

BULLETIN NO. 126
ISSUE 2
DECEMBER, 1931

TELETYPE

PRINTING TELEGRAPH SYSTEMS

DESCRIPTION
TYPE BAR TAPE PRINTER
MODEL 14


CORPORATION
SUBSIDIARY OF
Western Electric Company
CHICAGO, U.S.A.

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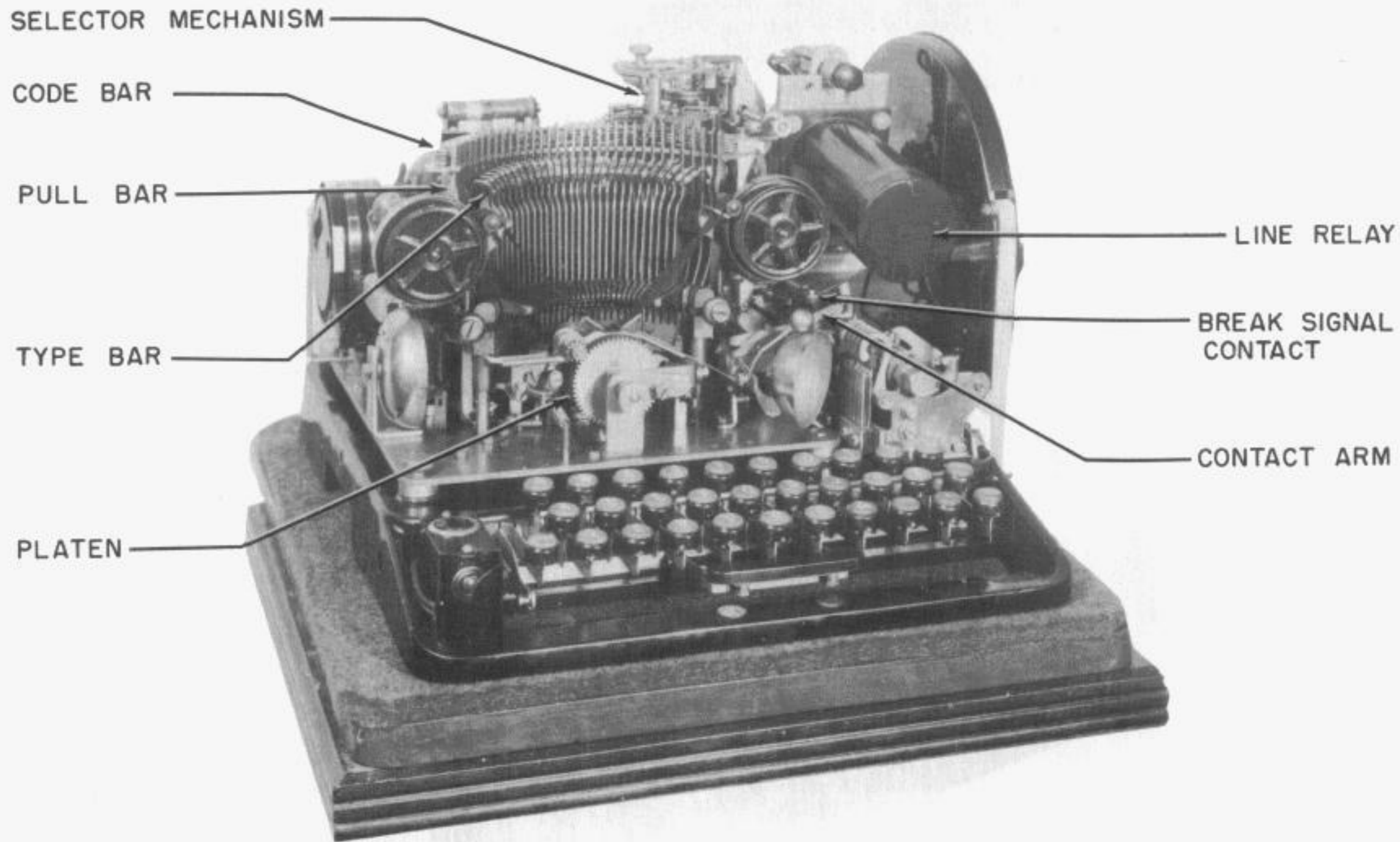


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DESCRIPTION OF THE MODEL 14 TYPEBAR TAPE PRINTER

GENERAL

The Teletype Model 14 Typebar Tape Printer is a machine designed for interchanging messages between two or more points. A sending-receiving station consists of a keyboard transmitting unit and a printer unit (Illus. 2).

The keyboard transmitting unit is used to send electrical impulses of the five unit code to the receiving mechanism of the printer unit at any station. These received signals will cause the printer unit to print a copy of the message sent by the keyboard operator.

Signalling Code

The signalling code used to transmit characters is the "start-stop", five unit code which consists of five selecting impulses used in various combinations of current and no-current intervals. Each group of five selecting impulses is preceded by a start impulse and followed by a stop impulse used to maintain synchronism between all stations on the circuit. Impulses which operate the selector magnets are known as marking and those which do not are known as spacing. Fig. 1 shows graphically the code used.

KEYBOARD TRANSMITTER

The keyboard (Illus. 3) consists of a set of keys, keylevers, a bank of sending contact springs, operating cams, clutch and driving gear. This gear is connected through the intermediate gears to the main shaft on the printer unit which in turn is driven by the motor. The sending cams are normally held stationary because the clutch members on the driving shaft are held apart by the clutch throwout lever (Fig. 2). When a key is depressed the driven member of the clutch is permitted to move into mesh with the driving member causing the cam sleeve assembly to revolve. At the end of the revolution the driven member of the clutch is disengaged by the clutch throwout lever and the cams brought to a stop until the next key is depressed.

Beneath the keylevers are five selector bars and a universal bar extending across the width of the keyboard. The selector bars are provided with saw tooth shaped notches as shown in Fig. 3 according to the requirements of the signalling code. These bars rest on rollers and are guided at each end so that they may be easily moved endwise. When a key is depressed the keylever strikes the slanting sides of these notches moving the bars either to the right or left depending upon whether the impulses corresponding to the bars are to be spacing or marking impulses.

The universal bar is connected to the trip-off pawl controlling the starting and stopping of the sending cams and is pivoted at its two ends in such a way that the depressing of any key moves it downward to actuate the clutch throwout lever. Thus, whenever a key is depressed the selector bars are set and the universal bar is moved down permitting the sending cams to start rotating (Fig. 2).

Each selector bar engages a vertical locking lever at its right hand extremity and positions it to correspond with the signal impulses to be transmitted (Fig. 3). Each locking lever controls the motion of a contact lever by either allowing the contact lever to close its contact when the cams revolve or restricting the motion of the contact lever. If the upper end of the locking lever is positioned to the left corresponding to a spacing impulse, it engages the contact lever and prevents it from rising into the indent of the cam as it rotates, thus holding the circuit open for that impulse (Fig. 3-A). If the locking lever is positioned to the right corresponding to a marking impulse it does not interfere with the movement of the contact lever (Fig. 3-B). Then as the cam revolves the contact lever rides on the cam periphery and rises into an indent thereby allowing its contact to close, sending out a marking impulse. As the cams rotate, the impulses, either marking or spacing, are transmitted in succession.

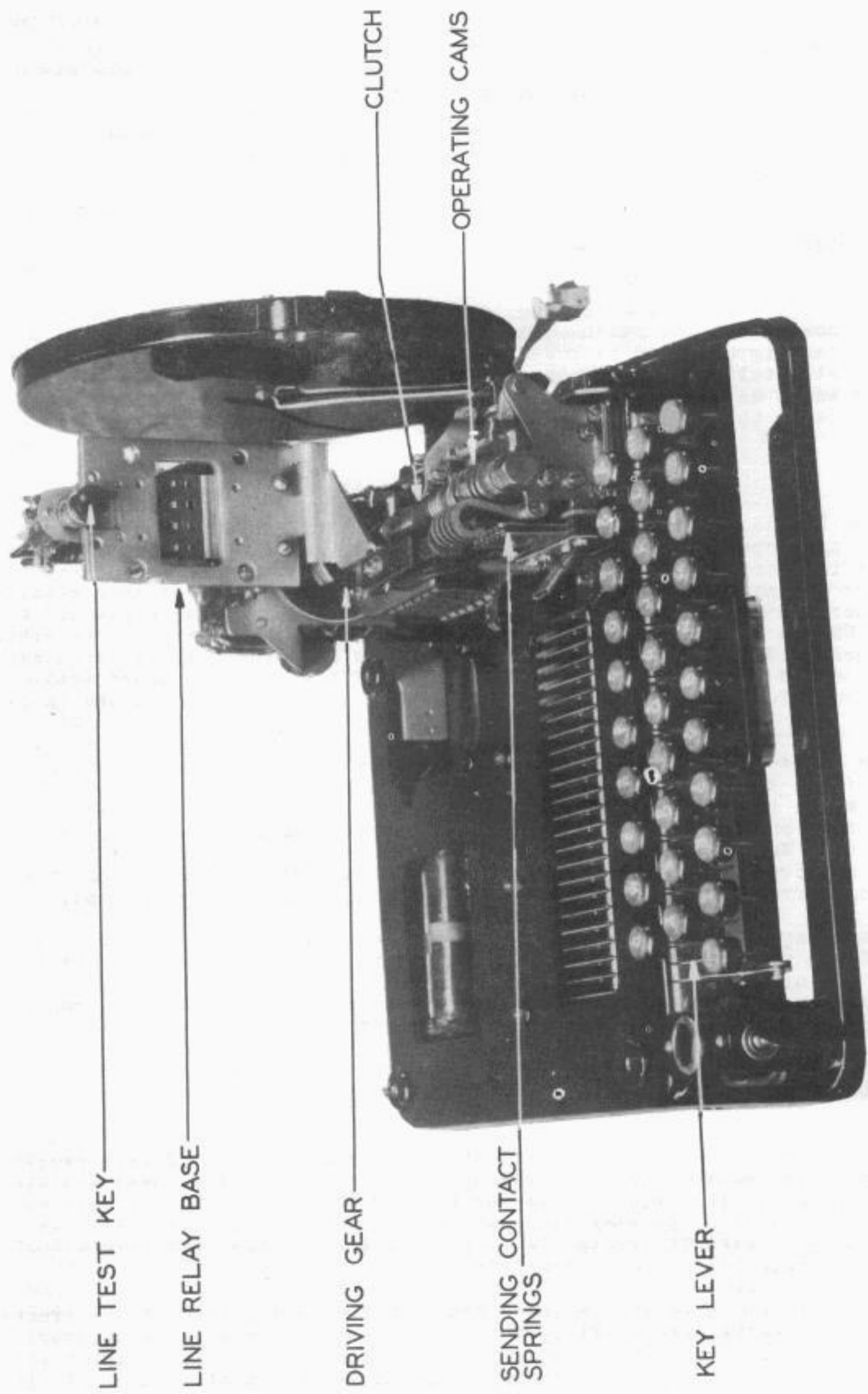
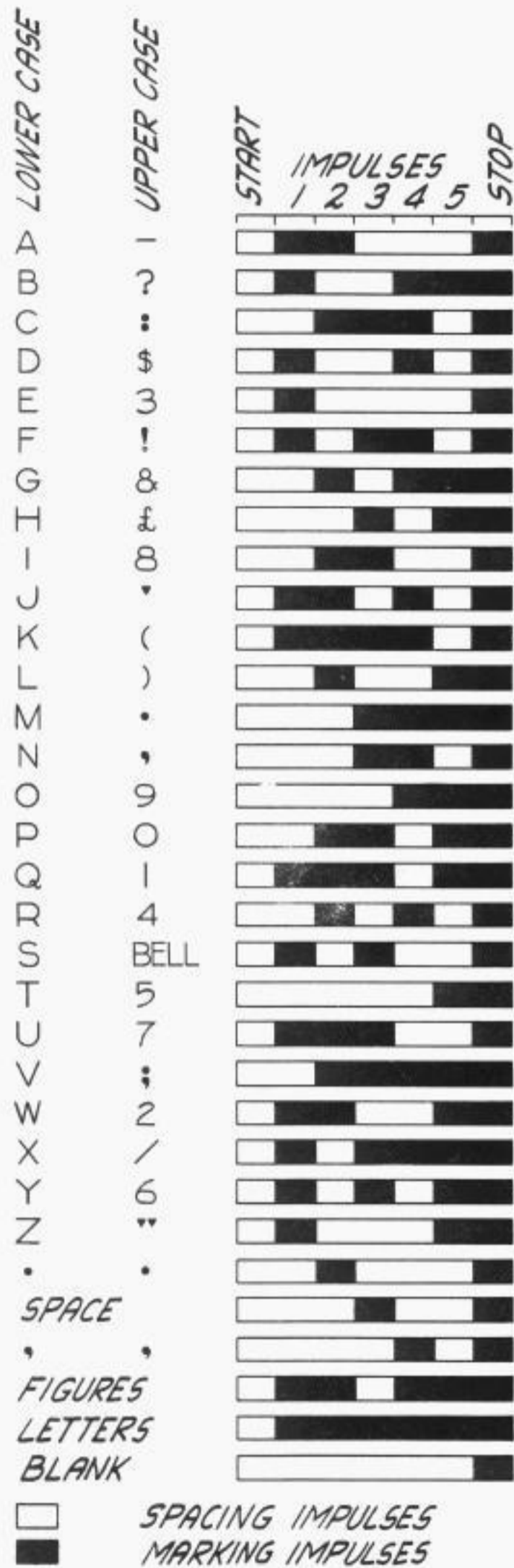


