

MORKRUM-KLEINSCHMIDT

PRINTING TELEGRAPH SYSTEMS

DESCRIPTION
of the
TYPEBAR PAGE PRINTER
(MODEL 12)

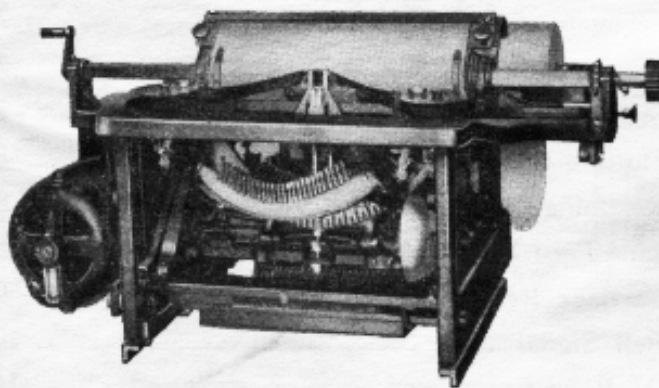
TELETYPE

MORKRUM-KLEINSCHMIDT CORPORATION
CHICAGO, U. S. A.

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TYPEBAR PAGE PRINTER
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CHICAGO, U. S. A.

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DESCRIPTION OF THE MODEL 12 TYPEBAR PAGE PRINTER

General

The Morkrum Typebar Page Printer consists of a basket carrying a set of typebars similar to that of the typewriter, these typebars being mechanically thrown against a platen, thus causing a letter to be printed. The typebar to be selected is determined by the setting of five code bars which are actuated by five selector magnets controlled by the line signals. The code bars are so arranged that notches on their under sides will be lined up, permitting a certain push bar which is linked to the typebar to move upward into the path of the striker bail. This bail moves the push bar which causes the typebar to move against the platen.

Selecting Unit

The five selector magnets are mounted in the rear left corner of the printer. The coils of these magnets are connected to the receiving distributor and are operated if the proper line signals are received. When a magnet is energized the armature pulls up and moves the selector plunger to the left (figure 1). The selector plunger strikes the upper arm of the selector latch, thus causing the latch to disengage from the selector lever. The upper end of the lever moves towards the left and pushes the corresponding code bar in that direction. Each selector magnet is either energized or remains unenergized, according to the combination of the code for the letter or

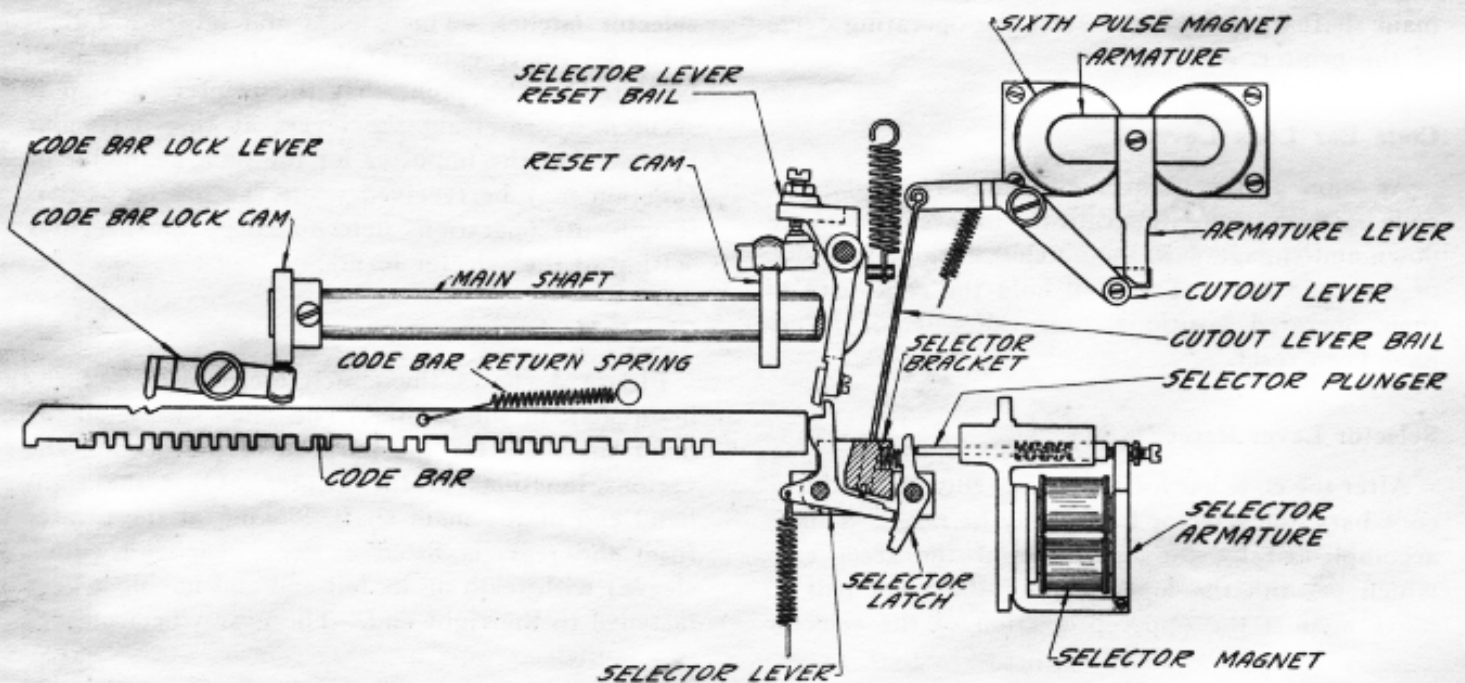


Figure 1—Selector Mechanism

The various functions, line feed, space, carriage return, figures, letters and signal bell are also accomplished mechanically. It should be noted that the only electrical equipment in the printer is five small selector magnets for actuating the code bars, a sixth pulse magnet which starts the operation of the printer, and a small motor which drives the mechanism.

