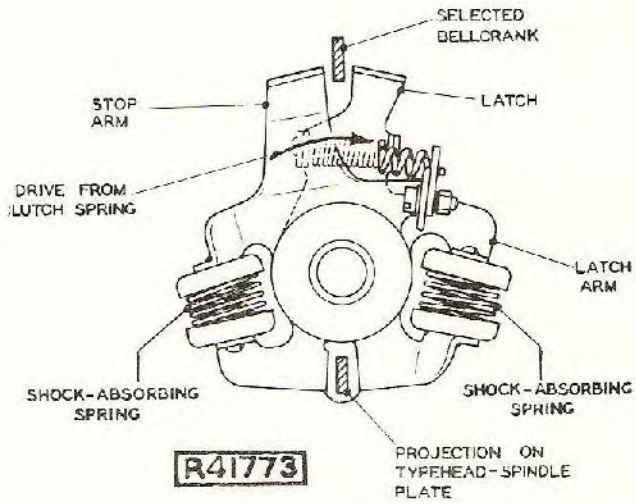


Fig. 19

The tape-roll holder

The tape-roll holder shown in Fig. 20 is fitted with a handle to facilitate its removal and replacement on the teleprinter. It is supported on a bracket fitted at the rear of the teleprinter base, outside the dust cover, and is automatically locked in position by a simple latch.

The roll of paper tape is accommodated on a boss which is pivoted on a spindle fixed to the main body of the roll holder. A disc, which supports the tape-roll is fixed to the boss, and a brake acting on the rim of the disc prevents spinning of the disc which would tend to produce loose turns of tape. A circular spring incorporated in the boss, presses outwards against the inner surface of the cardboard ring on which the tape is wound and prevents its rotation independent of the boss when the brake is applied. A tape guard in the shape of a circular strip is fixed on the main body so that it lies around the outer edge of the tape-roll disc and thus prevents loose turns of the tape from getting between the disc and the body of the roll holder.

The tape-roll rotates clockwise and tape from the top of the roll passes over a fixed guide-roller, under the brake lever, over a second fixed guide-roller and is then guided by a curved metal strip and an exit roller to the tape and ink-ribbon unit. When the tape is held under tension by the tape unit during a paper feed the brake lever is rotated clockwise away from its stop and this movement is communicated via an intermediate lever to the brake-block arm. The brake-block is lifted away from the rim of the tape-roll disc and the roll becomes free to rotate. When the pull on the tape ceases, the brake is re-applied and any tendency for the roll to spin is prevented.