ILLUSTRATION 3

CHARACTER SENT

LINE SIGNALS



□ SPACING IMPULSES
 ■ MARKING IMPULSES

FIGURE 1

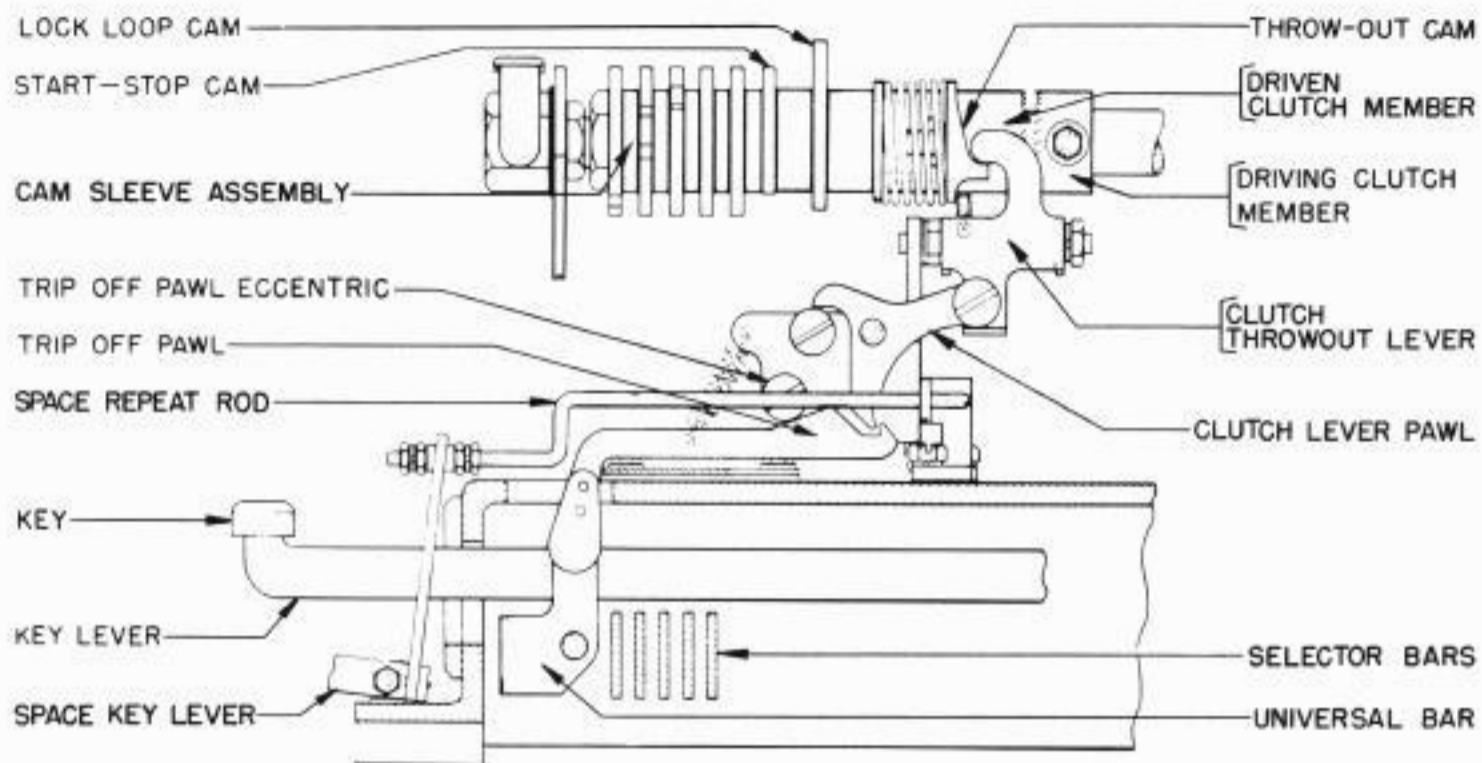


FIGURE 2

The start-stop cam controls an additional contact lever which in turn actuates the start-stop contacts (Fig. 2). These contacts are opened at the beginning of each revolution of the cam shaft to transmit the start impulse (spacing) and remain open during the transmission of the five selector impulses. After the fifth impulse has been transmitted, the start-stop contacts will again close sending the stop impulse (marking) to the line. These contacts will remain closed until the next keylever is depressed. At the end of the revolution the clutch driven member is cammed out of mesh with the driving member preventing the cams rotating further until the next key is depressed.

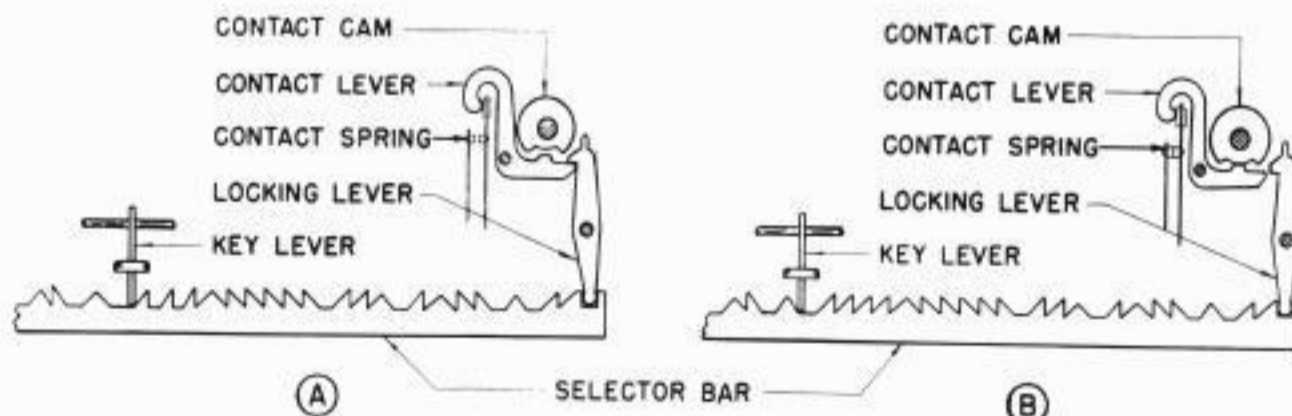


FIGURE 3

The lock loop which is raised by the lock loop cam at the end of each revolution to allow the new combination to be set up, is used when in its lower position to prevent a change in the selection set up (Fig. 4). This is done by holding the locking levers in their set positions while the signals are being sent out. This arrangement also makes it impossible to depress another key until the signal for the previous character has been transmitted.

Keyboards may be equipped with a space repeat device which permits the transmission of continuous spaces (Fig. 2). When the space keylever is depressed the space repeat rod attached to the keylever extension will move the clutch lever pawl forward in turn holding the clutch throwout lever out of engagement with the projection on the driven clutch member. Thus the transmitter cam sleeve will be permitted to revolve continuously until the space keylever is released.

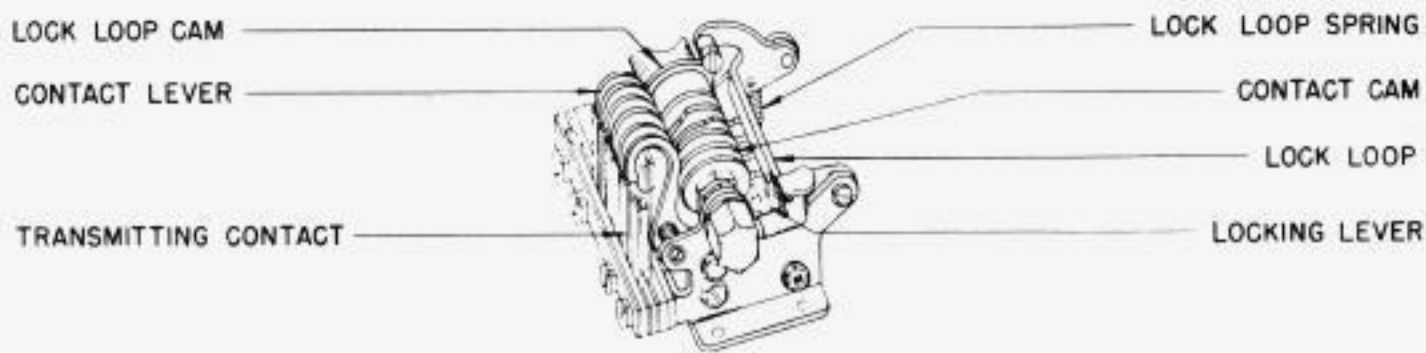


FIGURE 4

PRINTER UNIT

The typebar basket of the Model 14 Printer consists of typebars similar to those of a typewriter together with other associated parts. The typebars are mechanically thrown against a platen causing the letters to be printed. The typebar to be selected is determined by the setting of five code bars which are actuated by line signals through the medium of the selector mechanism. The code bars are so arranged that the notches on their forward edges will be lined up permitting a selected pullbar to move towards the rear into the path of the main bail. This bail moves the pullbar upward causing the typebar to which it is connected to strike the platen. Illus. 2 shows the printer unit mounted on a keyboard. The various functions: space, figure shift, letters shift, etc. are also accomplished mechanically.