The various operations of the printer are accomplished by a series of cams arranged on a shaft and driven by the motor through the medium of a clutch. These cams are so arranged that they operate various levers in a certain sequence causing the printer to perform its functions.

function. If a selector lever is operated, a projection on its upper end moves into the path of the selector lever reset bail.

During the time that the selectors are being operated the code bar lock lever (shown at left of figure 1) is being held away from the code bars, and the selector lever reset bail (shown at the right of figure 1) is held away from the selector levers. After the code combination has been received by the printer a local sixth pulse is transmitted from the distributor to the sixth pulse magnet. The sixth pulse magnet armature is pulled up (see figure 2) thus permitting the clutch throwout lever to move out of engagement with the projection on the driven

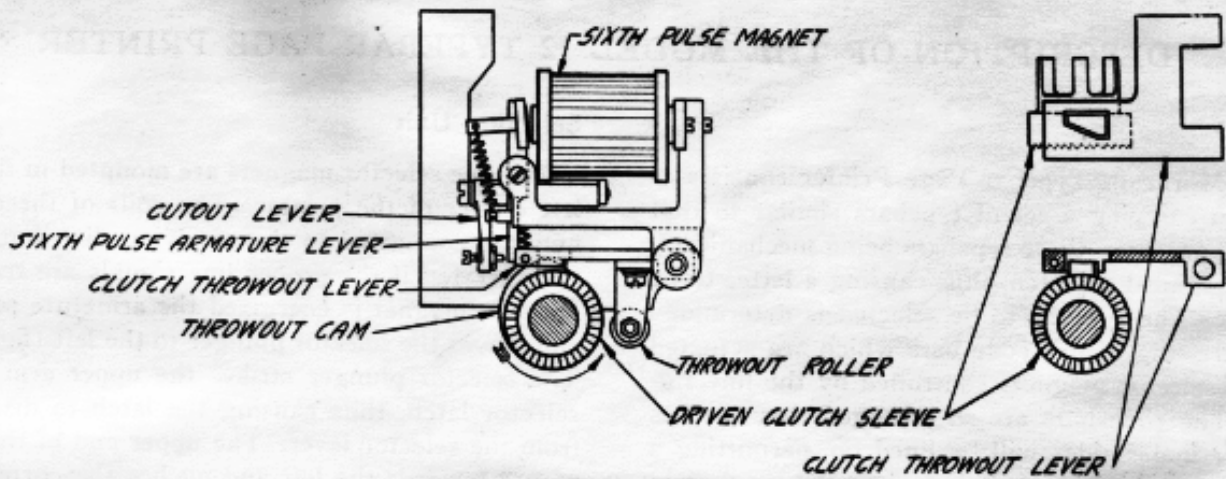


Figure 2—Clutch Throwout Mechanism

clutch sleeve. The driven clutch sleeve will then engage with the driving clutch sleeve and cause the main shaft to revolve and start the operating cycle of the printer.

Code Bar Lock Lever

As soon as the main shaft starts revolving the code bar lock cam will permit the lock lever to move down and engage with the notches in the upper side of the code bars. This will hold the code bars in their operated positions after the selector levers have been reset.

Selector Lever Reset

After the code bar lock lever has engaged with the code bars, the selector levers may be reset. This is accomplished by the operation of the reset cam which permits the lower end of the reset bail to move against the upper projection of the selector

levers. The lower ends of the selector levers will move downward and engage with the notches of the selector latches. The latches and levers are then ready for the reception of the next letter. It should be noted at this point that the printer overlap is secured by resetting the levers at this particular time so that the impulses for the next character or function may be received while the printer is performing its operations determined by the previous setting of the selector levers.

Clutch Mechanism

Figure 3 shows the clutch mechanism and the main shaft of the printer. The cams shown on the main shaft are for the purpose of performing the various functions of the printer. Over the right hand end of the main shaft, looking at the printer from the rear, is fitted a sleeve (driving clutch sleeve) with teeth on its left end and having a gear fastened to the right end. The gear wheel meshes

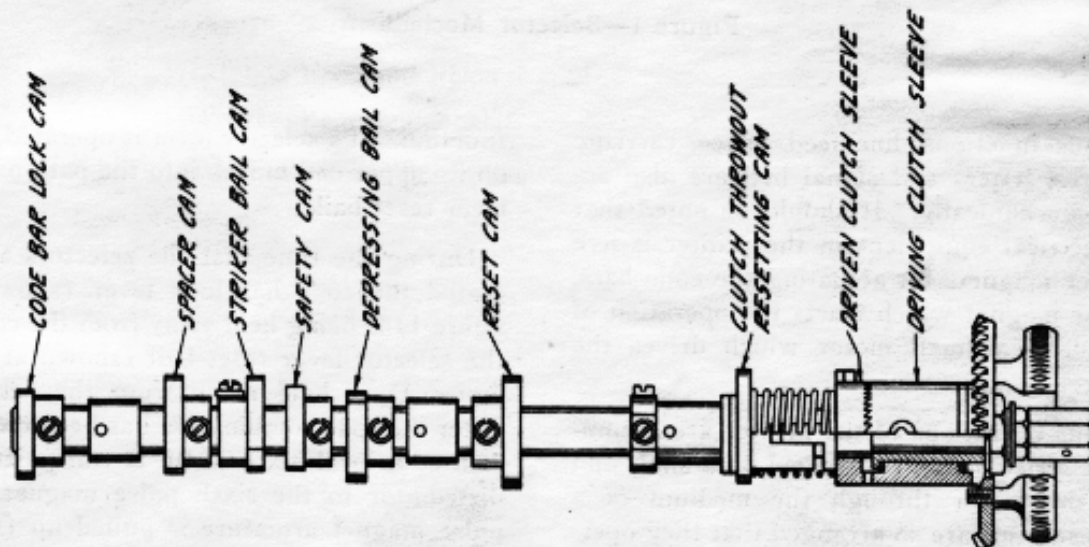


Figure 3—Main Shaft and Clutch Mechanism
(Looking at Printer from Rear)