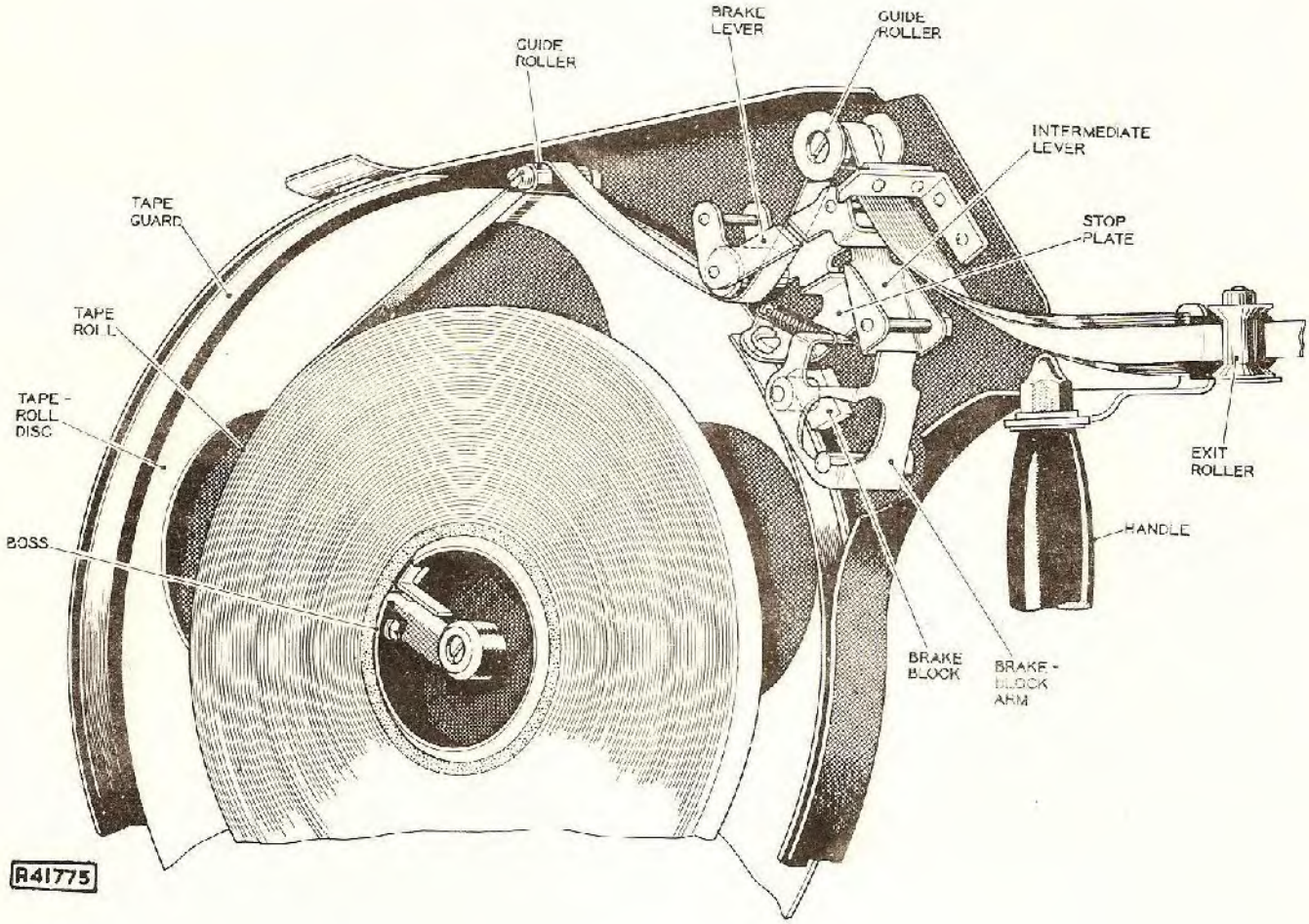


Fig. 20

Tape and Ink-Ribbon Mechanism

The functions of the tape and ink-ribbon mechanism are:-

(a) To move the paper tape forward, preparatory to printing, each time a character selection is set up on the receiving mechanism except in the case of certain selections for which a paper feed action is not required.

(b) To cause alarm contacts to close thus operating an external alarm, in the event of the paper feed being defective.

(c) To provide a means of feeding the paper tape from the teleprinter by hand.

(d) To provide a platen surface for the printing mechanism.

(e) To accommodate the ink-ribbon spools, provide ink-ribbon feed action and a means for automatically reversing the direction of feeding when either spool is exhausted.

(f) To provide a shield to keep the ink ribbon from contact with the rapidly rotating typehead.