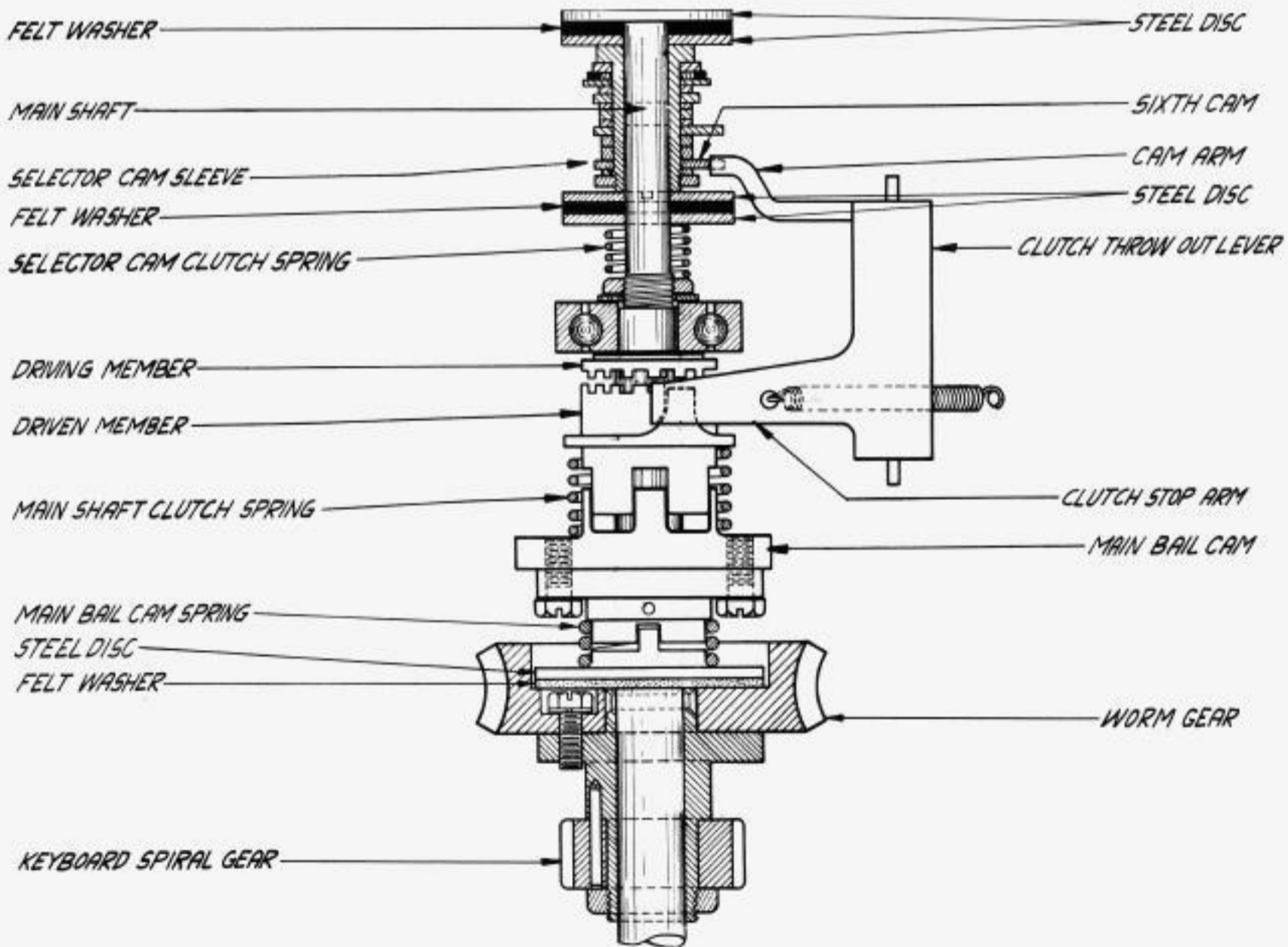


FIGURE 5.

A motor drives the main shaft assembly of the printer which supplies power to all mechanically operated parts.

Main Shaft Assembly (Fig. 5).

The main shaft is located in the rear right hand corner of the printer and is mounted vertically. It is driven by the motor through the medium of the motor pinion and worm gear. The upper surface of the worm gear, a felt washer, steel disc and spring comprise the main bail cam clutch. Projections on the steel disc fit into notches in the lower surface of the main bail cam. In a somewhat similar manner, projections on the upper portion of the main bail cam engage notches in the lower section of the driven member of the main shaft clutch. The main shaft clutch spring moves the driven clutch member upward so as to engage the driving member when permitted to do so by the clutch throwout lever.

The selector cam sleeve is driven through the medium of the friction clutch formed by the selector cam clutch spring, four steel discs and two felt friction washers. Mounted on the main shaft beneath the worm gear is a spiral gear which drives the keyboard driving gear through the medium of the intermediate gears.

Selecting Mechanism

The purpose of the selecting mechanism is to receive the signals from the transmitting station, distributing them mechanically thereby setting up various combinations on the code bars. These combinations will determine the character to be printed or the function to be performed. The selector mechanism is controlled by the magnet which receives the code impulses from the line. Normally the armature of this magnet is pulled up and the stop arm is against the stop lever which in turn is held by the trip latch. Because the stop arm which is a part of the selector cam sleeve is engaged with the stop lever, the cam sleeve is prevented from revolving (Fig. 6).

When the start impulse which is spacing (no-current) is received the armature is released and pulled away from the magnet pole pieces by the armature spring. This will move the trip latch out of engagement with the stop lever thereby releasing the stop arm allowing the cam sleeve to revolve with the main shaft.

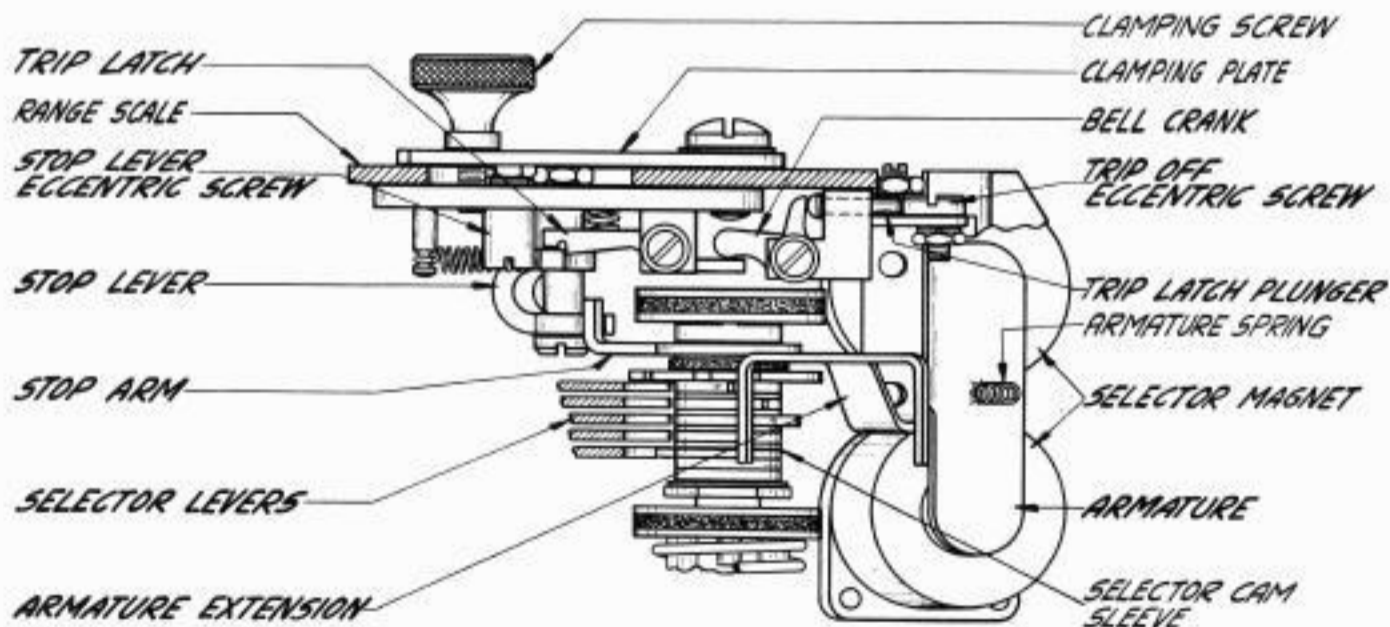


FIGURE 6.

Each code bar is operated by a selector cam through the medium of a selector lever, sword, and "T" lever (Fig. 7). For instance, suppose that the code for the letter "E" is received. Upon the reception of the start impulse (a no-current impulse), the armature moves away from the magnet imparting motion first to the trip latch plunger (Fig. 6), which in turn causes the bell crank to move the trip latch out of engagement with the stop lever releasing the stop arm as explained previously.

The selector cams start to revolve and the number 1 selector cam engages number 1 selector lever, when the first impulse of the letter "E" (marking or current impulse) has been received by the magnets from the line. The magnet armature is therefore pulled up, bringing the right hand end of the armature extension into the path of the right hand sword arm. When the peak of the number 1 cam passes the number 1 selector lever, this lever is rotated counter clockwise, carrying with it the sword, which strikes the right hand end of the armature extension and is in turn rotated clockwise about its pivot, point "A". This positions the sword so that when the number 1 cam clears the selector lever, the selector lever spring moves the sword against the left end of the "T" lever and brings the number 1 code bar to the right. As no current is received while the 2, 3, 4, and 5 cams are passing their selector levers, the magnet armature is released and the armature extension moves to the left so that the left hand end of the armature extension is in the path of the left hand sword arm (Fig. 7). As the number 2, 3, 4, and 5 cams pass the number 2, 3, 4, and 5 selector levers the number 2, 3, 4, and 5 code bars are moved to the left. With the number 1 code bar to the right and number 2, 3, 4, and 5 code bars to the left, there will be a notch in each code bar opposite the "E" pullbar.

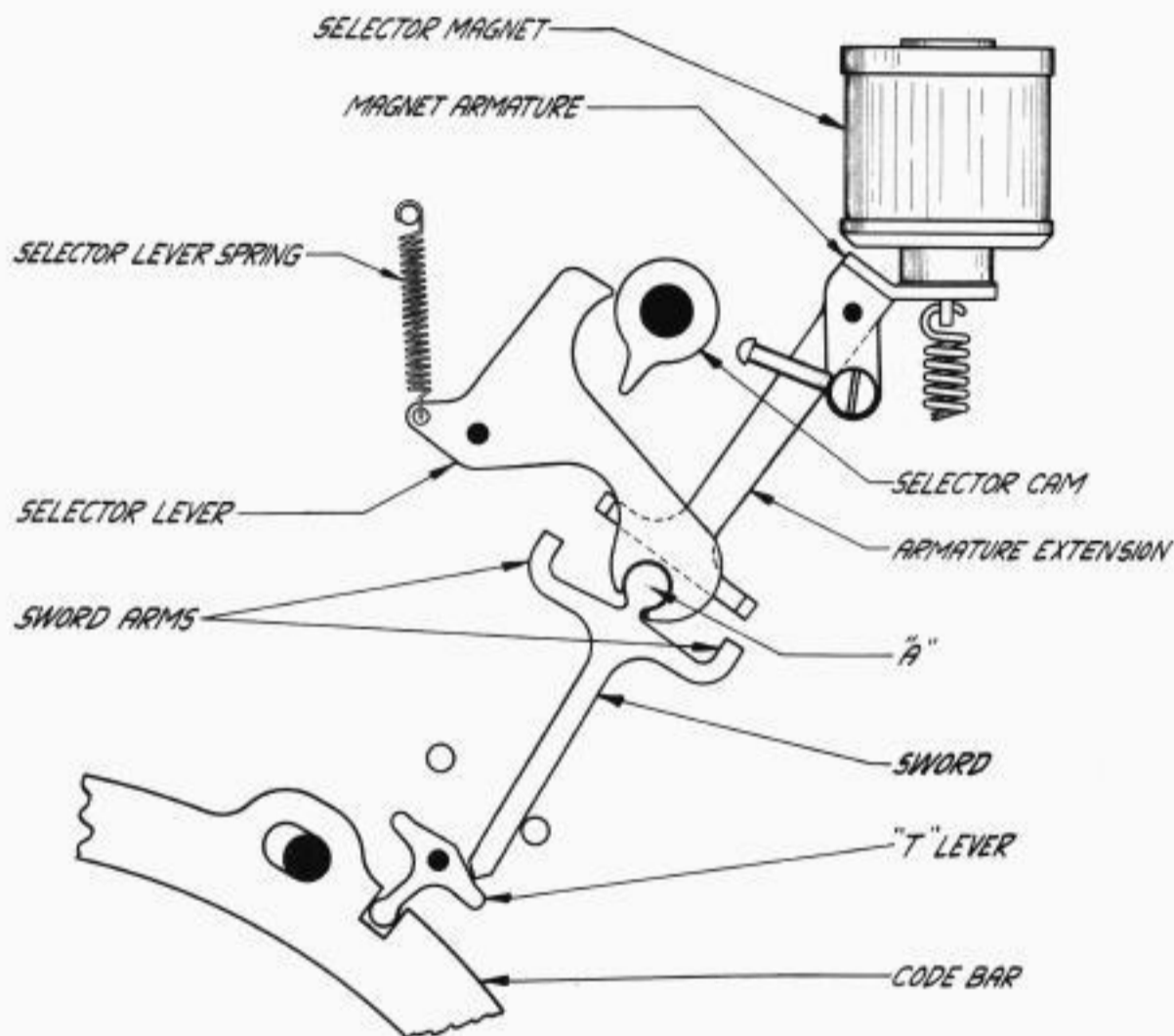


FIGURE 7

The sixth cam releases the main shaft clutch allowing the main bail cam to start revolving (Figs. 5 & 9). As the low part of the main bail cam approaches the main bail bell crank roller, the striker spring pulls the main bail upward. The main bail in moving upward first permits the "E" pullbar to move into the path set up for it in the code bars. As the main bail continues upward it will engage the notch on the "E" pullbar pulling the pullbar upward and causing the typebar to strike against the platen printing the letter "E". Then when the roller rides onto the high portion of the cam it moves the main bail downward against the tension of the striker spring to its normal unoperated position.