with a pinion on the motor and is continually rotated. To the left of this driving sleeve is a driven sleeve the right end of which is toothed and meshes with the teeth on the driving sleeve when the main shaft is revolving. The left hand side of the driven sleeve has four tongues which slide into four grooves on a collar secured to the main shaft. The driven sleeve may therefore be moved in and out of mesh with the driving sleeve and have a driving connection with the main shaft. Normally a projection on the driven sleeve is engaged in a V shaped slot in the clutch throwout lever which forces the driven clutch to the left and out of engagement with the driving clutch, thus causing the main shaft to come to rest. When the sixth pulse magnet operates, it permits the throwout lever to disengage from the projection on the driven sleeve, which is moved to the right by a spring and into engagement with the driving sleeve, causing the main shaft to revolve.

driven sleeve camming to the right in the slot of the throwout lever.

Typebars and Push Bars

Each typebar (figure 4) is pivoted on a ballbearing and is connected to its push bar by two links. The rear end of the push bar has a projection on it which rises into the path of the striker bail when the code bars are lined up for that particular push bar.

Depressing Bail

Referring to figure 4, it is to be noted that normally the push bars are held down by a depressing bail. This is necessary in order to permit the code bars to be set, and this may only be accomplished when all the push bars are held out of the way of the code bars. The operation of the depressing bail is controlled by the depressing bail cam, shown in figure 3.

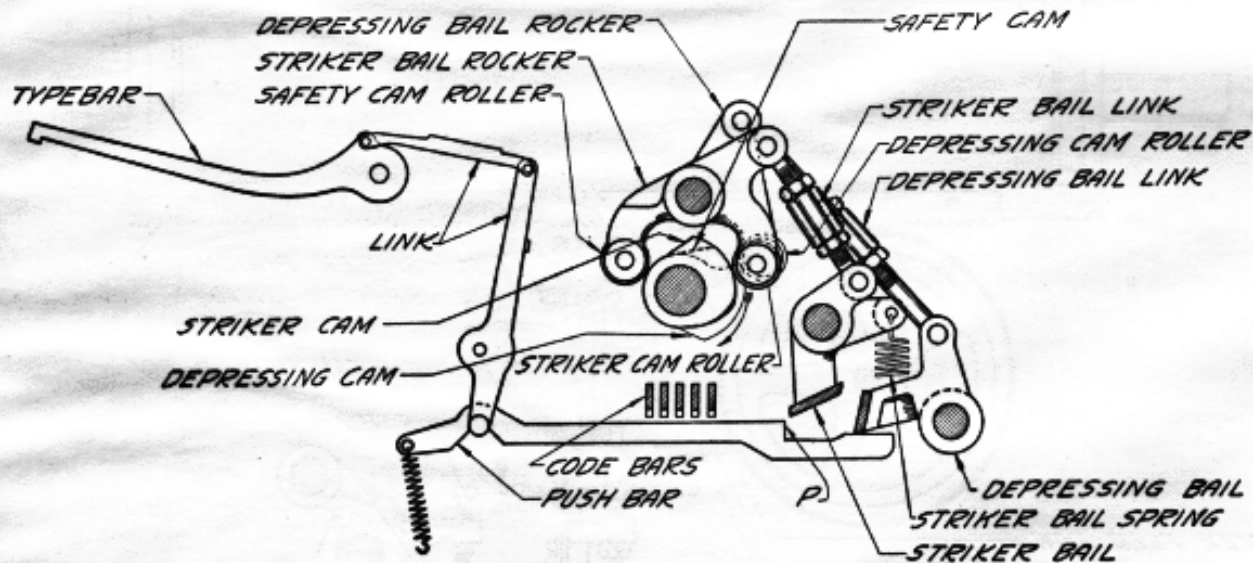


Figure 4—Striker and Depressing Bail Mechanism

Clutch Throwout Resetting Cam

The clutch throwout resetting cam is located just outside of the main shaft bearing and is the last cam to the right shown in figure 3. Referring to figure 2, it is to be noted that as the main shaft revolves the clutch throwout lever cam will move against the throwout roller forcing the roller to the right and causing the clutch throwout lever to move downward. The clutch throwout lever is moved downward far enough to engage in the notch in the armature lever. The operation of the sixth pulse initiates the rotation of the main shaft. Towards the end of the revolution the resetting cam resets the clutch throwout lever so that the clutch will be disengaged at the end of the revolution. The clutch sleeves are disengaged by the projection on the

Striker Bail Action

Let us assume that the code bars have been set for a certain combination and that a particular letter is to be printed. The sixth pulse will be received and the clutch engaged thus starting the rotation of the main shaft. The depressing bail cam will rotate (see figure 4) and cause the depressing bail to move upward through the medium of the depressing bail lever and link. This will permit all the push bars to rise and the push bar to be selected to move upward into the slots lined up in the five code bars. This will bring the projection on the rear end of the push bar in the way of the striker bail. Normally the striker cam roller is being held upward by the striker cam thus causing the striker rocker to pull up on the striker bail against the tension of the

striker bail spring. As soon as the main shaft comes to the striking position the striker cam roller drops off the striker cam and the striker bail spring moves the striker forward against the projection of the selected push bar. The push bar will transmit its motion to the typebar and the character will be printed.

