Bulletin No. 110
(POSTAL W.S.B.)
AUGUST, 1925

MORKRUM-KLEINSCHMIDT

PRINTING TELEGRAPH SYSTEMS

ADJUSTMENTS
PAGE TYPEBAR PRINTER
(MODEL 12)

TELETYPE

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

Bulletin 110

(Postal W.S. 8)

ADJUSTMENTS OF THE MORKRUM TYPEBAR PRINTER

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ADJUSTMENTS

MORKRUM TYPEBAR PRINTER ADJUSTMENTS.

LUBRICATION

If the printer is properly lubricated, wear will be minimized and it will operate for long periods without readjustment. How often a printer should be oiled depends upon the class of service in which it is used. The principal bearings of the printer which require the most frequent lubrication are equipped with oil cups. Looking at the rear of the printer they are located as follows:

1. On the end of the main shaft. This is in the form of a nut with a ball oil retainer. It is well to remove this nut occasionally, fill with oil and replace it. The oil from this cup feeds through a lengthwise hole in the shaft from which it is conducted by two wicks, passing through crosswise holes to the driving and driven portions of the clutch.

2. On the shaft of the clutch throwout lever. This supplies oil through wicks to the two bearings of this lever.

3. On the right rear corner post. This cup supplies oil to the right hand bearing of the main shaft through a wick in the tube leading from this cup.

4. On the shaft of the selector lever reset bail. Oil from this feeds through cross wicks to the bearings.

5. On the right hand bracket of the cam rocker shaft. This shaft is hollow and oil from the cup fills the shaft and is fed by cross wicks to each of the rockers. A hole is drilled in each of the brackets to allow oil to feed downward to the two main shaft bearings below.

6. On the left hand bracket of the striker bail shaft. Oil feeds through the hollow shaft to the striker bail bearings.

7. On the left hand bracket of the depressing bail shaft. Oil feeds through the hollow shaft to the depressing bail bearings.

8. On the left hand side of the spacer frame casting. Oil from this cup lubricates the spacer block.

Other places in the body of the printer which should be oiled are:

1. The shoulder screws on which the cam rollers revolve.
2. The turnbuckle shoulder screws.
3. The shoulder screws which carry the carriage return lever and latch.
4. The shoulder screws which carry the code bar lock lever and the selector reset bail roller.
5. The code bar bearings.
6. The bearings of the selector levers and latches.
7. The sixth pulse armature bearings.

The selector plungers should not be oiled as the oil is apt to gum and prevent them from moving freely in their guides. If they are removed for any reason wipe them clean with a slightly oily rag. The pivot screws which carry the selecting magnet armatures should be oiled occasionally but sparingly. A drop of oil should be applied occasionally at the point where the push bars hook onto their vertical levers. A little grease should be applied to the gear teeth occasionally and the motor grease cups should be filled with vaseline regularly.

On the top the following places should be oiled:

1. The spacer pinion shaft, both front and rear, and the bearing of the carriage return disc, which turns on this shaft.
2. The shoulder screws carrying the spacer pawl and the check pawl.
3. The shoulder screw which carries the carriage return bell crank.
4. The bearings of the line feed shaft and line feed pawl.
5. The end bearings of the carriage shaft. Wipe the shaft clean occasionally and apply a few drops of oil at either end of the carriage, moving the carriage back and forth to distribute it.

Use a good grade of medium oil. 3 in 1 is too light. Oildag P-2 is excellent.

Caution - Do not oil typebar ball bearings.

SPRING TENSIONS

Spring values are given in order that the attendant may check them in case a spring becomes mutilated or if the printer is not functioning properly and he suspects that a spring value may have changed. Undue friction may give the effect of a weak spring so that in checking the value of a spring it is well to remove the spring and note if the part to which the spring is attached moves freely.

The spring tensions given in the table below are proper for operation at from 60 to 75 words per minute and will take care of all speeds lower than this. It will be found that a considerable variation in spring tensions has no bad effect on the operation of the printer, but best results are obtained with tensions as given. Springs, in general, should be lubricated during the periodical oiling of the printer to prevent rusting. Spring eyes and attachment points should also have a drop of oil to prevent excessive wear.

To measure selector plunger, latch. and lever springs remove selector lever unit.

SELECTOR PLUNGER SPRINGS

Remove selector magnet armature. Scale should read ½ ounce when end of plunger is pushed in flush with the guide.