Locking Cam

The locking cam on the selector cam sleeve assembly has five low and five high

portions on its periphery against which the locking lever is held by its spring (Fig. 8). During that part of each impulse when the swords are set by striking against the armature extension (at the time the peak of any selector cam is operating the corresponding selector lever) a low portion of the locking cam is opposite the locking lever. The armature will now be held firmly in position by the "U" shaped extension of the locking lever engaging the locking wedge on the armature extension. When the locking lever is riding on the high portion of the locking cam the locking lever extension will be held away from the locking wedge and the armature will be free to move in response to the next impulse.

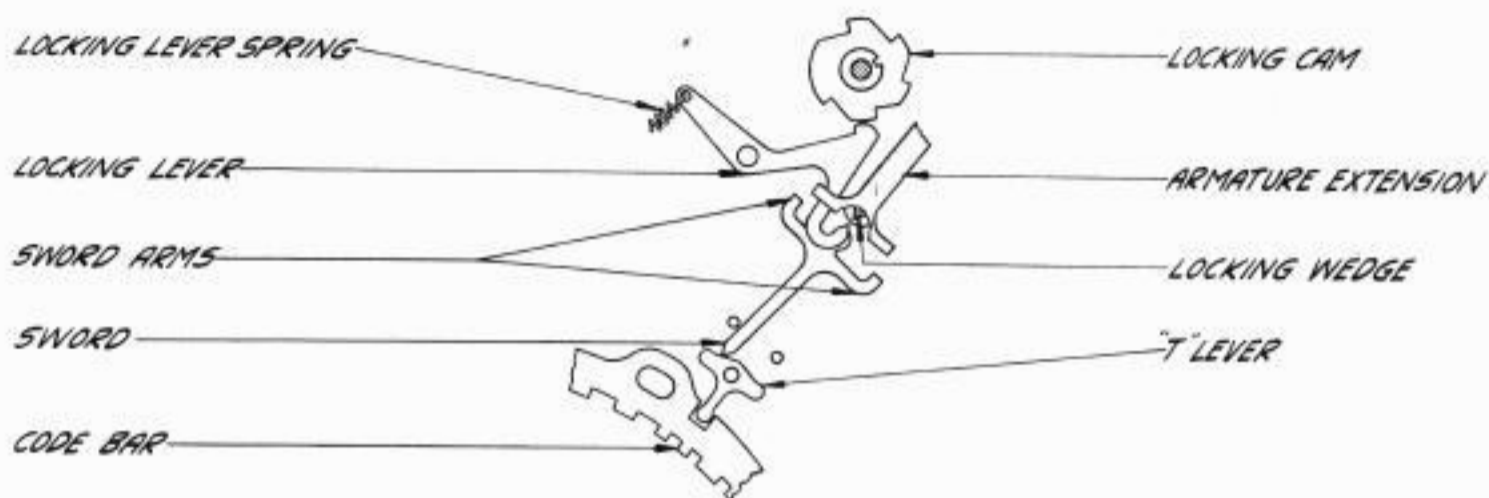


FIGURE 8

Main Shaft Clutch Throwout Lever (Fig. 5).

As previously described, the sixth cam on the selector cam sleeve releases the main shaft clutch allowing the main bail cam to make one complete revolution. At the end of each revolution of the main bail cam the clutch stop arm engages with the projection on the driven clutch member and cams it out of mesh with the driving clutch member.

Immediately after the fifth impulse has been received the peak of the sixth cam strikes the clutch throwout lever cam arm moving the clutch stop arm out of engagement with the projection on the driven clutch member. This will permit the clutch spring to move the driven clutch member into mesh with the driving member. Thus it may be seen that immediately after the completion of the selection of any character or function the main bail cam will be permitted to revolve one revolution which will effect the printing of that character or the operation of that function.

Printing (Fig. 9).

The printing of any letter or the operation of any function is effected by the main bail. The main bail is attached to the upper end of the main bail plunger. The plunger is moved up and down by the main bail lever which engages a notch in the lower end of the plunger. Pivoted on the same shaft with the main bail operating lever is the main bail bell crank. Contact between the lever and the bell crank is made by means of the main bail adjusting screw. Thus it may be seen that the striker spring (attached to the main bail lever) holds the main bail bell crank roller against the periphery of the main bail cam.

At the end of each revolution of the main bail cam the main bail bell crank roller will be on the high portion of the cam and the main bail will be in its lowest position carried there against the tension of the striker spring. As the main bail cam revolves the bell crank roller will move against the low portion of the cam, allowing the main bail to be pulled upward by the striker spring. During the upward motion of the main bail it will first allow all of the pullbars to be pulled against the code bars by their respective springs, the selected pullbar being pulled farther to the rear than the rest, into the path set up in the code bars. As the main bail continues on its upward stroke it will engage the notch in

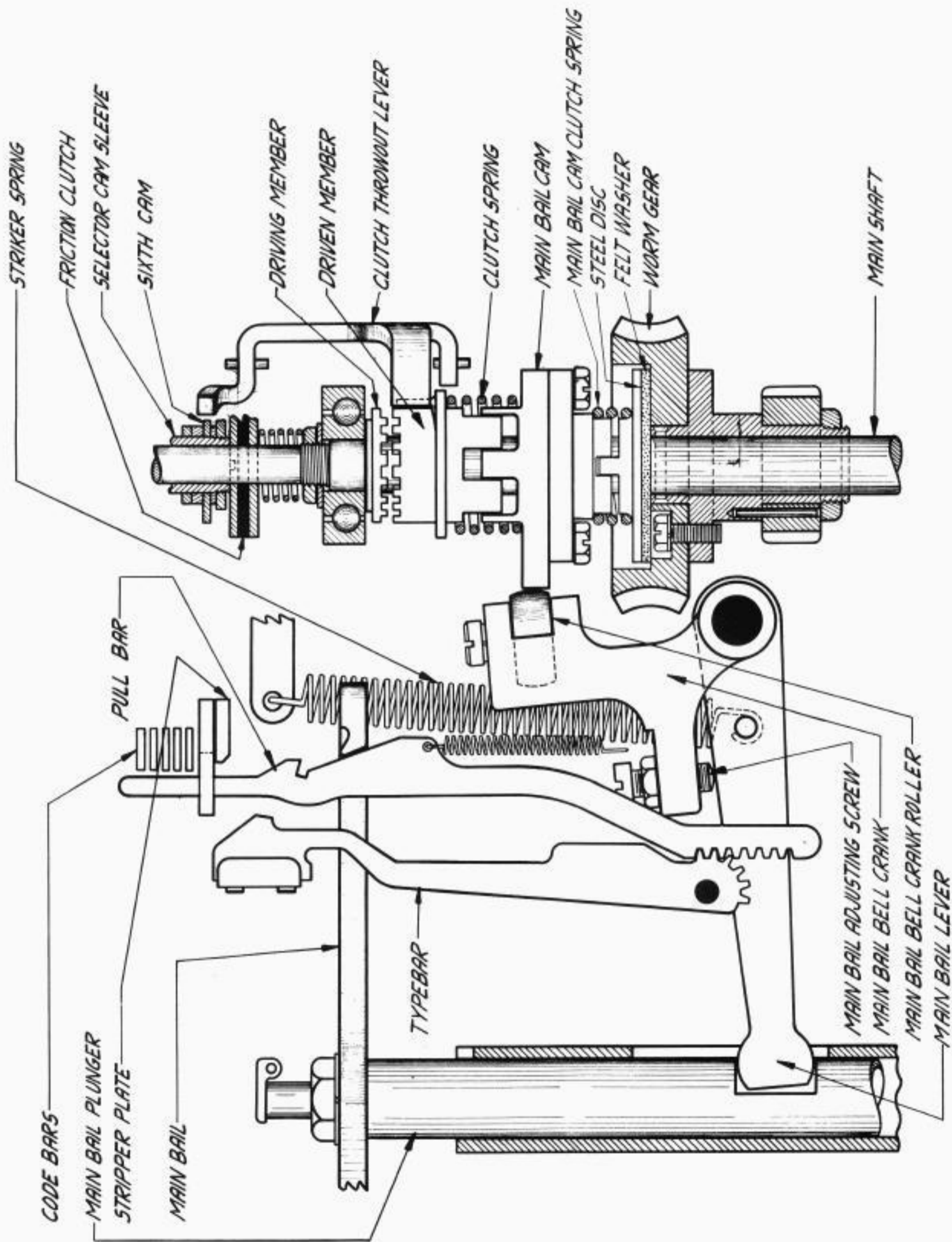


FIGURE 9.

the selected pullbar only (the remaining ones being held out of engagement by the code bars) and carry the pullbar upward throwing the typebar which is geared to it against the platen printing the character. As the pullbar is moved upward the rear end of the notch on the pullbar strikes the stripper plate and the pullbar is moved from engagement with the main bail shortly before the typebar reaches the platen. Momentum carries the typebar the remaining distance.

The main bail bell crank roller will again ride onto the high portion of the main bail cam as it completes its revolution. Thus the main bail is brought back to its lower position and all the pullbars are positioned sufficiently forward to clear the code bars so that the code bars are free to move in either direction. The code bars are then set for the succeeding letter and the printing operation is repeated as previously described.

Code Bar Locking Lever (Fig. 10).

The code bars must be held in their selected positions during the time the printing of characters takes place. This is accomplished by the code bar locking lever which is located to the right of the pullbars.

When the main bail is in its lower position the code bar lock lever is held away from the "V" shaped notches in the code bars. When the main bail moves upward the code bar lock lever is permitted to be pulled by its spring into the "V" shaped notches in the code bars.