The edge of the bail travels through an arc and disengages from the push bar, when printing a letter, before the type face reaches the paper. The actual printing is therefore done by the momentum of the typebar.

Safety Cam

The line feed, figures, letters, and bell signal functions which are operated from the push bars in the same manner as the printing of a letter, require more power than the printing of a letter. If the

Spacing Mechanism

Spacing takes place after a letter has been printed and is accomplished through the medium of the spacer cam (second from the left in figure 3) and the spacer rocker. The rocker (figure 5) has an arm extending to the rear with a stud in the end which registers with the spacer block. This block normally tends to move downward under the influence of a spring and works in a slide in the spacer frame which is fastened to the printer top plate. To the spacer block is fastened a pawl which engages with the spacer ratchet. The spacer ratchet is fastened to a short shaft to the opposite end of which is secured the spacer pinion which meshes with a toothed rack fastened to the carriage. As the striker bail moves forward, the spacer cam allows the spacer block to move downward and the spacer pawl to engage the next tooth of the spacer ratchet. The spacer cam then moves the block upward rotat-

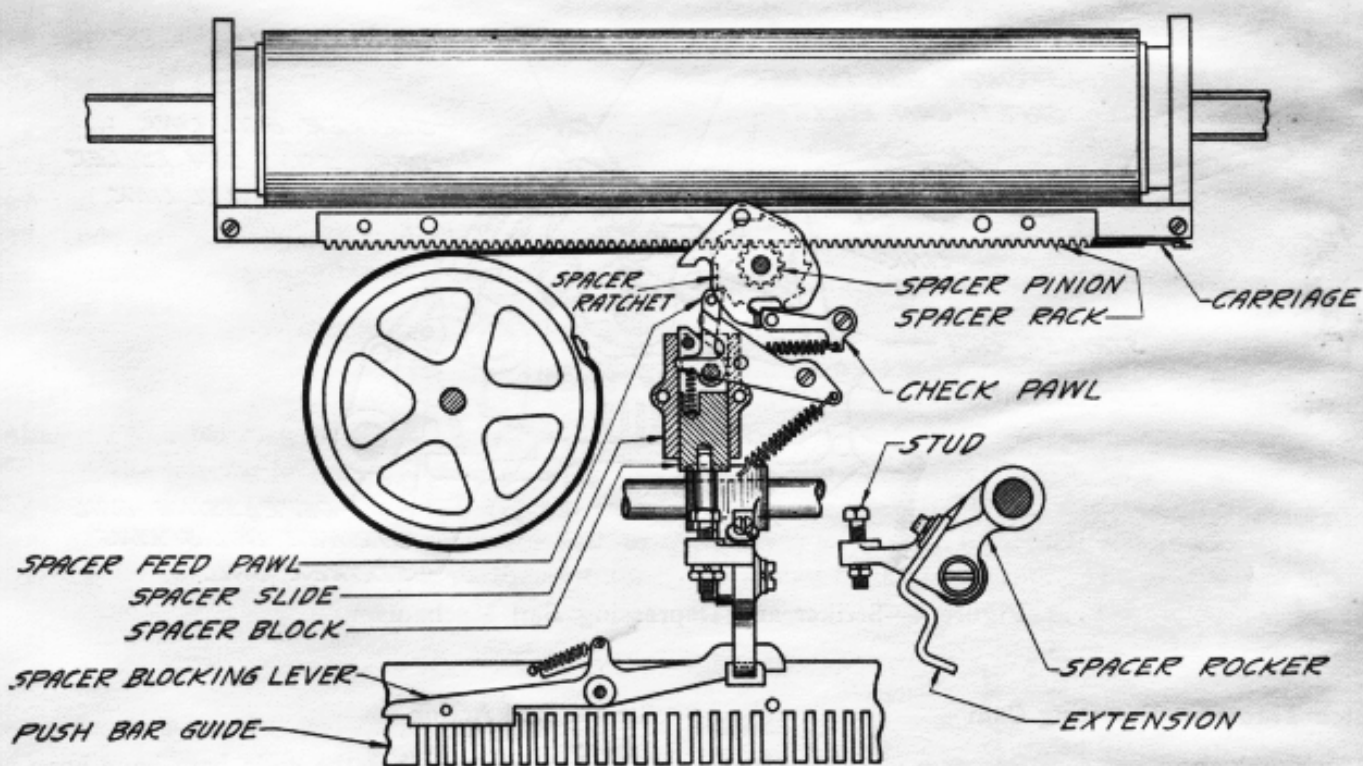


Figure 5—Spacing Mechanism

striker spring were adjusted for the functions the letter blow would be too heavy so that another means is provided in the form of a safety cam (see figure 4) to take care of the additional power. The safety cam is mounted on the main shaft next to the striker cam and acts on a roller pivoted on a front extension of the striker bail rocker. When one of the above functions is to be performed, the striker spring initiates the motion of the striker bail and the safety cam comes into operation later in the cycle completing the work of the function.

ing the spacer ratchet until the check pawl catches the next tooth. Thus the carriage is moved one letter space.

When spacing without printing is required a combination is received by the printer which actuates the code bars in the same manner as when a printed letter is selected. No push bar, however, is associated with the spacing mechanism so the main shaft revolves performing all the operations except that of the printing. In its regular sequence of operation the carriage is spaced.

Releasing the Code Bars

Near the end of the printing cycle the code bar lock lever is disengaged from the code bars thus permitting the code bars to be restored to their unoperated positions. The code bars are normally under the tension of the code bar springs (see figure 1) which tend to pull them into their unoperated position. If another combination has been set up while the printer was functioning the code bars will be immediately set for the next operation.