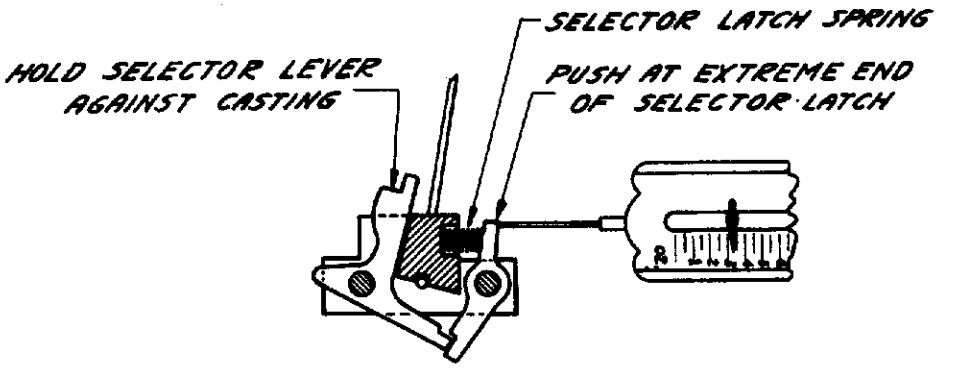


FIGURE 1.

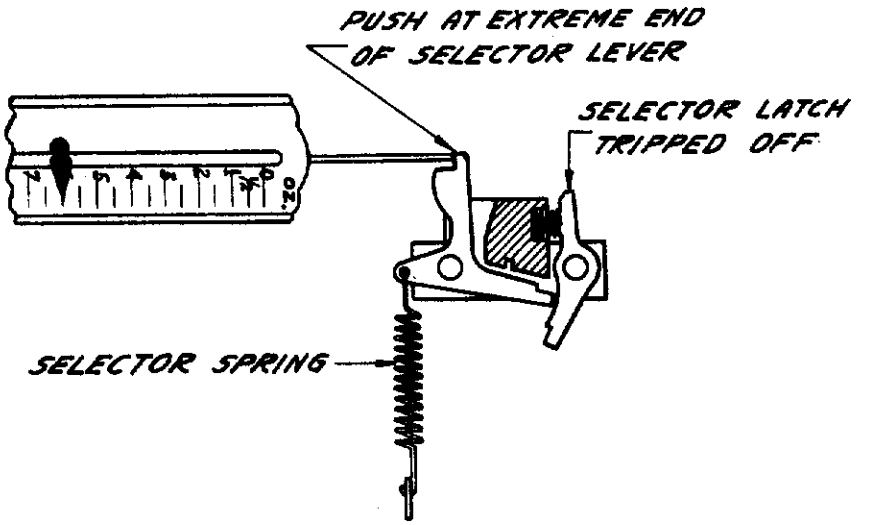


FIGURE 2.

SELECTOR LATCH SPRING

Hold the upper end of the selector lever against casting. Push against extreme top end of latch. Scale should read from 3 to 3½ ounces when latch begins to move. See figure 1.

SELECTOR LEVER SPRING

When selector lever is in its tripped off position it should require a 6-ounce push at extreme upper end of lever to just move it. See figure 2.

CODE BAR RETURN SPRING

When the code bar lock lever is held away from the code bar notches it should require 3½ to 4 ounces to move code bar to left, looking at printer from rear, with balance hooked in spring hole of bar. To measure these springs it is necessary to remove main rocker shaft assembly.

CODE BAR LOCK LEVER SPRING

With lever blade in code bar notches hook spring balance under lever blade and pull upward. Scale should read between 3 and 4 pounds to move lever.

SIXTH PULSE ARMATURE SPRING

Unhook spring from armature and hook balance in spring eye. Pull upward until spring eye is opposite post on armature. Scale should read between 8 and 9 ounces.

CLUTCH THROWOUT LEVER SPRING

Unhook spring from end of sixth pulse armature bearing screw and hook balance in spring eye. With throwout lever engaged with notch of sixth pulse armature lever, pull upward until spring eye is opposite bearing screw. Scale should read 2½ to 3 pounds.

SIXTH PULSE CUTOUT SPRING

Unhook spring from cutout lever and attach to spring balance. Scale should read 1 ounce when spring eye is opposite hole in lever, the lever being held in its blocking position.

SELECTOR RESET BAIL SPRING

With roller on high part of cam it should require a pull of 10 pounds to move selector lever reset bail when spring balance is hooked under upper end of casting and pulled upward. See figure 7.

DEPRESSING BAIL SPRING

With depressing bail in released position and balance attached to top of ribbon throw cam on depressing bail rocker, pull toward front of printer. Scale should read from 18 to 20 ounces.