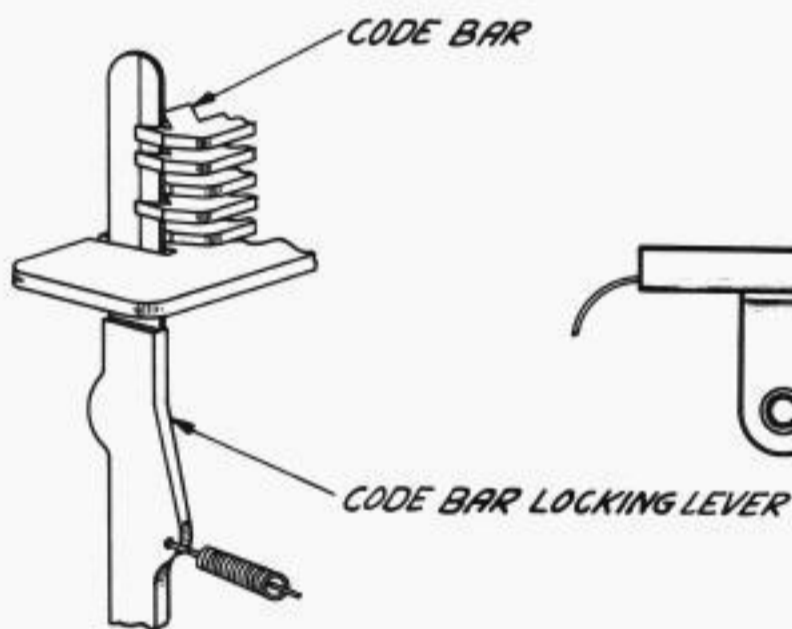


FIGURE 10

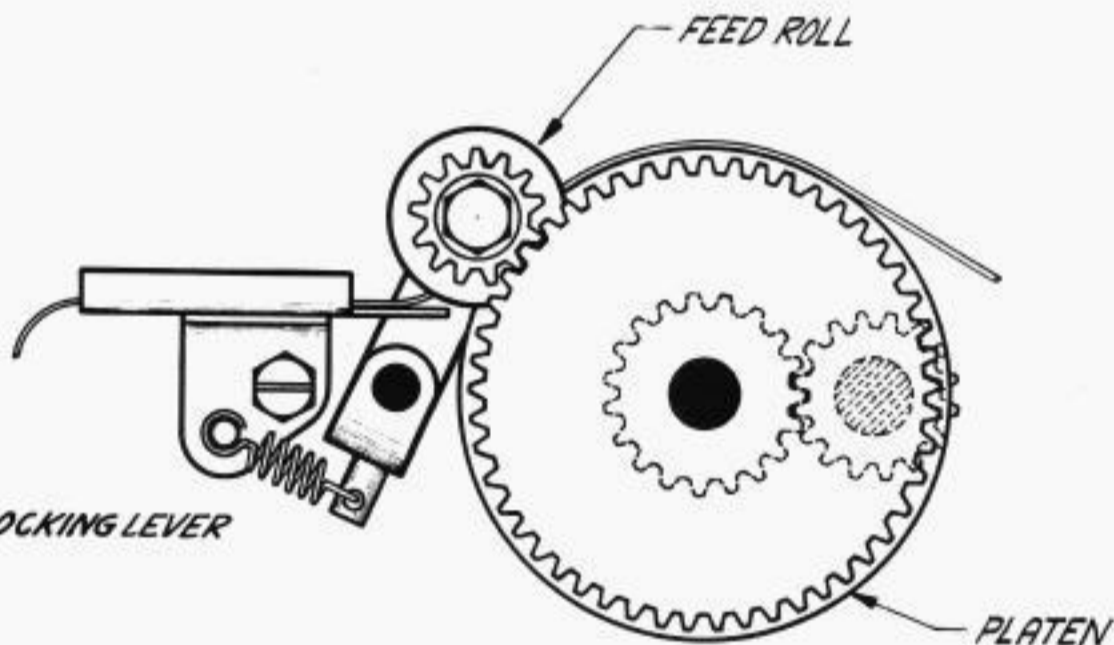


FIGURE 11

Spacing (Fig. 12).

Spacing is accomplished by revolving the platen counter clockwise the equivalent of one letter space after each character is printed. A tape feed roll holds the paper tape against the platen causing the tape to move with the platen (Fig. 11). Geared to the platen shaft is the spacing shaft on which is mounted the spacer ratchet wheel.

The platen is rotated by means of the spacer operating lever through the spacer feed pawl which engages the spacer ratchet wheel (Fig. 12). The spacer operating lever is located immediately in front of the main bail plunger and its roller is held against the plunger by the spacer operating lever spring. As the plunger moves up and down the lever roller rides into and out of an indent in the main bail plunger. The spacer feed pawl attached near the lower end of the spacer operating lever is held against the spacer ratchet wheel by its spring. Each time the plunger rises to actuate the printing of a letter the spacer feed pawl will

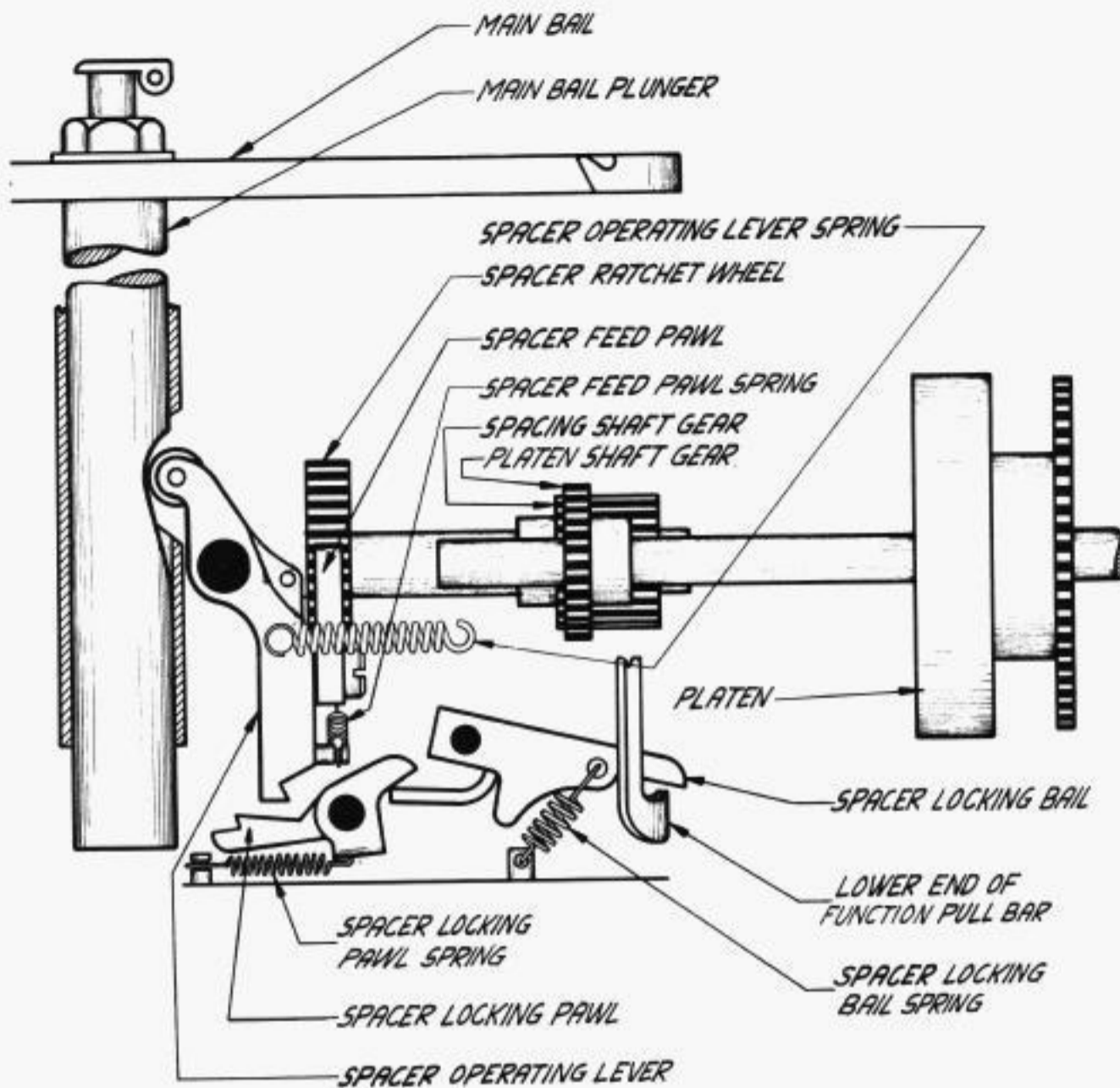


FIGURE 12

engage the next tooth on the ratchet wheel. On the down stroke of the plunger the spacer operating roller will be pulled into the indent by the lever spring causing the feed pawl to rotate the spacer ratchet wheel on the spacing shaft. The motion of the spacing shaft is transmitted to the platen shaft through the spacing and platen shaft gears. Note: When functions are operated spacing is blocked (see Spacing Outout).

Overlap

In summarizing the selecting and printing operations described in the foregoing it should be noted that the selecting cycle is followed immediately by the operating cycle. Near the end of the selecting cam cylinder revolution the sixth cam trips the clutch throwout lever allowing the main bail cam to make one revolution. Thus it may be seen that the printing of a letter or the operation of a function requires time equivalent to both a selecting and a printing cycle. However, the selection of the next character may be made at the same time the operation of the previous character is taking place. This arrangement is known as overlap and is used to facilitate printer operation at high speeds. Without the use of overlap it would be necessary to allow time for printing after each selection is set up.

The following shows the time relationship (theoretically) between the operations of the previous selection and the next letter selection when the printer is being operated at the full capacity of its set speed:

OPERATIONS OF PREVIOUS SELECTION	IMPULSES OF NEXT LETTER SELECTION	Time required to receive one letter
Main bail cam clutch engaged by the sixth cam. Selector cam assembly stopped.	Stop	
Main bail starts moving up. (Selector cam assembly starts rotating for the next letter selection, #1 cam peak approaching #1 selector lever) Lockbar engages code bars holding them in their selected position. Selected pullbar is allowed to move into notches in code bars. Main bail engages with selected pullbar.	Start	
Main bail pulls pullbar up causing typebar to move downward toward platen. (#1 sword is positioned for next letter.)	1	
Typebar prints letter and returns. Main bail starts downward. (#2 sword is positioned for next letter.)	2	
Typebar fully returned and main bail continues downward camming pullbars away from code bars. Spacing starts. (#3 sword is positioned for next letter.)	3	
Main bail at its lowest position. Pullbars away from code bars. (#4 sword is positioned. Code bar locklever releases code bars, allowing that portion of the selection stored up in the swords to be set up.) Clutch starts to disengage. Spacing completed.	4	
Clutch fully disengaged. (#5 code bar positioned for next letter.)	5	

Spacing Cutout (Fig. 12).

The spacer locking pawl is normally held out of engagement with the spacer operating lever by the rear extension on the spacer locking bail. During the operation of any function pullbar an extension on its lower end will engage the forward end of the spacer locking bail raising it. The rear extension on the locking bail will be moved away from the spacer locking pawl allowing its spring to pull it into engagement with a notch at the lower end of the spacer operating lever making the spacer operating lever inoperative.

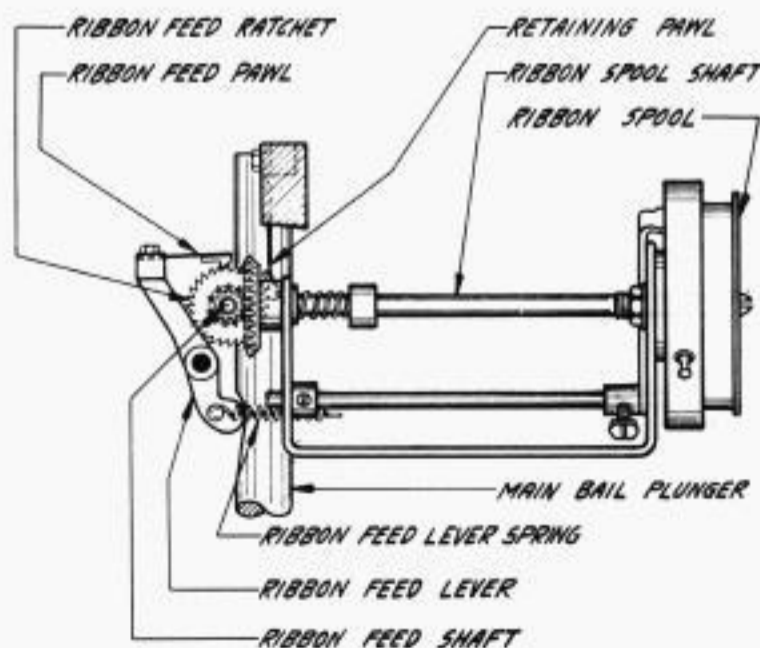


FIGURE 13

Ribbon Feeding (Fig. 13).

The ribbon feed lever is operated by an indent in the main bail plunger. Attached to the upper end of the ribbon feed lever is the ribbon feed pawl which engages with the teeth on the ribbon feed ratchet. With each operation of the main bail the ratchet is rotated a slight amount. This motion is carried through either one of two bevel gears on the ribbon spool shafts, causing one of the ribbon spools to be revolved.