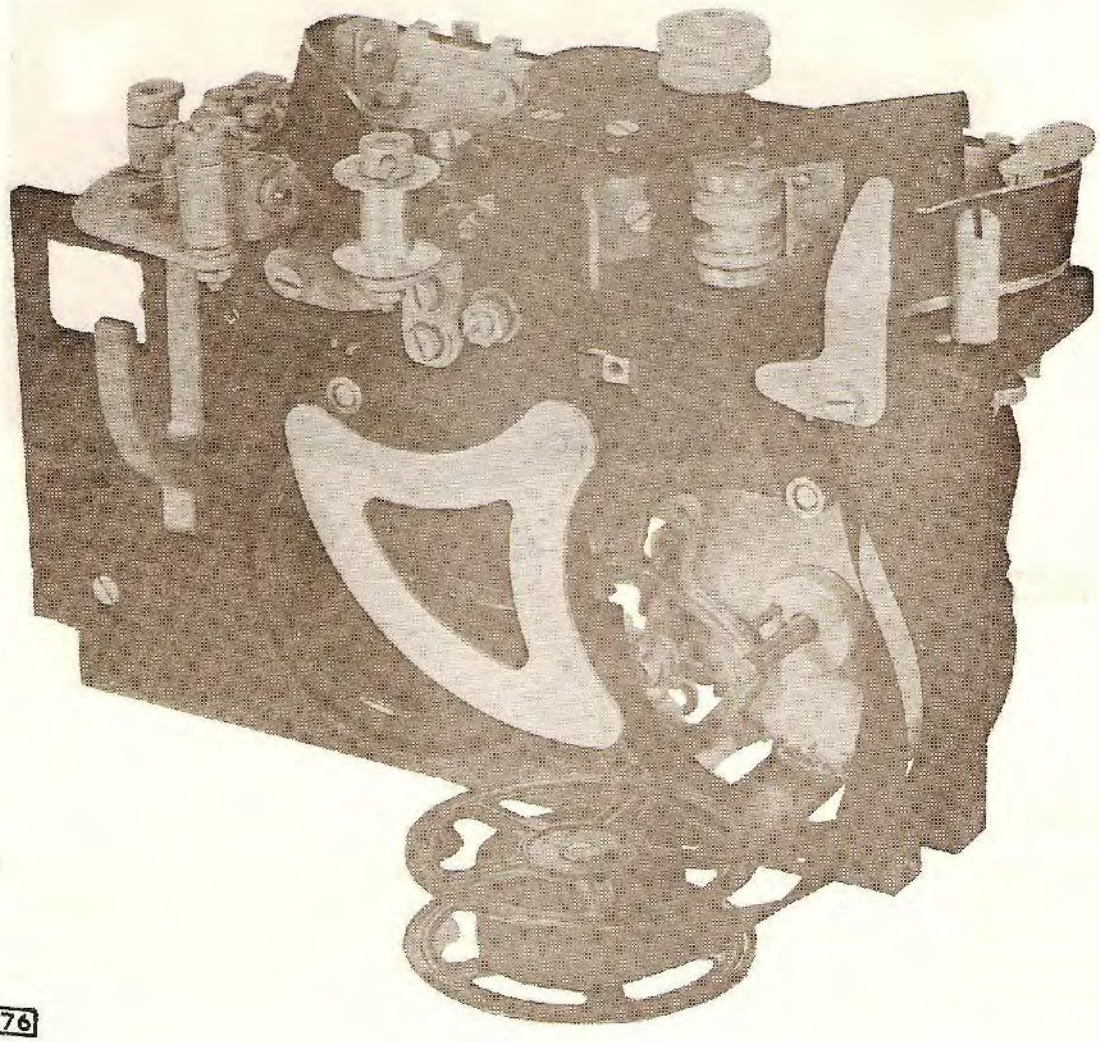


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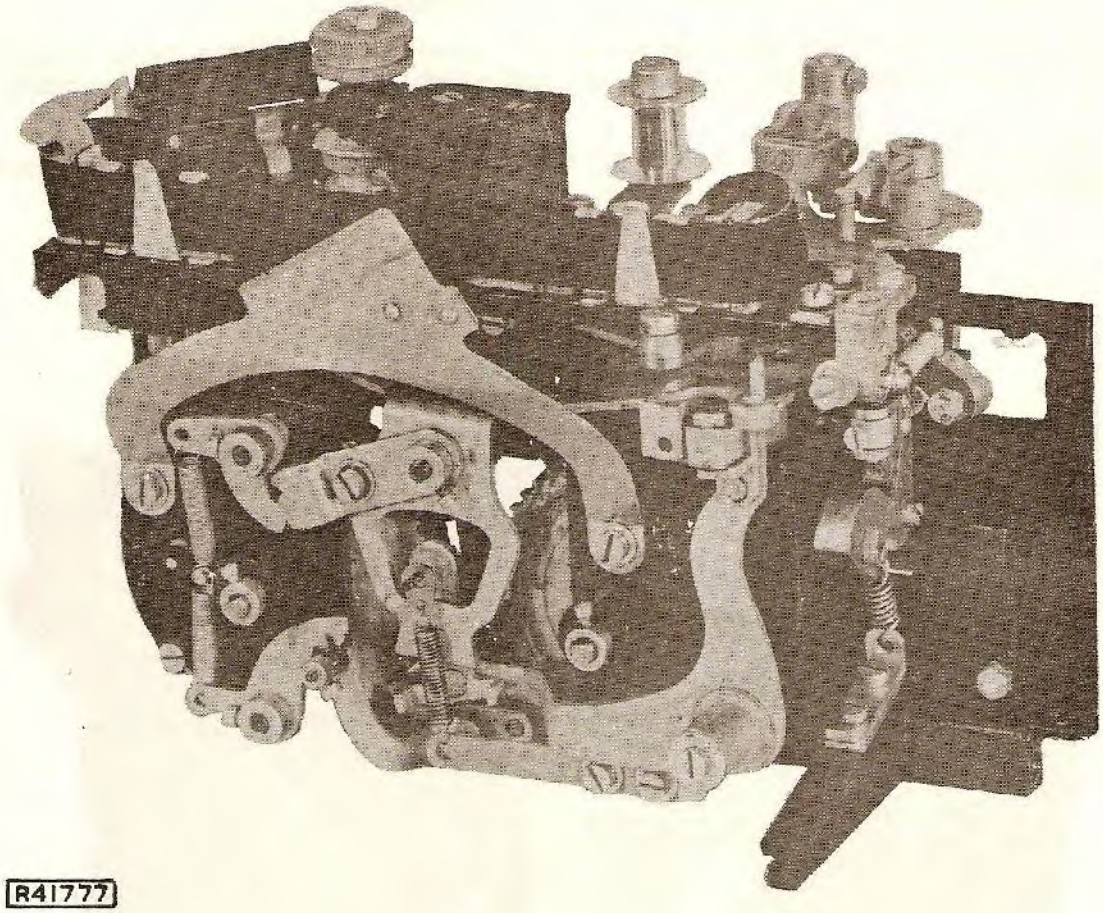
Fig. 21

The mechanism is shown in two views one external the other internal in Figs. 21 and 22. It is fixed on a single casting which is hinged to the main base of the teleprinter. It is normally firmly latched in position but can be unlatched and swung outwards to expose the printing faces of the types.



R41777

Fig. 22

The platen

This consists of a cylindrical metal core, free to rotate about a fixed central spindle. The metal core is coated with a surface of hard rubber. As the platen rotates the paper tape is moved forward and a different area of surface is thus presented to the typehead for each impression. The rotation of the platen also reduces the frictional drag on the tape.