PUSH BAR SPRING TENSIONS

Before checking push bar spring tensions turn mainshaft until depressing bail just clears push bars

CHARACTER PUSH BAR SPRINGS

3¾ to 4¼ ounces should be required to move bar when balance is hooked into the corner of the push bar notch and pulled perpendicular to bar.

SHIFT PUSH BAR SPRING

6¼ to 7½ ounces should be required to move bar when balance is hooked on to bar directly in front of depressing bail and pulled perpendicular to bar.

BELL PUSH BAR SPRING

4 ounces should be required to move bar when balance is hooked on to bar directly in front of depressing bail and pulled perpendicular to bar.

RELEASE PUSH BAR SPRING

2½ to 3½ ounces should be required to move bar when balance is hooked directly in front of depressing bail and pulled perpendicular to the bar.

LINE FEED PUSH BAR SPRING

5 ounces should be required to move bar when balance is hooked on to bar directly in front of depressing bail and pulled perpendicular to bar.

CARRIAGE RETURN PUSH BAR SPRING

9 to 11 ounces should be required to move bar when balance is hooked on to bar directly in front of depressing bail and pulled perpendicular to bar.

SPACER CUTOUT LEVER SPRING

Revolve mainshaft so that spacer rocker extension is away from cutout lever. ½ to ¾ ounces should be required to move the lever with spring balance hooked in hole in left hand of lever.

MAIN CLUTCH SPRING

It should require 5 pounds pressure to move driven clutch away from driving part, measured against projection on driven clutch. This measurement is easily made by holding screw driver against projection and pushing perpendicular to screw driver.

STRIKER BAIL SPRING

This spring is adjusted for good printing by turning the adjusting screw on the left hand rear side of printer. The blow should be no stronger than necessary for clear printing as excessive blow wears the ribbon rapidly.

LINE FEED LEVER SPRING

15 to 17 ounces should be required to move the lever with spring balance hooked in fork at upper end and pulled perpendicular to lever.

CARRIAGE RETURN RELEASE LATCH SPRING

Hold down carriage return release rod, hook scale in hole in upper end of latch and pull to the left. 1 to 1½ ounces to move latch.

CARRIAGE RETURN RELEASE ROD SPRING

1¼ to 2 pounds should be required to move lever away from latch measured by pushing downward on rod.

CARRIAGE RETURN LEVER SPRING

2 ounces should be required to just move lever when balance is hooked in spring hole of lever and pulled to right.

CARRIAGE RETURN LOCK PAWL SPRING

¾ to 1 ounce pull should be required to move pawl when measured at hole near end of pawl.

CARRIAGE RETURN CAM LATCH SPRING

2¾ to 4 ounces should be required to move latch with balance hooked into notch in upper left hand extension of latch and pulled downward.

SPACER CHECK PAWL SPRINGS

Hold spacer block up so that spacer ratchet notch is away from point of spacer ratchet. It should require a 2 ounce pull when balance is hooked in spring hole and pulled to right.

SPACER PLUNGER SPRING

Unhook spring from hole in plate. Scale should read 28 to 30 ounces when eye is in line with spring hole.

LINE FEED PAWL LEVER SPRING

With feed pawl in its operated position, hook spring balance to spring post on line feed pawl lever and pull toward rear. Pull should be from 9 to 10 pounds.

RIBBON CARRIER SPRING

With ribbon switch in its center position and carrier up, spring should measure 7½ to 8½ ounces when detached from post and eye is brought in line with spring post.

PLATEN ROLL SPRING TENSIONS

Remove platen roll from square shaft, and spacer rack and roller release shaft from platen roll assembly. The platen roll springs will then be accessible. Hook spring balance to end of spring; reading should be 14 to 18 ounces. Bend springs to get proper tension. It is essential that the pressure on all four corners of the roll carrier be equal. See that the six small rollers all rotate when platen roll is revolved.

CARRIAGE RETURN SPRING

This spring is a standard typewriter spring, adjustable by an escapement on the rear of the drum. The spring tension should be just sufficient to return the carriage quickly and without jar. This spring should be adjusted in conjunction with air buffer as explained later.