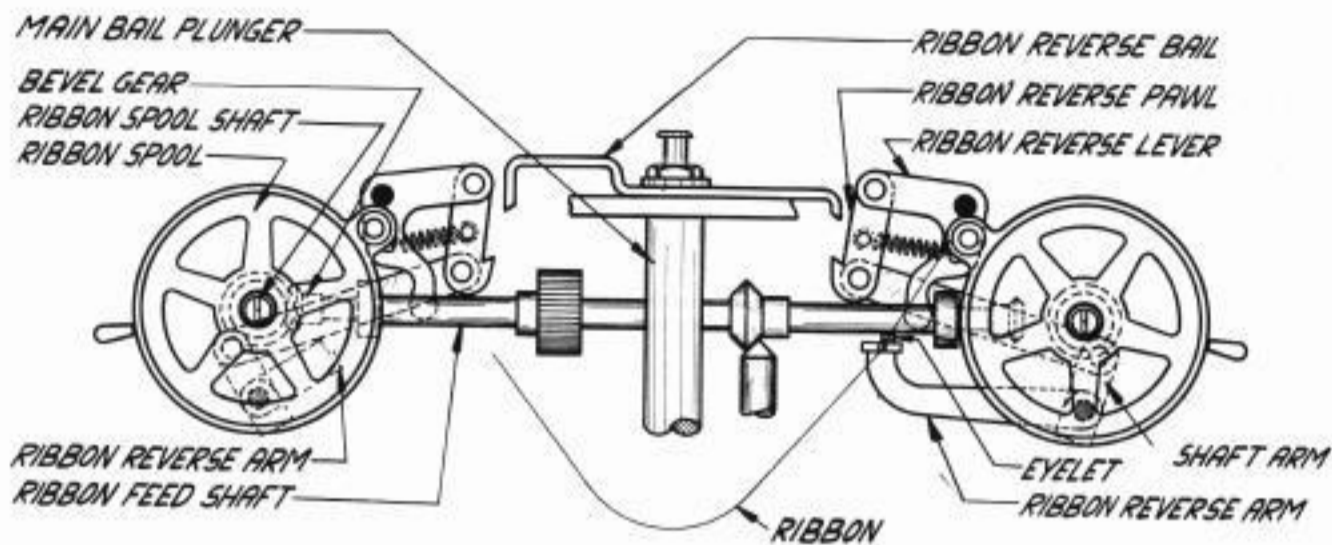


FIGURE 14

Ribbon Reverse (Fig. 14 & 15).

Assuming that the ribbon is being wound on the left hand spool and is almost unwound from the right hand spool, an eyelet which is fastened to the ribbon will engage and move the right hand ribbon reverse arm. This arm moves the right hand ribbon reverse pawl into the path of the ribbon reverse bail (Fig. 15). As the bail moves downward it engages the pawl moving the ribbon feed shaft to the right (Fig. 16). This will disengage the left hand ribbon feed bevel gears and engage the right hand gears. The ribbon will then be wound on the right hand spool. The reversing operation takes place in a similar manner on the left hand side of the assembly when the eyelet near the left end of the ribbon engages with the left hand ribbon reverse arm.

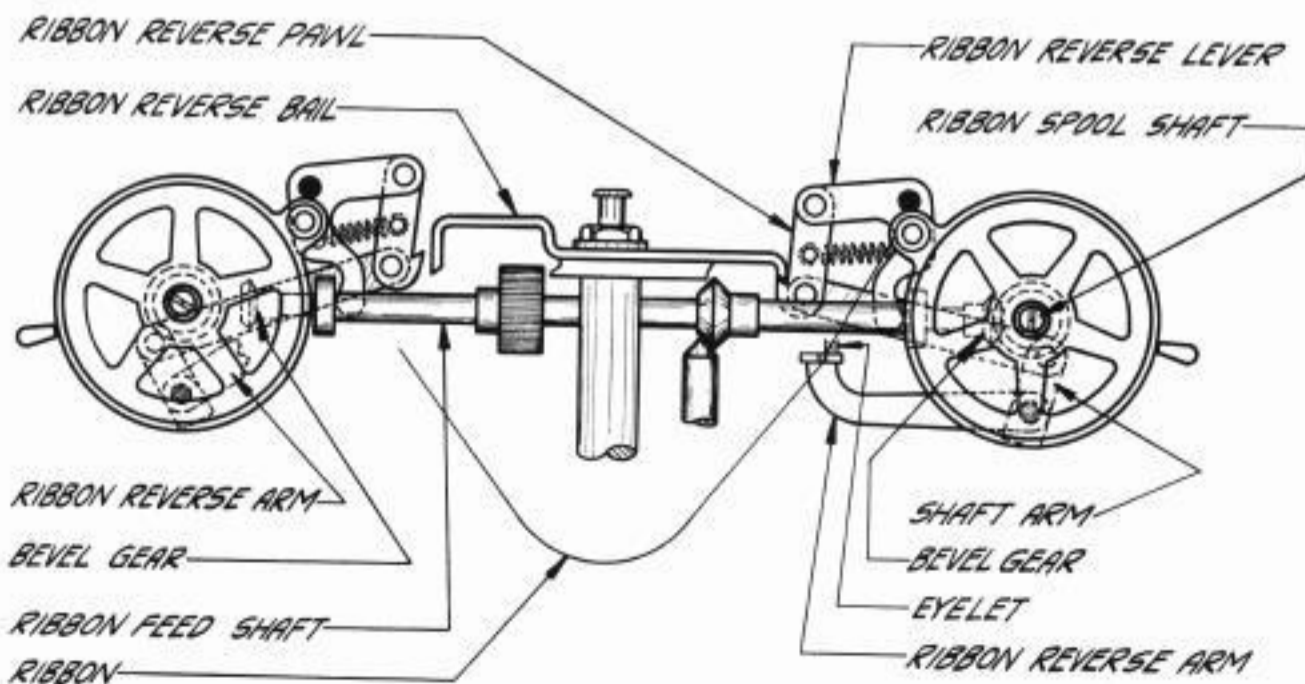


FIGURE 15

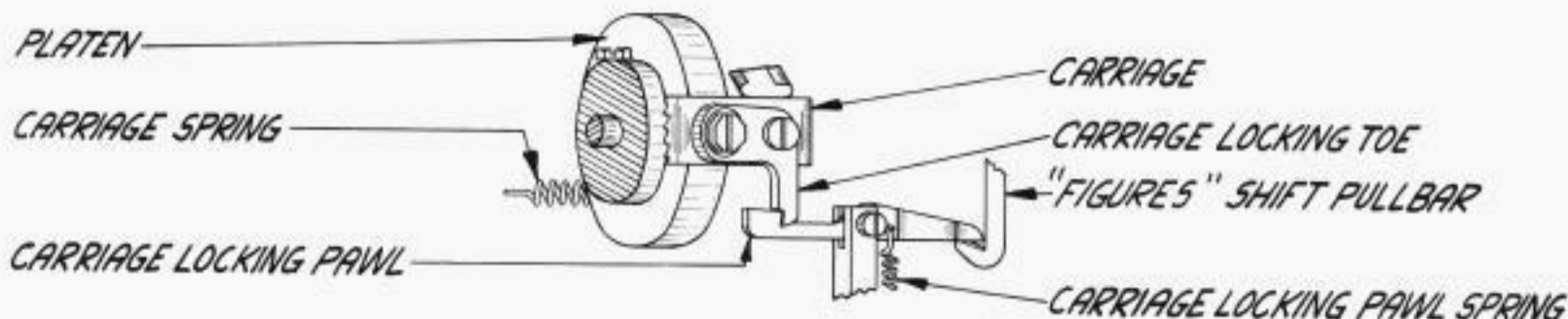


FIGURE 16

Figures Shift (Fig. 16).

When the figure shift pullbar is raised by the main bail its extension engages the carriage locking pawl moving it out of engagement with the carriage locking toe. The carriage spring will move the carriage to the forward or figure shift position.

Letters Shift (Fig. 17).

When the letters pullbar is raised by the main bail its extension engages the rear arm on the shift rocker lever moving the front arm of the shift rocker lever down against the shift rocker arm. The upper notched end of the shift rocker in turn will be moved toward the rear. The extension on the platen carriage being engaged in the notched portion of the shift rocker, the carriage will be moved to its rear position. The carriage locking pawl then engages the carriage locking toe holding the carriage in the "letters" position.

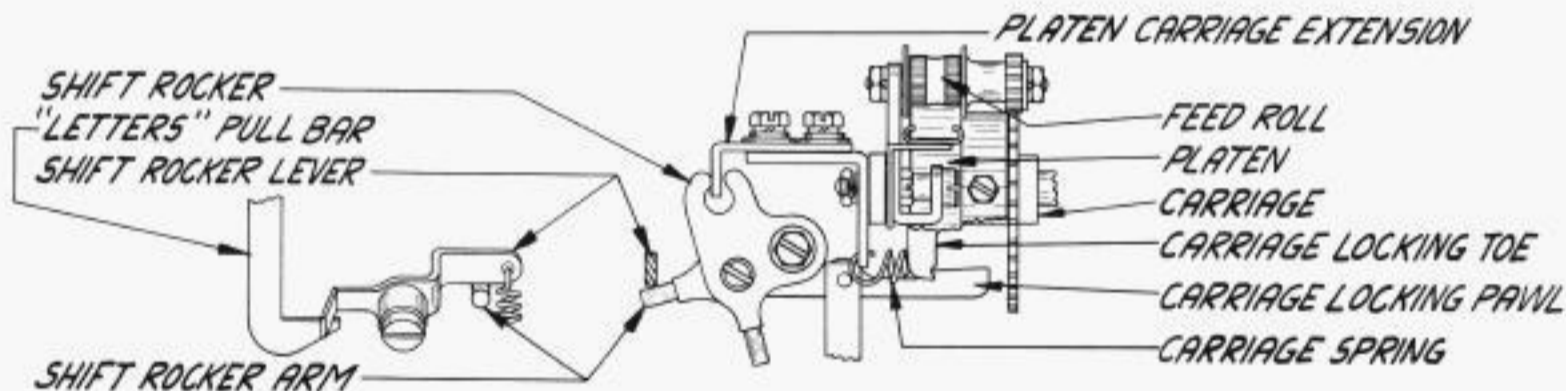


FIGURE 17

Unshift on Space.

On those printers arranged to unshift on "space" as well as on "letters" combination an unshift on space pullbar has been added. If the unshift on space feature is not desired the upper end of the unshift on space pull bar may be moved to a notch on the pullbar guide making it inoperative.

On printers of this type the unshift on space pullbar is selected on the "space" combination and operates the shift rocker lever as the letters pullbar does, described in the preceding paragraph.

Signal Bell (Fig. 18).

Some printers are arranged to operate a signal bell on upper case (figures) "J" and others the upper case "S" combination.

To operate the signal bell it is necessary to first send the figures shift combination (if the carriage is in the letters position). The platen being in the figures position, the lockout lever arm on the shift rocker (which is engaged with the notch in the pullbar lockout lever) having positioned the pullbar lockout lever the "J" or "S" pullbar will be prevented from moving into the notches of the

code bars when the "J" or "S" combination is received (Figure 18-A). The bell pullbar (located to the left of the "J" or "S" pullbar) however, will be permitted to move into the notches in the code bars. Then the main bail will move the bell pull bar upward and its extension will engage the eccentric screw on the rear end of the bell hammer, lifting it. The forward end of the bell hammer will strike the gong (Figure 18-B).

With the carriage in the letters position, the lockout lever arm on the shift rocker positions the pullbar lockout lever so as to prevent the bell pullbar moving into the notches of the code bars when the letters "J" or "S" are to be printed (Figure 18-C).