Sequence of Printing a Letter

Normal condition of Printer:

Main shaft is at rest.

Clutch throwout lever is engaged with projection on the driven clutch sleeve.

Selector latches and levers engaged.

Code bar lock lever held away from code bars.

Selector lever reset bail held away from selector levers.

Spacer rocker and striker bail are in their up positions.

Depressing bail is holding push bars out of engagement with the code bars.

After the code bars are selected and the sixth pulse magnet is operated, the clutch throwout lever moves upward and the main shaft starts to revolve. The code bar lock lever then drops into the notches in the upper part of the code bars and the depressing bail moves upward permitting the push bars to press against the code bars and the selected one to enter the notches.

As soon as the depressing bail starts upward the selector lever reset bail resets the selector levers and immediately the bail is restored so that selection for the next letter may start.

The striker bail then moves forward, striking the selected push bar to cause the printing of a letter or the operation of a function. As the striker bail moves forward the spacer cam allows the spacer block to move downward and the spacer pawl to engage the next tooth of the spacer ratchet.

Immediately after the striker bail has completed its forward movement the depressing bail starts downward to disengage the push bars from the code bars and the spacer cam starts to move the spacer block upward to space the carriage. At the same time the lock cam moves the lock lever out of the notches in the code bars, and shortly after the striker cam starts the striker bail backward to its normal position.

These movements are relatively timed so that they are all accomplished just before the main shaft completes its revolution. In the meantime the throwout resetting cam has moved the throwout lever into engagement with sixth pulse armature and as the shaft completes its revolution the projection on the driven clutch sleeve engages with the notch in the throwout lever and the two clutch sleeves disengage.

At the end of the cycle a notch in the spacer cam permits the spacer rocker to drop slightly, thus causing it to act as a detent to hold the main shaft in its stopped position.

Functions

In addition to printing letters, the printer must perform certain functions such as causing the paper to feed upward, return the carriage, shift the type to print figures or punctuation marks instead of letters, return the type to the letter printing position, and operate a signal bell. These functions are accomplished by push bars located at the extreme right of the printer which are selected in the same manner as the push bars for the various letters.

Spacer Cutout

When certain of the functions are performed it is necessary to prevent the carriage from spacing. Pivoted on the push bar guide above the function push bars is the spacer blocking lever shown in figure 5. When a function push bar is operated it pushes one end of the blocking lever upward while the other is moved downward into the path of an extension on the spacer rocker.

When the spacer cam tends to allow the spacer block to move downward so that the pawl can engage the next tooth of the spacer ratchet, the extension striking against the blocking lever prevents this downward movement and consequently prevents the pawl engaging the next tooth and the carriage does not space. When the depressing bail moves the push bars downward, the left hand end of the blocking lever also moves downward causing the right hand end to move upward out of the path of the extension so that if the next selection is not a function, the carriage will be spaced in the normal manner.

If it is desired to prevent spacing on certain functions while permitting it on other, the blocking lever is notched above the push bar positions for which it is not desired to suppress the spacing operation. Thus when these particular push bars move upward they do not engage the blocking lever.

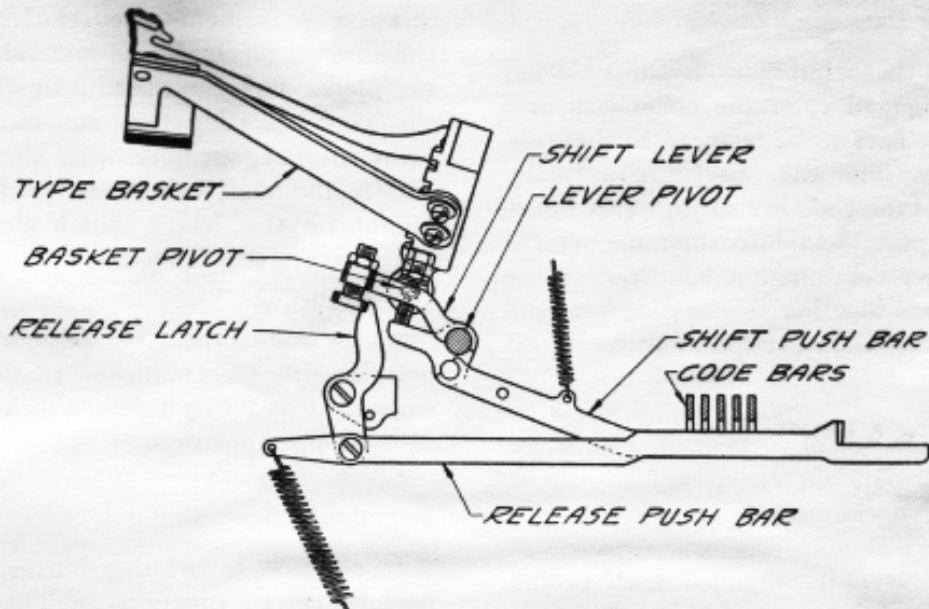


Figure 6—Shift-Release Mechanism

Ordinarily the spacer blocking lever is effective on Line Feed, Carriage-Return, Shift, Release, and Bell functions. However for certain applications the Printer is permitted to space on the Shift and Release functions in which case the blocking lever is cut away above these push bars.

Shifting the Type Basket

Figure 6 shows the mechanism for shifting the type basket. The setting of the code bars for causing the printer to shift is the same as explained for that of a letter, the shift push bar rising into the path of the striker bail when the depressing bail moves upward. The shift push bar moving causes the shift lever to rotate about its pivot and a projection on the lever to push the type basket upward. Another projection on the shift arm engages with the release latch which holds the basket in its shifted position.