Tape Feed and Pressure Rollers

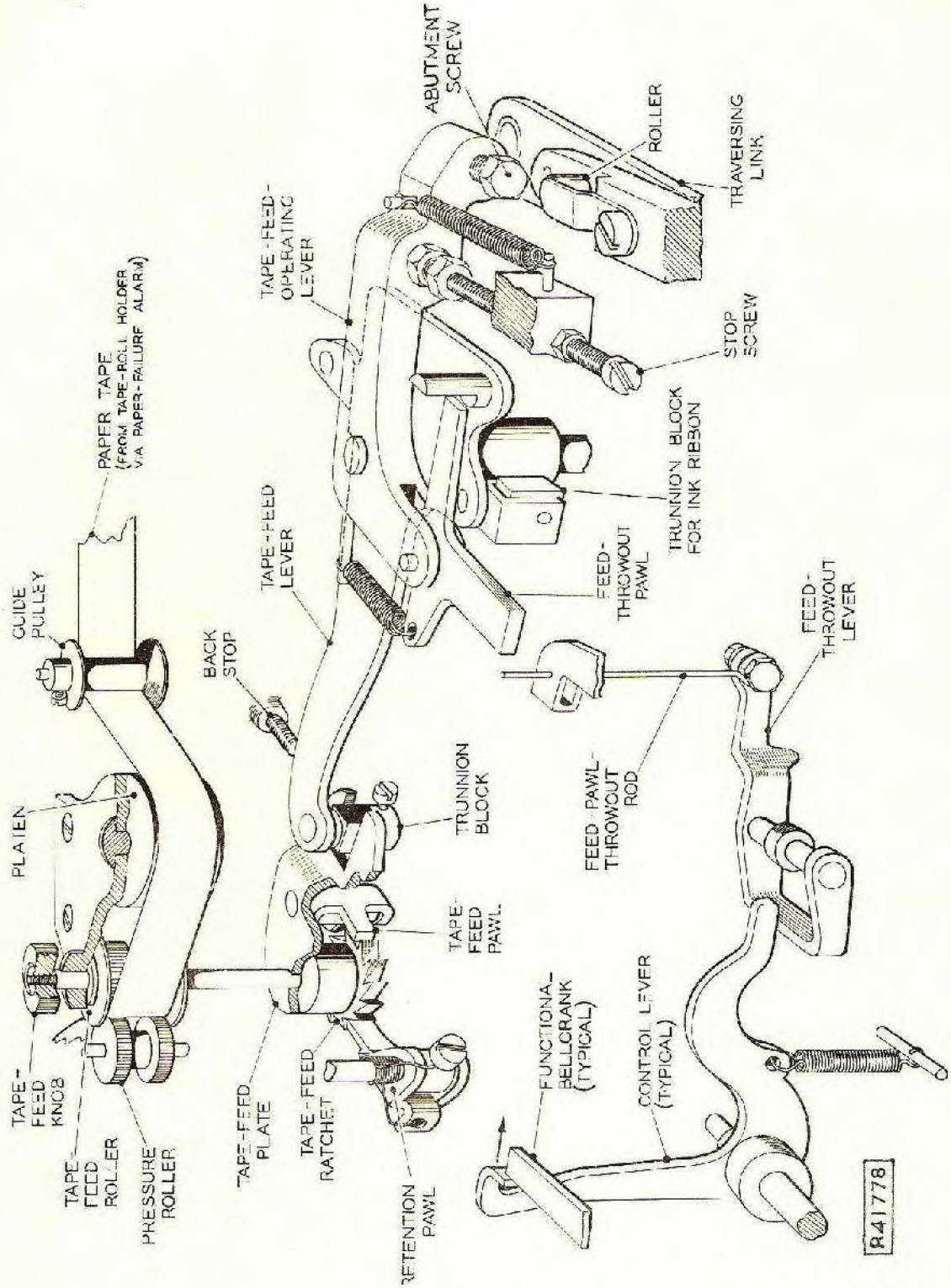


Fig. 23

The paper tape is taken from the tape-roll holder at the rear of the teleprinter via the jaws of the paper-fail-alarm mechanism to the guide pulley shown in Fig. 26, thence round the platen and between the tape-feed and pressure rollers. The tape-feed roller is fluted but the pressure roller has a plain surface. Both rollers are cut away so that they grip the tape at its edges only i.e. clear of the printing.

The pressure roller is self aligning and the pressure roller assembly is spring loaded so that the pressure roller presses the tape against the feed roller with considerable pressure, thus ensuring that when the feed roller rotates the tape moves with it. A finger grip is provided on the pressure roller assembly so that it may be pulled away from the feed roller for insertion of the tape.

Feeding of the tape

The mechanism (see Fig. 23) is operated by the traversing link which moves forwards, and then backwards, once during the selection of each character. The hardened steel roller on the end of the traversing link engages with the head of an abutment screw in the tape feed operating lever. In its rest position the lever is held by its spring against a stop screw.

The tape feed operating lever is forked to carry the feed throw-out pawl. This pawl is acted upon by a spring so that in its normal position one of its operational arms engages with a pin on the tape feed lever which is free to move about the same pivot as, but independently of, the tape feed operating lever. Thus, as the traversing link is moved forward during the selection of a character combination, the tape feed operating lever is moved anti-clockwise (viewed from above) and, providing the feed throwout pawl is in its normal position, the tape-feed lever is moved with it.

The tape-feed lever carries at its end a square trunnion block, pivotted on a vertical pin, which engages in a slot in the tape feed plate. The tape feed plate pivots about the spindle of the tape feed roller and carries the tape feed pawl which is held by a spring in engagement with the tape feed ratchet. Thus each anti-clockwise movement of the tape-feed lever produces a rotation of the tape-feed roller and the tape is fed forward.

When the traversing link is moved backward to its normal position, the tape-feed operating-lever is moved clockwise under the influence of its restoring spring and the tape-feed pawl is moved back one tooth on the ratchet in readiness for the next feed cycle. A retention pawl is provided to hold the feed ratchet and roller in position during this operation.

A knob, for manual feeding of the paper tape is secured to the top end of the tape-feed roller.

Tape feed throw-out

For certain signal combinations viz. "Letter Shift" "Figure Shift" and "All Space", feeding the paper tape is not required and therefore a feed throw out mechanism is provided. Associated with the combination head bell-crank for each of these combinations is a control lever, one end of which is held against the bell-crank by a spring; the other end normally rests against an extension of a common feed throw-out lever. The other end of the feed throw-out lever carries the feed pawl throw out rod, the upper end of which is normally flush with its guide. A typical control lever is shown in Fig. 22 when one of these bell-cranks is selected and falls into the prepared channel of the receiving combs, the associated control lever and the feed

throw out lever move on their pivots and the feed pawl throw out rod is lifted and projects in the path of the feed throw out pawl.