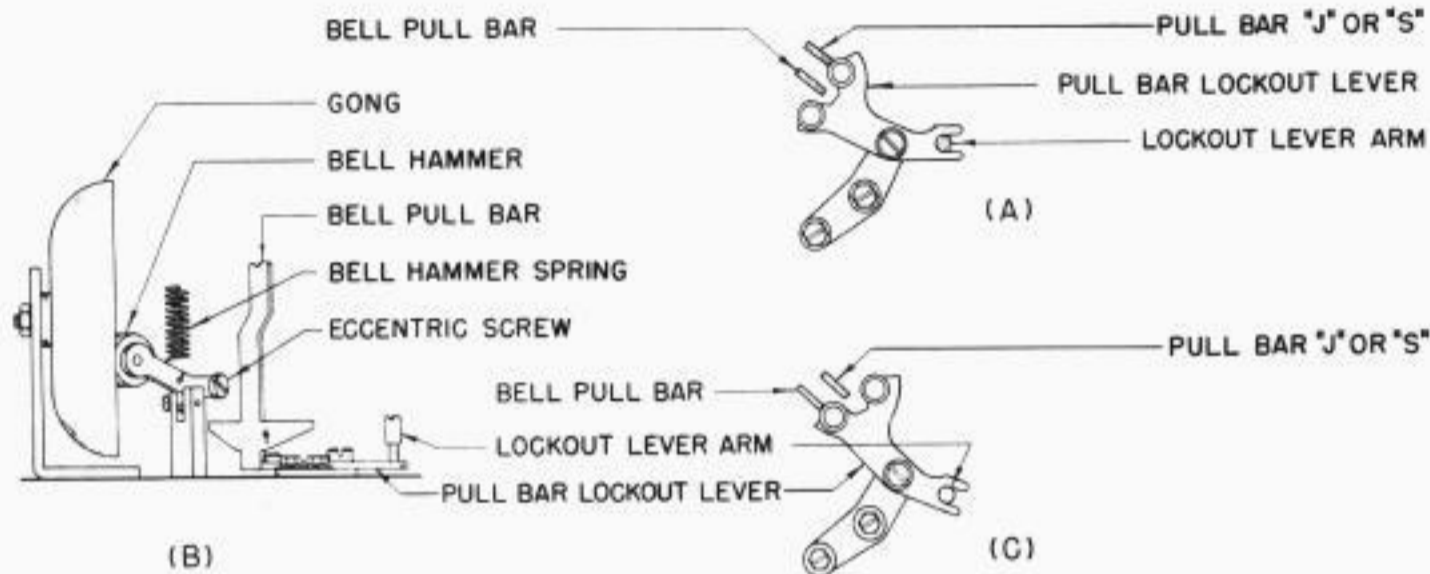


FIGURE 18

Bell and Break Mechanism (Fig. 19 & Illus. 2).

Some printers are equipped with a Bell and Break Mechanism which, in addition to ringing a bell, locks the transmitting keyboard preventing further transmission. When a distant station breaks the sending station by pressing the break key the blank pullbar at all stations will be selected. As the blank pullbar moves upward its lower end will engage the rear end of the bell and break operating lever causing its front end to move downward. The bell hammer which is attached to the operating lever will strike the gong and the right hand end of the contact arm will rise allowing the break signal contacts to close. These contacts being connected across the sending contacts, the keyboard transmitting contacts will be shorted out. Before any station can send, it will be necessary to raise, manually, the finger arm of the bell and break operating lever.

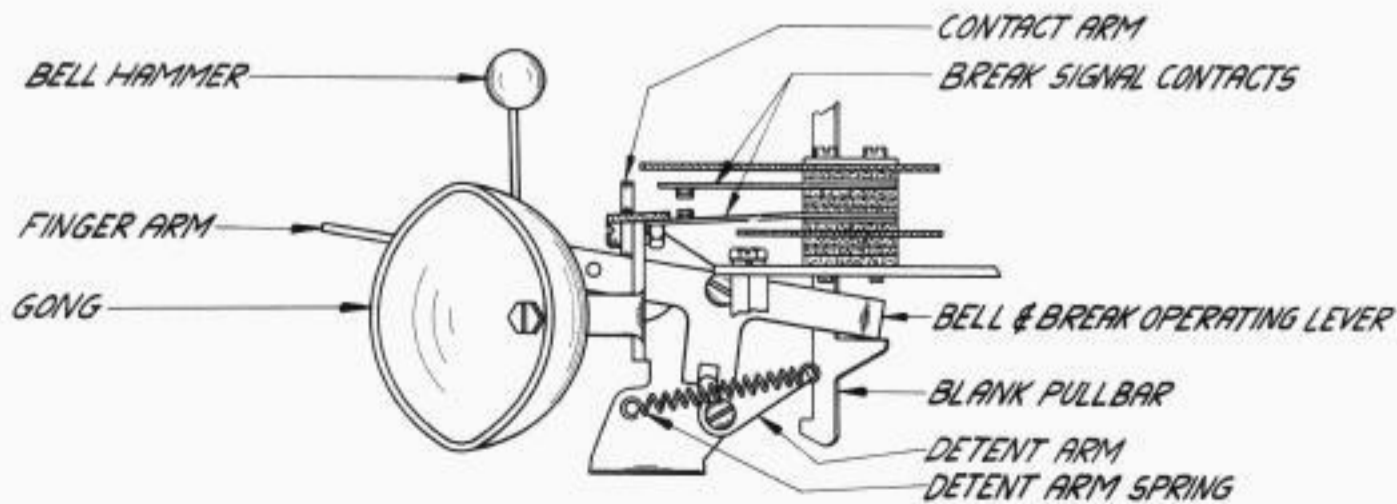


FIGURE 19

MOTOR SPEED CONTROL

In order to maintain the transmitting and receiving stations at the proper speed the driving motor is equipped with a governor attached to one end of the motor shaft (Fig. 20).

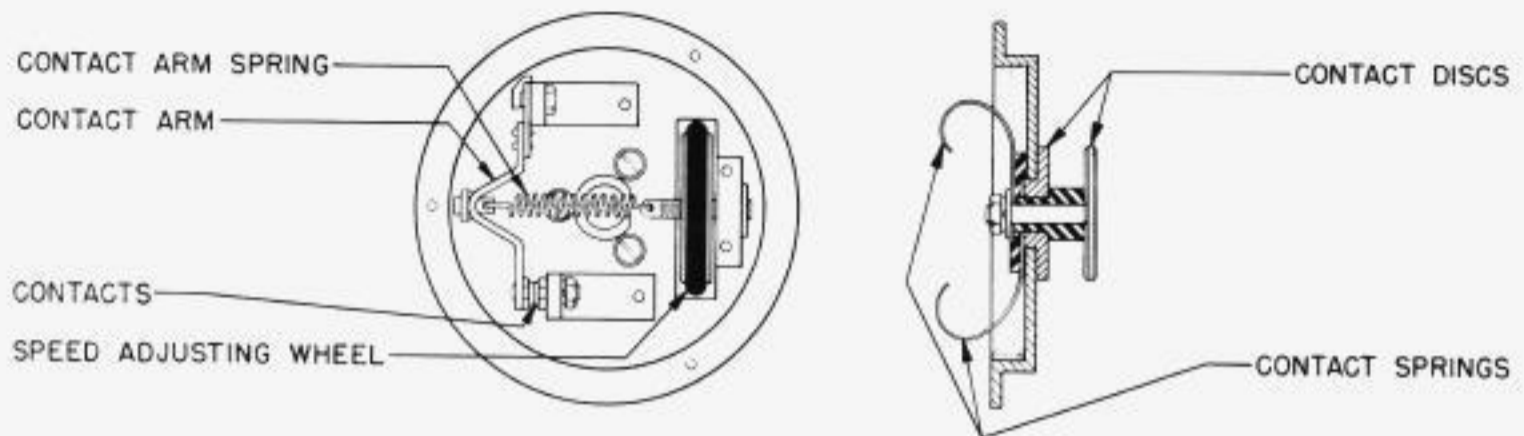


FIGURE 20

The governor contact arm consists of a bent strip of metal with a contact mounted on one end and fastened by a flat spring at the other end. The contact arm spring holds this contact against a companion contact until the centrifugal force of the contact arm overcomes the tension of the spring. When the contacts open, a resistance is connected into the motor circuit which tends to reduce the speed of the motor. The closing and opening of the contacts holds the motor speed constant to the value of the tension at which the spring is set. The spring tension is adjusted by turning the speed adjusting wheel which extends through the cover of the governor.

Some machines are equipped with synchronous motors which maintain a constant speed without the aid of a governor.

SYNCHRONISM

In order that the character and function signals sent out by the transmitter may be interpreted by the printing unit it is necessary to keep the transmitting and receiving machines running in synchronism. This is accomplished by the use of a start and a stop signal.

The transmission of the start impulse, which is a spacing impulse, starts the selector cam sleeve on the printer revolving. The speed of rotation is such that when the transmitting cam shaft has revolved far enough to send out the first impulse, the selector cam sleeve has revolved to the proper position to receive it. When the transmitter has revolved to the position to send out the second impulse the selector cam sleeve also will have rotated to the corresponding position and so on. At the end of the revolution after the fifth impulse has been received, the reception of the stop impulse stops the selector cam sleeve.

The selector cam sleeve is geared to rotate faster than the transmitter cam shaft, but it is so constructed that the distance from the position where it can receive one impulse and where it can receive the next impulse is correspondingly greater than the distance between the position where the keyboard cam shaft can control the sending out of one impulse and the next impulse.

The reason that the selector cam sleeve is made to rotate faster than the transmitting cam shaft is this: It is not possible to maintain several units at exactly the same speed. In a short time even a slight speed difference would

cause the transmitting mechanism and receiving mechanism to get out of unison so that when the transmitting keyboard was sending out the first impulse of a character signal, the selector cam sleeve might be in a position to receive the second. This is avoided by arranging the selector cam sleeve to rotate faster than the transmitting keyboard which allows it to complete its revolution sooner than the transmitting distributor completes the corresponding one.

When the selector cam sleeve has completed a revolution it comes to a stop until the transmitting keyboard again sends out a "Start" impulse. Now, if the speed of the selector cam sleeve is slightly faster than its proper speed, the only effect will be that it will remain at rest slightly longer. If its speed is slightly slower than the proper speed, it will remain at rest just that much less time. Of course there will be a slight error in the position of the selector cam sleeve in the various positions but the mechanism is so constructed to provide for this and due to the fact that the selector cam sleeve starts each revolution in unison with the transmitting cam shaft this error does not become any greater.

ORIENTATION

In order to properly operate the selector mechanism it is necessary to place the starting point of the selector cam sleeve in the most favorable position. This is accomplished by means of the range finding mechanism which is used to orient or take a range.

Mounted on the stop lever plate (which is a part of the range finding mechanism) are the stop pawl latch and the stop pawl which may be rotated thereby varying the relation between the start of the selector cam sleeve and the time the selector cams operate the selector levers. A graduated scale indicates the setting of the stop mechanism and the clamping plate screw holds it in place after having been set (Fig. 6).

To obtain maximum margin in operation of the selector magnet armature the adjusting screw to which one end of the selector armature spring is attached is provided. The spring tension may be adjusted to meet various line conditions.

LINE RELAY

A line relay base is provided on some machines (which is mounted on a bracket located on the keyboard to the right of the printer) so that a line relay may be used (Illus. 2).

LINE TEST KEY

Mounted on the relay bracket is the "Line-Test" Key. It is provided for the purpose of testing the machine, without sending to the line circuit (Illus. 3).

When the knob of the "Line-Test" Key is pulled out, the line relay and keyboard contacts are disconnected from the line and a local circuit is established.

TAPE OUT BELL SIGNAL

The tape out bell mechanism is provided to warn the operator that the tape is becoming exhausted (Fig. 21).

The roller on the tape lever is held against the roll of tape by its spring. When the tape is nearly used up a stud on the tape lever adjusting clamp moves against the lower end of the locking pawl moving its upper end out of engagement with the bell hammer. This will allow the bell hammer to be pulled by its spring into the path of the bell operating post on the keyboard gear hub. With each revolution of the keyboard shaft the bell operating post moves the bell hammer away from the gong. The bell hammer spring then pulls the bell hammer against the gong.