Releasing the Type Basket

To release the type basket the code bars are set for the letters combination. The striker bail moves the release push bar, which transmits its motion to the release latch moving its upper end out of engagement with the projection on the shift lever and permitting the basket to return to its letters position. A push button is provided in the front of the printer to manually operate the release latch.

Frequently it is desired to have the type basket released to the letters position on the space combination as well as the letters combination. In this case the code bars are provided with a set of notches which permit a push bar to rise on the space com-

bination. This push bar has a piece riveted to its side which engages a projection on the side of the letters push bar so that when the space push bar moves forward the letters push bar moves with it releasing the type basket. Naturally the spacer blocking lever is cut away above the space push bar.

Line Feed Mechanism

Figure 7 shows the mechanism for feeding up the paper. On the right hand end of the carriage rod

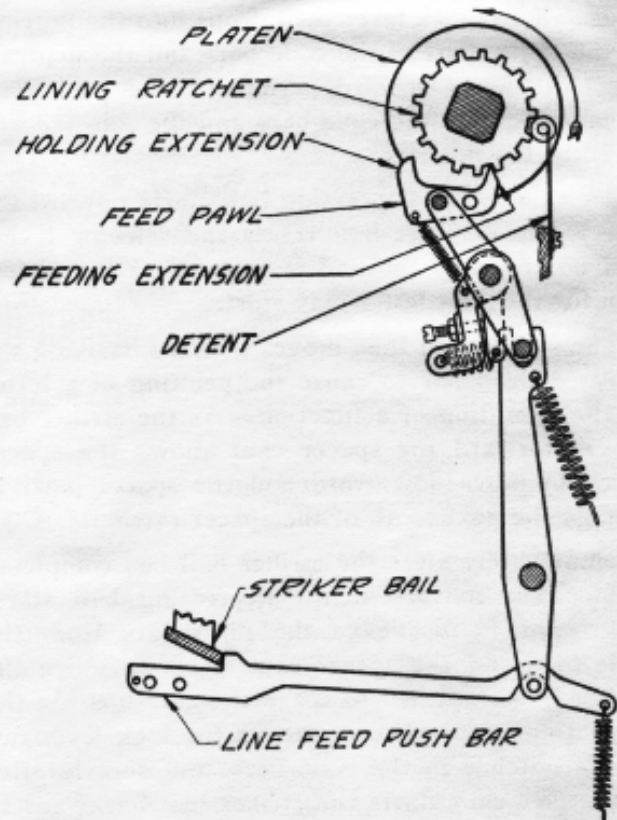


Figure 7—Line Feed Mechanism

is the lining ratchet which is rotated one tooth on the reception of the line feed signal.

The line feed push bar is selected in the usual manner and is pushed forward by the striker bail, causing the lower end of a pivoted vertical lever to move forward. Because of the power required the forward motion of the striker bail is completed by the safety cam and the push bar is held forward until the striker bail returns to its normal position. The upper end of this vertical lever moves backward carrying with it the lower end of a pivoted short lever. To the upper end of this short lever is pivoted the feed pawl which engages with the line feed ratchet. As the lower end of the short lever moves towards the rear its upper end moves forward carrying the feed pawl with it and causes the feeding extension to engage with the ratchet and rotate the platen. At the same time that the feeding extension of the feed moves forward, the

and check pawls are released the carriage will be pulled back by this spring. Fitting over the spacer ratchet shaft and in the back of the ratchet is the pawl release cam. This cam may be rotated by a horizontal lever pivoted to it and when moved the rim of the cam presses against pins which extend backward from the ends of the spacer feed and check pawls. The cam is so shaped that it will push the two pawls out of engagement with the spacer ratchet and permit the carriage return spring to pull the carriage back to the beginning of the line.

The carriage return push bar differs from the others in that it projects further to the rear and has no projection to engage the striker bail. Registering with its extreme rear is a latch, the upper extension of which engages with a horizontal lever, mounted on a casting in the lower right rear of the printer, and held under tension of a spring. Pivoted to this horizontal lever is a vertical one which acts