Paper-failure Alarm-mechanism

In order to bring about operating economies it is an advantage to be able to rely on the reception of the answer back signal from a distant teleprinter at the beginning and end of a transmission of a message as a sufficient acknowledgement of the receipt of that message. Under these conditions failure of the paper-feed mechanism to feed paper correctly could cause message failure and in consequence a reliable paper failure alarm is essential. The fault conditions to which the alarm mechanism must respond are:-

(a) breakage of the tape

(b) jamming of the tape not followed by breakage

(c) failure to feed the tape sufficiently so that overprinting of successive characters occurs.

The elements of the alarm mechanism are shown in Fig. 27 and 28.

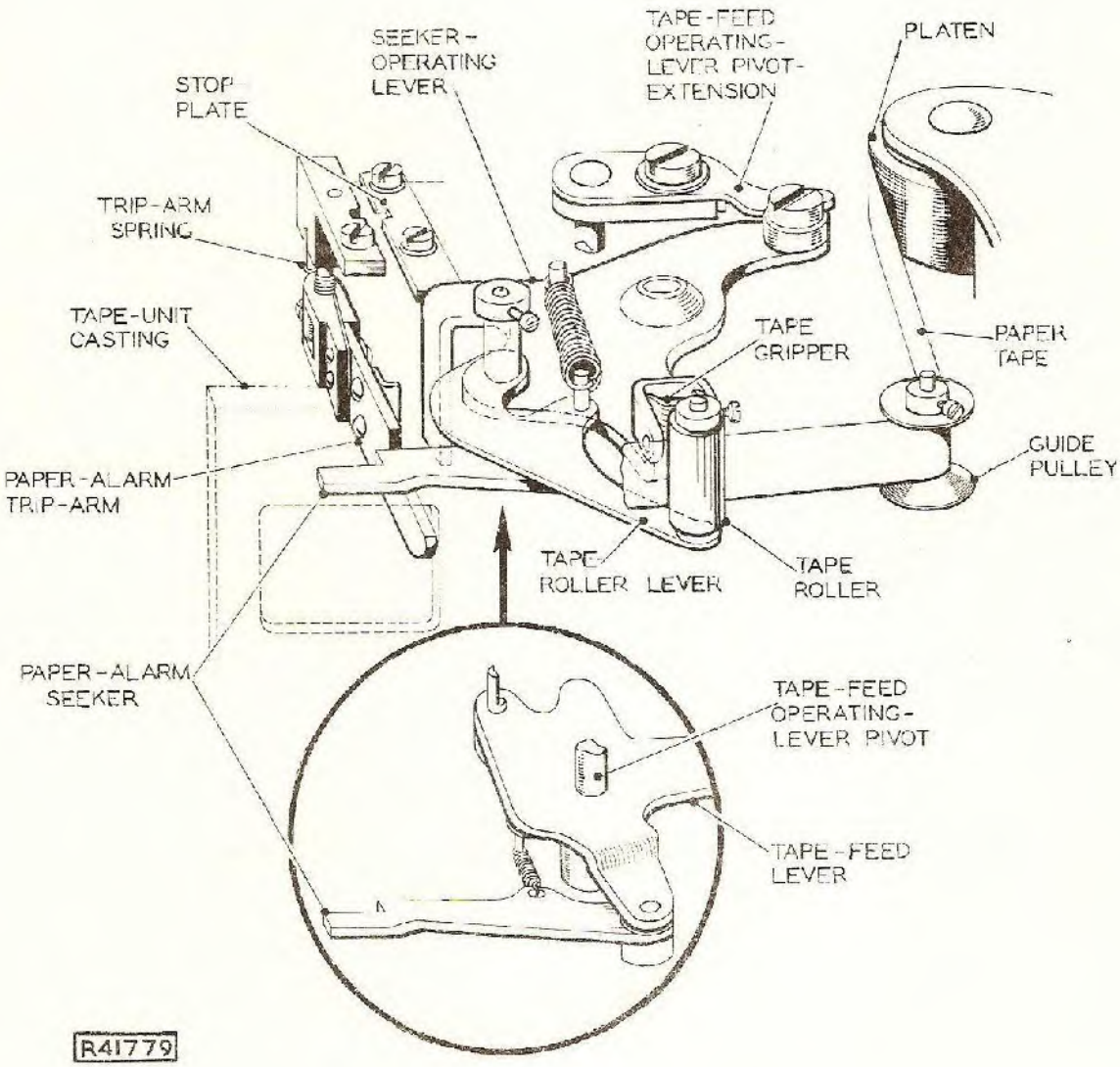


Fig. 24

The seeker operating lever rotates horizontally about its pivot and carries a self aligning tape gripper.

The tape-roller lever is pivoted on the seeker operating lever and carries the tape roller which is held against the tape gripper by the action of a spring on the lever, thus forming a pair of jaws through which the paper tape is passed on its way from the tape roll holder to the platen.

Thus when the tape is moved forward the seeker operating lever is rotated anti-clockwise (as seen from above in Fig. 24) on its pivot; the angle of rotation being determined by the amount the tape moves. As the seeker operating lever rotates, a vertical extension at its rear comes into contact with the paper-alarm seeker and moves it outwards. The seeker is mounted on a spingle on the tape-feed lever and is spring loaded so that it is normally against the shoulder on the paper alarm trip-arm which is held against the casting by a light spring.