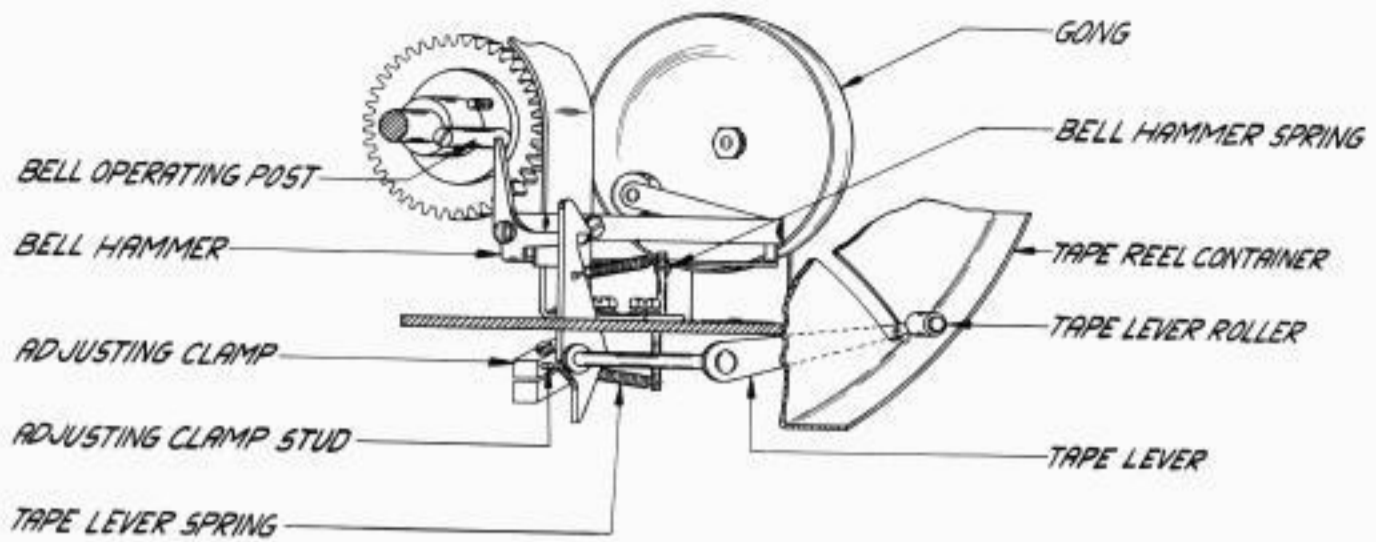


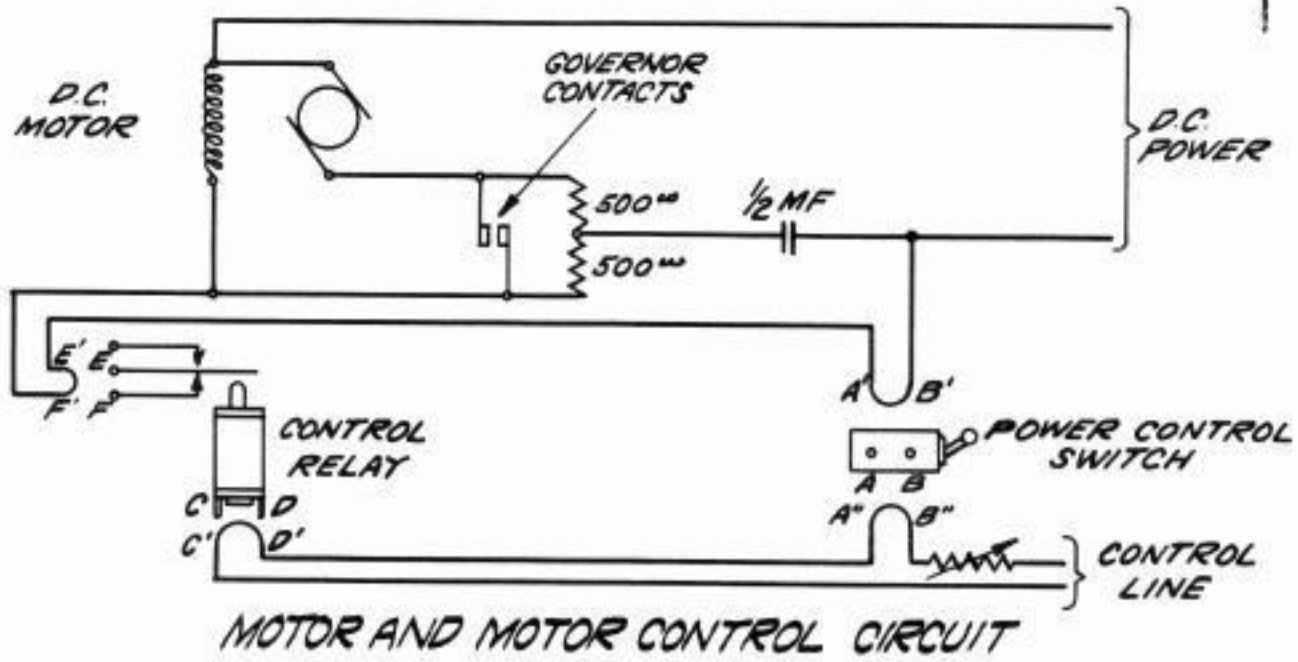
FIGURE 21

WIRING DIAGRAM

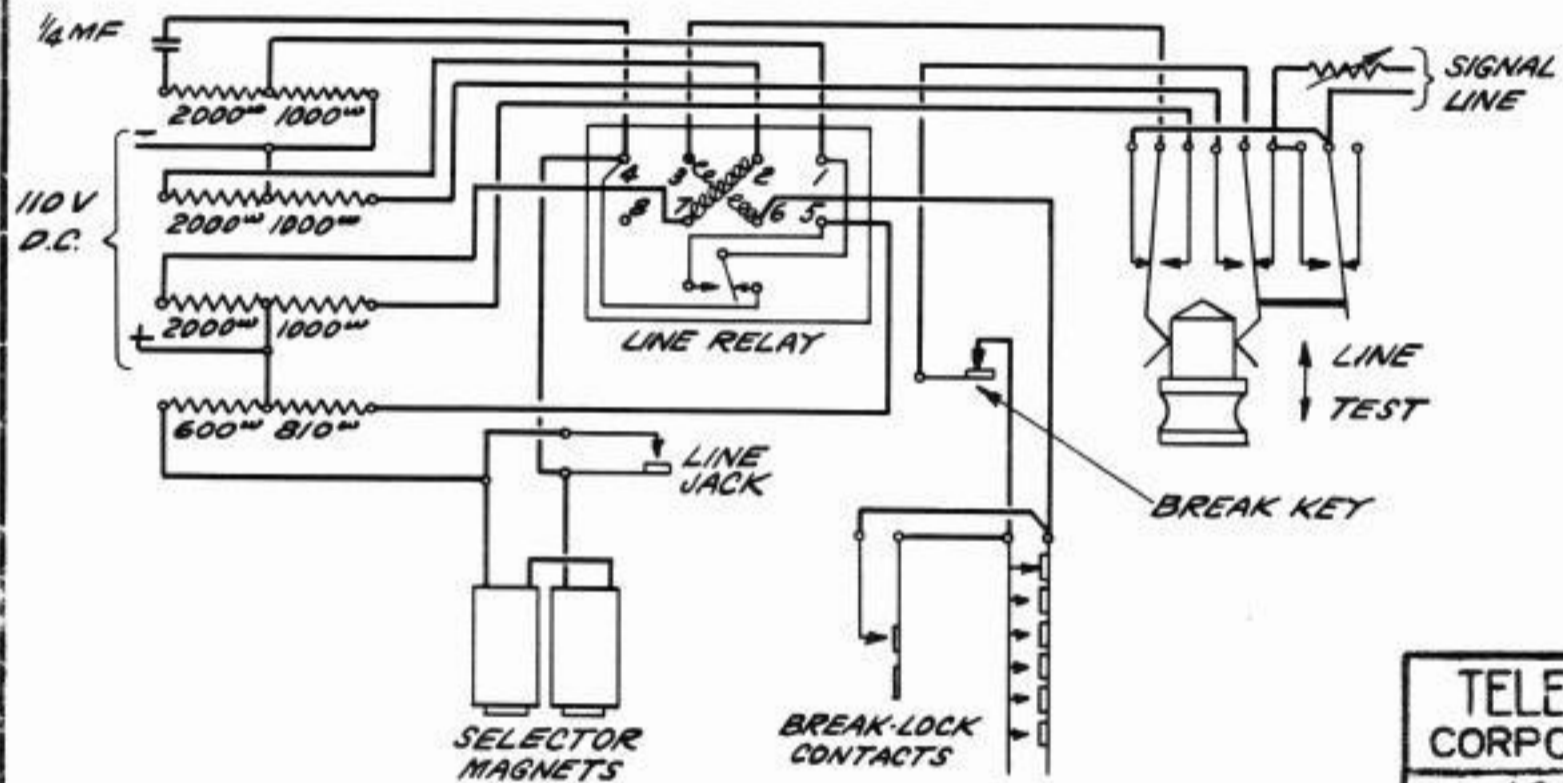
Wiring Diagram #1401 on the following page shows the theoretical wiring of a typical model 14 printer. The motor circuit shown is one generally used with 110 volt direct current motors. Refer to actual wiring diagram for complete circuits.

The top figure on Wiring Diagram #1401 shows the motor and motor control circuits. When no control relay is used, loop A'B' is open and A' is connected to A and B' to B power control switch terminals. When the control relay is used, loops A''B'', C'D' and E'F' are open and A'' is connected to A, B'' to B, C' to C, D' to D, E' to E, and F' to F.

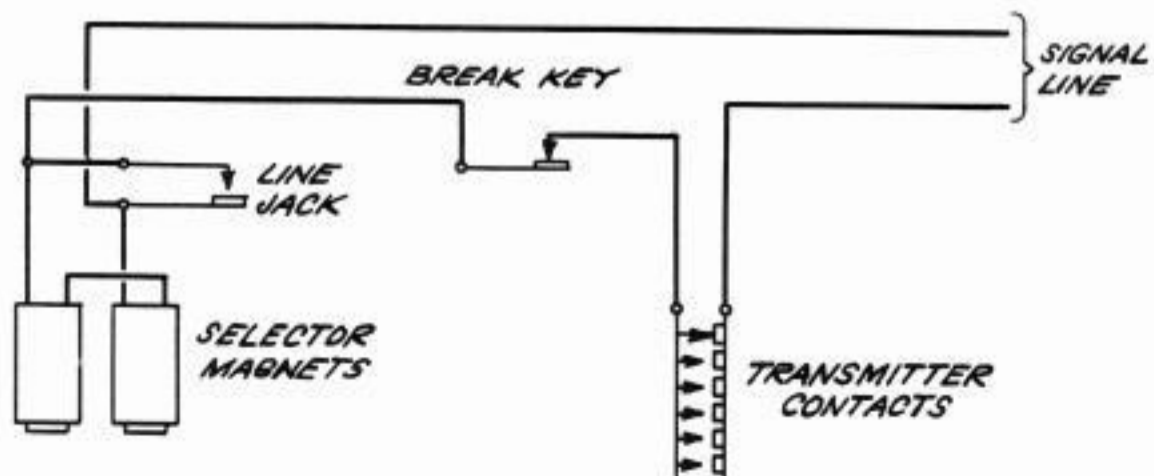
The other two figures on the wiring diagram show the line and line relay circuits.



MOTOR AND MOTOR CONTROL CIRCUIT



LINE AND RELAY CIRCUITS



LINE CIRCUITS WITHOUT RELAY

TELETYPE CORPORATION

1401
DEC. 15, 1931

THEORETICAL
WIRING DIAGRAM

14 PRINTER

DRAWN *all*
TRACED *all*
CHECKED *V.R.V.*
ENG. RD. *E.P.K.*
APPROVED *[Signature]*