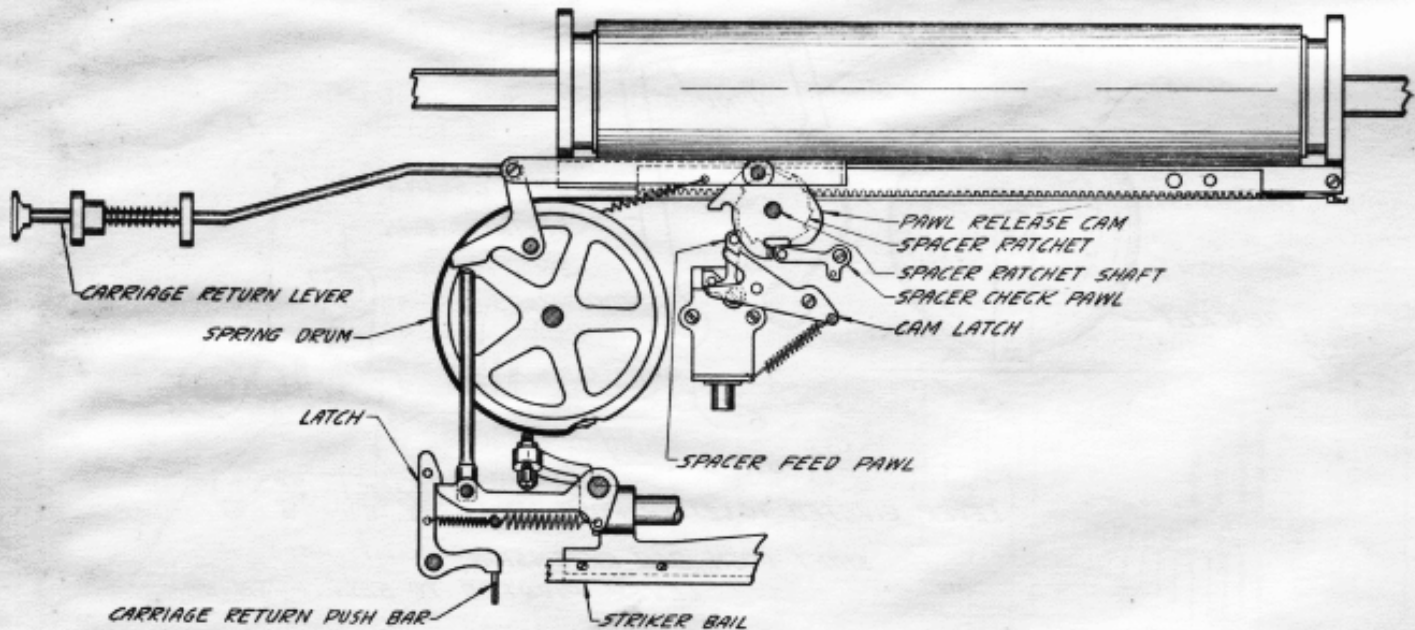


Figure 8—Carriage Return Mechanism

holding extension engages in one of the rear teeth preventing the platen from overthrowing.

A detent drops into a tooth of the ratchet, thus insuring positive positioning of the platen. When the striker bail returns to its normal position, the push bar moves back and the feeding mechanism is restored to its normal position by a spring.

Carriage Return Mechanism

Figure 8 shows the mechanism for returning the printer carriage to the beginning of a line. As the carriage is spaced it winds up the carriage return spring in the spring drum, and if the spacer feed

on one end of a bell crank. The other end of the crank is pivoted to the horizontal lever which actuates the pawl release cam. When the carriage return push bar is selected it moves upward and disengages the horizontal lever from the latch, which imparts its motion to the other levers and causes the pawl release cam to move the spacer pawls out of engagement with the spacer ratchet. The horizontal lever which was released by the latch must now be restored to its normal position, that is, into engagement with the latch. This is accomplished by an extension of the striker bail frame which when the striker bail moves forward, pushes the lever down until it engages with the latch. Since the striker bail is operated before the

completion of the cycle, sufficient time would not be allowed for the carriage to return. A means is therefore provided to keep the release cam operated until the spacer block moves downward on the next cycle. This is accomplished by the upper end of the cam latch engaging with a projection on the release cam and preventing the cam from moving back to its normal position after the latch and horizontal lever are engaged. The cam latch will remain in its upward position until the spacer block moves down. The spacer block will not move downward until the next cycle due to the fact that the spacer cutout is operative on carriage return. When the spacer block moves downward a pin pulls the cam latch out of engagement with the release cam and the cam is restored to normal.

A push button on the right carriage bearing brackets is provided to permit the return of the carriage manually.

mer is connected to the push bar by a link similar to that used for connecting the typebars to the push bar. When the code bars are set and the proper push bars move upward into the notches the striker bail will move forward and cause the bell hammer to strike against the bell, the action being similar to that of throwing a typebar against the platen to print a letter.

In the case of operating a bell on a shifted letter combination it is first necessary to transmit the shift combination in order to bring the type basket to the shifted position. The code bars are cut with two sets of notches for the particular letter combination on which the bell is to be operated. One set of these notches is placed on either side of the notches for the shift combination. The push bars (see figure 9) corresponding to the two sets of notches have downward extensions adapted to pass underneath an extension on the shift push bar.

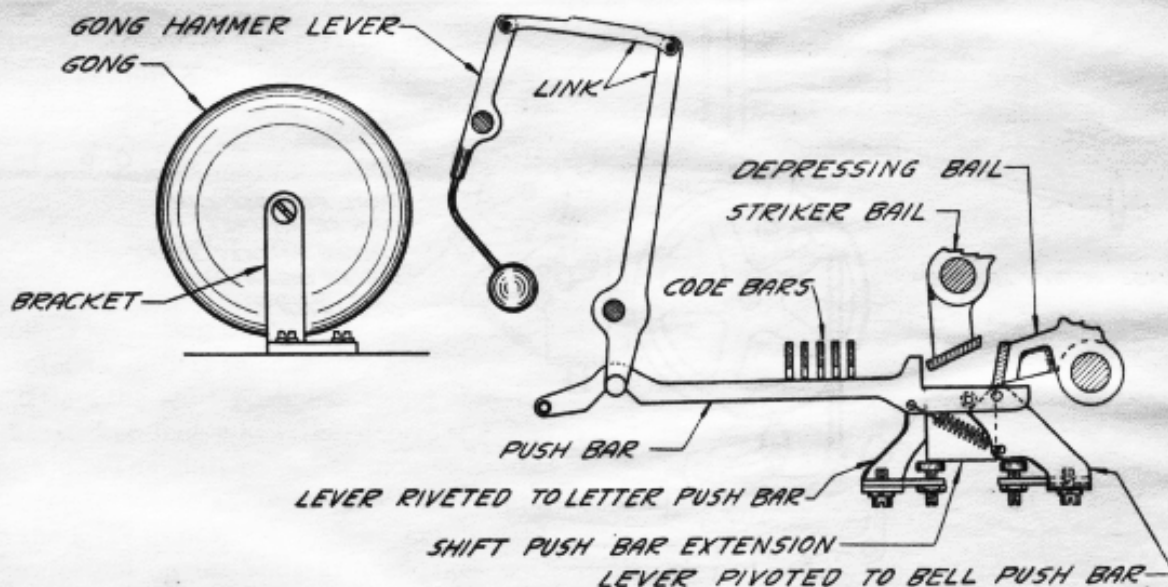


Figure 9—Signal Bell Mechanism

Bell Signal

The typebar printer may be provided with a bell signal operated from the blank code combination or from the code combinations for the letter J, S, A, or any other desired letter when preceded by the signal shift. That is, the printers may be arranged to operate a signal bell if the type basket is shifted and the combination for a letter corresponding to the bell signal transmitted.