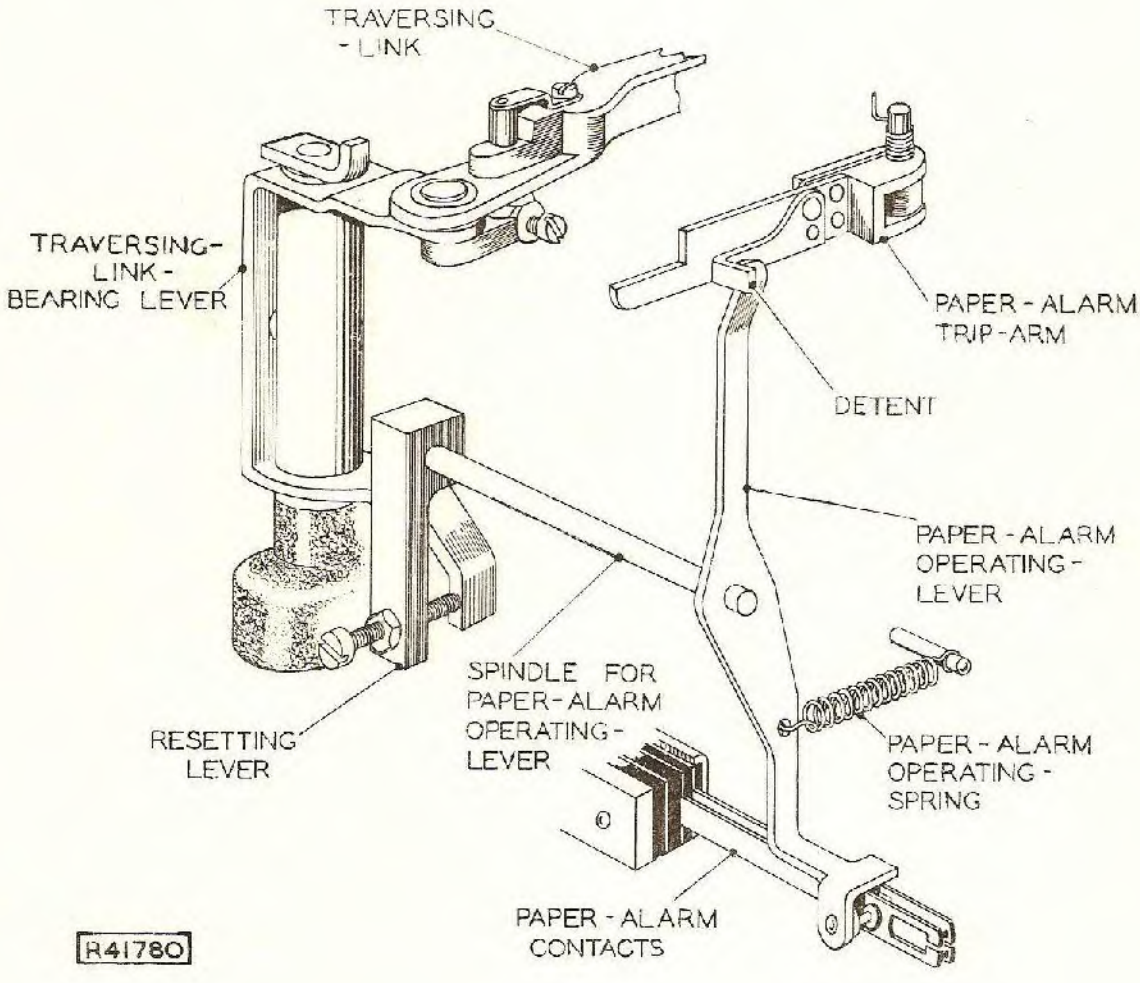


Fig. 25

At the same time as the seeker operating lever rotates due to the paper movement, the paper seeker is withdrawn towards the front of the machine by the rotation of the feed lever. If the paper movement is satisfactory for each oscillation of the traversing lever i.e. between 0.06 in. and 0.125 in. then the paper seeker is moved clear of the paper alarm trip arm and, when the tape feed lever is subsequently restored it will come to rest in its normal position against the shoulder on the paper alarm trip arm. If, however, the paper movement is below the minimum, the step at the end of the seeker is allowed to fall behind the shoulder of the paper alarm trip arm and when on the restoration of the tape feed lever, the seeker moves to the rear again the trip arm moves with it and operates the paper alarm contact operating mechanism.

The seeker operating lever is reset at the end of each paper feed cycle by an extension of the tape feed operating lever pivot (see Fig. 25). During this resetting action, the tape gripper jaws slide backwards on the paper tape which is held by the feed and pressure rollers. When reset the seeker operating lever rests against the adjustable stop plate (see Fig. 23). The resetting extension resets the seeker operating lever after the step on the paper-alarm seeker has passed the shoulder of the trip arm.

Paper failure alarm contact operating mechanism

The paper alarm operating lever is mounted on a common spindle with a resetting lever as shown in Fig. 25. The lower end of the resetting lever has an adjustable screw which abuts against an extension at the lower end of the traversing link bearing lever. The operating lever is normally held in the unoperated position by a detent on the trip arm. When the trip arm is displaced the lower end of the operating lever moves inwards under the action of its spring, causing the paper alarm contacts to close. When the operating lever is in the operated position the end of the detent projection rests against it so that the trip arm is held displaced. The circuit is so designed that the external alarm circuit when once operated provides an audible or visible alarm until reset manually.

Feeding of the ink ribbon

The feeding of the ink ribbon is effected at the same time as the feeding of the paper tape. As can be seen in Fig. 23 the tape-feed lever carries a second trunnion block pivoted horizontally, which abuts against a similar but vertically pivoted block on the ribbon-feed lever, see Fig. 26.

The oscillatary movement of the tape-feed lever is transferred to the trunnion block on the ribbon-feed lever. Pivoted at the end of the lower arm of the ribbon-feed lever is the ribbon-feed pawl. The upper end of the pawl (shown dotted in Fig. 26) is fitted with a horizontal pin, one end of which can engage with either of the two ratchets as determined by the position of the ribbon-feed-change lever, a toggle spring is attached to the other end of the pin. Thus when the ribbon-feed lever is actuated. The feed pawl causes one of the ratchets to be stepped forward one tooth and the associated spool is rotated.

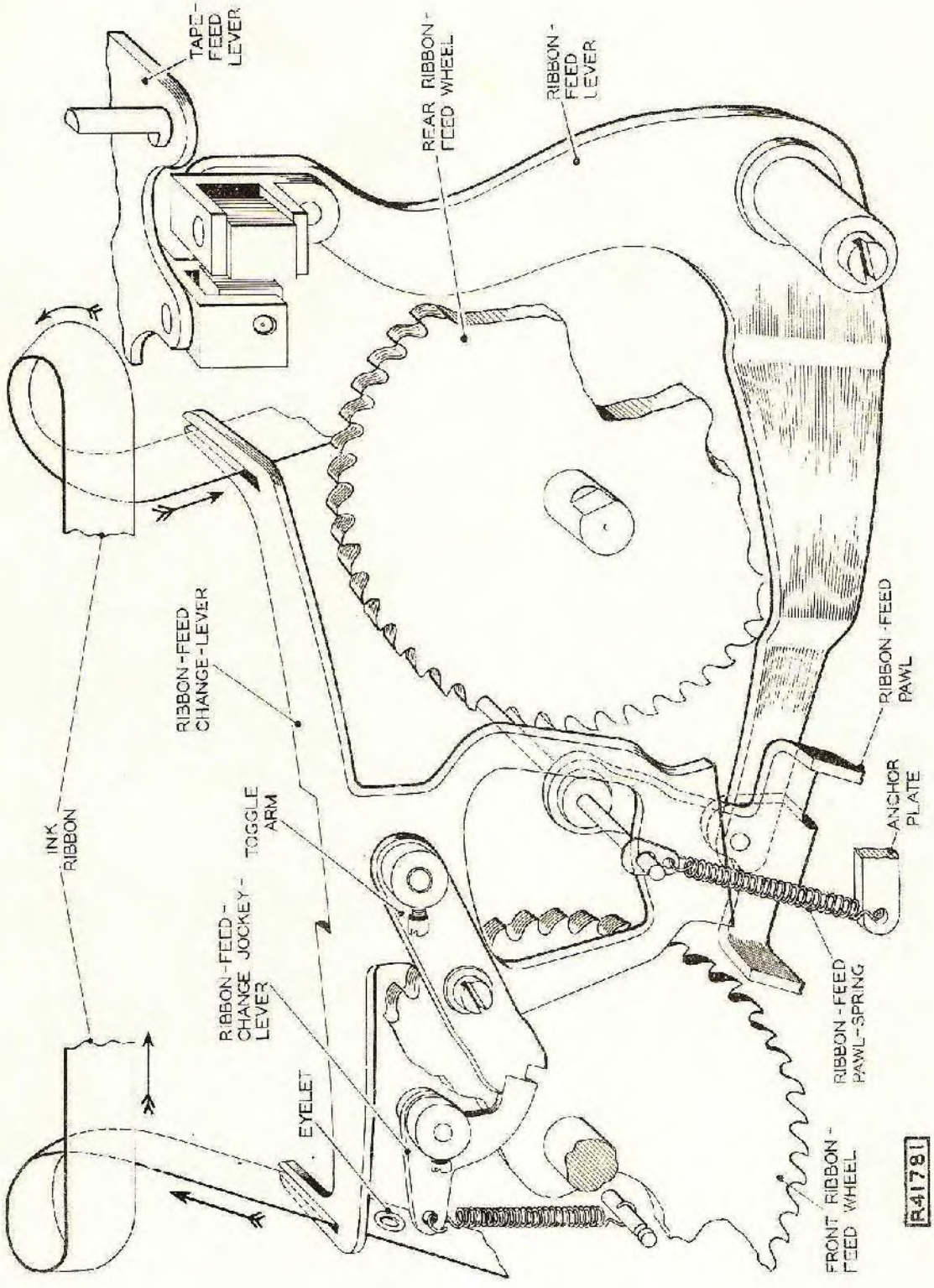

TAPE-FEED LEVER
REAR RIBBON-FEED WHEEL
RIBBON-FEED LEVER
RIBBON-FEED CHANGE-LEVER
INK RIBBON
TOGGLE ARM
RIBBON-FEED-CHANGE JOCKEY-LEVER
EYELET
RIBBON-FEED PAWL
ANCHOR PLATE
RIBBON-FEED PAWL-SPRING
FRONT RIBBON-FEED WHEEL
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Fig. 26