When the bell signal is operated on the blank combination, it is only necessary to send a blank signal over the line to operate the mechanism. In that case instead of having a typebar on the push bar corresponding to the blank signal, a bell ham-

mer is connected to the push bar by a link similar to that used for connecting the typebars to the push bar. When the code bars are set and the proper push bars move upward into the notches the striker bail will move forward and cause the bell hammer to strike against the bell, the action being similar to that of throwing a typebar against the platen to print a letter.

When the shift push bar is operated for the printing of figures and other upper case characters the lug on it moves into the path of the lug on the bell letter push bar, thus blocking it. The bell push bar will, however, be permitted to move upward and into the path of the striker bail. The striker bail moving forward will cause the push bar

to move with it and transmit its motion to a bell hammer connected to it. It should be noted that only a single stroke of the bell will be obtained with each combination.

Sixth Pulse Cutout

It is to be noted that when the printer is to be used in conjunction with a receiving distributor which is continually rotating, a sixth pulse will be received for every revolution of the distributor and will therefore permit the printer to space for each revolution of the distributor whether the code signals are being transmitted or not. A means is therefore provided to prevent the printer from functioning unless some code combination is being sent over the line. This is accomplished by the sixth pulse cutout lever bail and cutout lever shown in figures 1 and 2. The cutout lever bail is a light wire which rests across the top of the selector levers and is pivoted to the cutout lever. Normally, the lower end of the cutout lever is held upward by a spring and in the way of the sixth pulse armature lever. If a sixth pulse is received when the cutout lever is in this position the lower end of the sixth pulse magnet armature will not be permitted to move outward so as to release the throwout lever. It is therefore evident that the main shaft will not revolve.

Should any of the selector levers, however, be operated the cutout lever bail will be moved upward and the lower end of the cutout lever will be moved downward and out of the path of the sixth pulse armature. If the sixth pulse is now received, the sixth pulse armature will be permitted to move outward and the clutch throwout lever to disengage from the projection on the driven clutch sleeve.

Ribbon Feed and Reverse

The ribbon for inking the characters winds from one ribbon spool to the other and reverses automatically when either end is reached. The shaft for each spool is provided with a small gear wheel underneath and either gear wheel may engage its feeding gear wheel driven from the rear ribbon drive shaft. This is rotated by a ratchet and pawl actuated by the spacer block. When the gear wheel of one spool is engaged the gear of the other is disengaged. When the last half turn of the ribbon is reached on the spool which is unwinding, the upper end of the small pivoted reverse pawl within the core of the spool is permitted to project, under the action of a spring, through a slot in the core (because of the absence of ribbon over this slot) and the lower curved end of this pawl is permitted to come into the path of the winding gear wheel which is disengaged from the gear of the spool unwinding. As this gear rotates, it catches on the curved end

of the pawl and climbs up into engagement with the gear of the empty spool, causing this to start winding. At the same time the two gears for the spool which has the entire ribbon wound on it are disengaged and this spool is permitted to unwind. The ribbon reverse can be accomplished manually, if desired for testing, by moving a small knob at the upper left front of the printer from one side to the other.

At the printing point, the ribbon passes through a carrier and guide fastened at its lower end to a ribbon actuator which is oscillated during operation by means of a cam on the depressing bail rocker. After the printing of each letter, the ribbon is pulled down below the printing point so as to make the printing readable up to the last character.

Near the left-hand carriage bearing bracket there is provided a three-position manual lever for varying the upper position of the ribbon travel. In one position the characters strike the upper half of the ribbon, in the middle position they strike the lower portion and in the other position the ribbon is removed from the printing point so that wax stencils may be made if desired.

Power Requirements:

Printers are supplied with direct current or alternating current motors depending upon the source of power available at the point at which the printers are used. These motors are comparatively small and require about 75 watts for their operation.

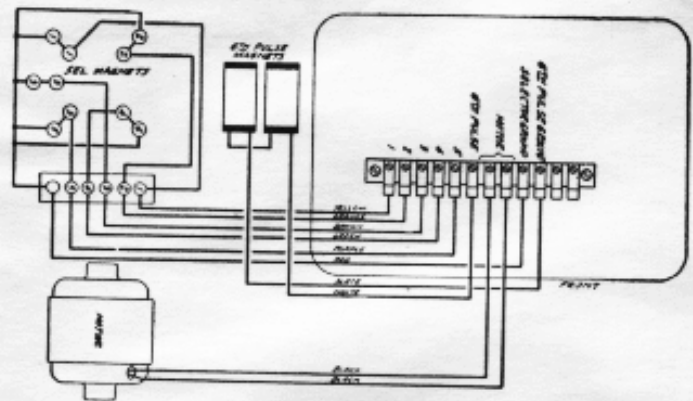


Figure 10—Wiring Diagram

Direct Current only can be used for the operation of the selecting and sixth pulse magnets on the printer. This source of power must be at least 110 volt D.C., a minimum of 30 watts being required for each printer and the associated apparatus with which it works.

Wiring Diagram:

Figure 10 shows the wiring of the printer. It should be noted that the various wires terminate on connection clips, these clips engaging with the connection springs on the table on which the printer is operated.