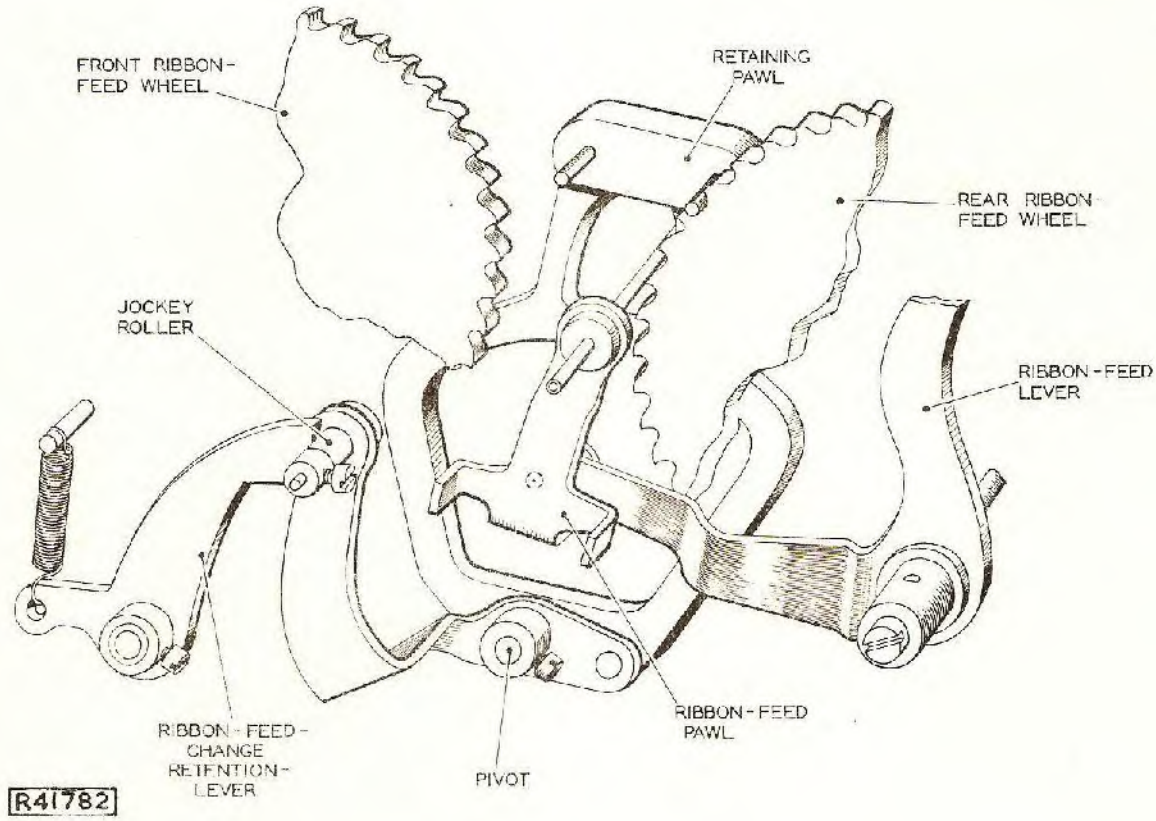

Fig. 27

Fig. 27 shows the ribbon-feed mechanism viewed from the other side. The action of the ribbon-feed pawl can be more clearly seen in this diagram. A retaining pawl, which can be seen in Fig. 27, is provided to hold the ratchet during the return movement of the feed pawl. The retaining pawl can also take up one of two positions as determined by the ribbon-reverse mechanism; a jockey roller is provided to hold the pawl in one or the other position.

The ink ribbon spools are housed in the tape and ink-ribbon casting. Each spool is supported on a spingle to which is attached a boss with a driving pin which projects into the hole in the ribbon spool. A triangular keep-plate retains the spools in position on their spindles and is designed so that it can be swung about a pivot to enable either of the spools to be withdrawn. The ends of the spindles remote from the spools are fitted with ratchet wheels.

The ribbon is fed from the spools via the forked ends of the ribbon-feed-change lever as shown in Fig. 26 and is then brought to the inner side of the unit in front of the typehead where it is held in place by guides.

Reversal of the direction of the ribbon feed is produced in the first case by eyelets inserted in the ink ribbon six inches from either end. Consider the condition shown in Fig. 29 where the rear ribbon-feed wheel is being driven. When the ribbon on the front spool is nearing exhaustion, the eyelet at that end will come into contact with the forked end of the ribbon-feed-change lever through which the ribbon is threaded. The ribbon-feed-change lever is therefore moved clockwise into its reverse position where it is held by the action of the ribbon-feed-change jockey lever. In this position its foot is brought immediately over the front one of the two projections on the ribbon-feed pawl and when the next upward movement of the feed pawl occurs, the front projection comes into contact with the foot and is prevented from rising. In consequence the feed pawl swings anti-clockwise about its pivot and the pin on its end engages with the front ribbon-feed ratchet thus reversing the direction of the ribbon feed. Examination of Fig. 27 shows that as the ribbon feed changes over, the retaining pawl also is moved from engagement with the teeth of one ratchet to those of the other.

END

Reference: E.P. Draft Series: TELEGRAPHY 4/1.