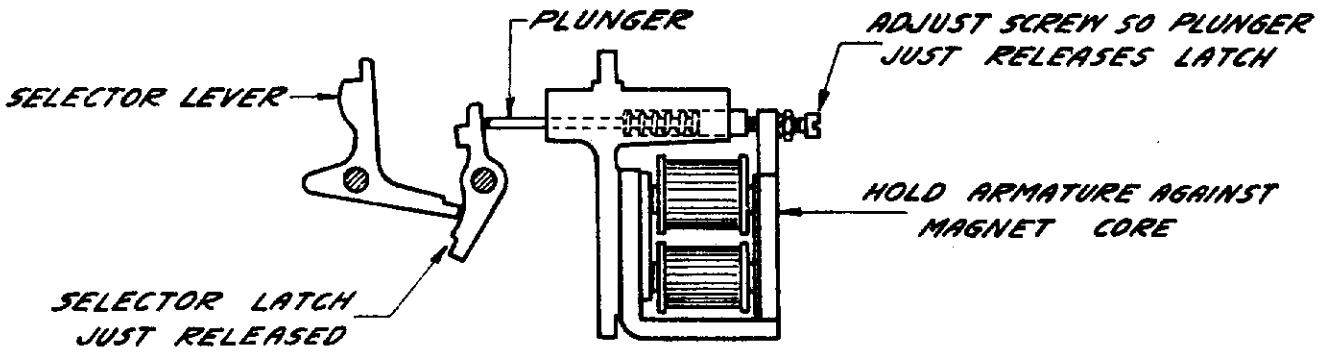


FIGURE 3.

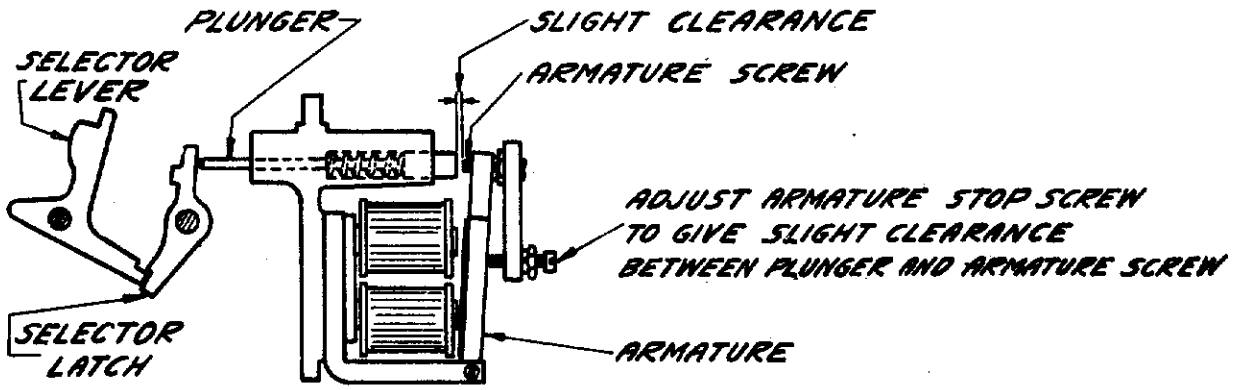


FIGURE 4.

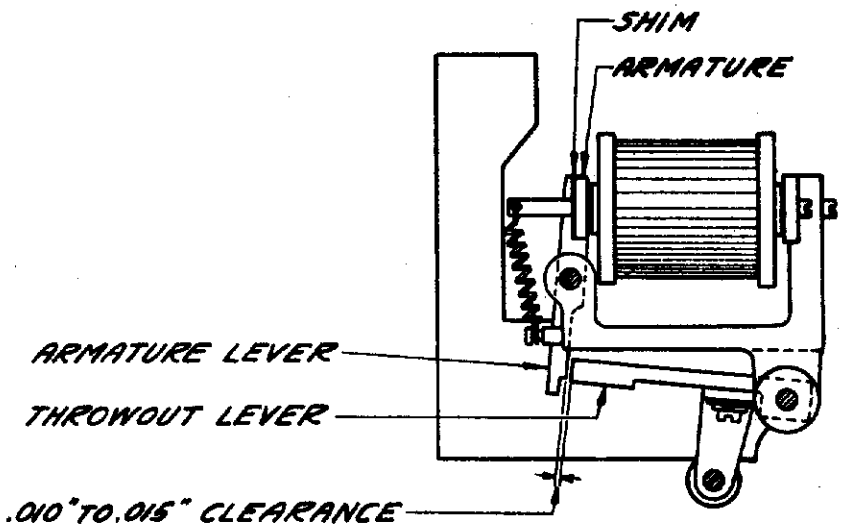


FIGURE 5.

ADJUSTMENTS

Any of the operations of the printer may be performed slowly by tripping any combination of the selector levers by hand, then tripping the sixth pulse armature and turning the main shaft by means of the hand wheel. This feature is of inestimable value in studying any operation or in checking adjustments.

SELECTOR MAGNET ARMATURE SCREWS

Hold the armature firmly against the magnet core. Adjust the screw so that plunger will just release the selector latch. Lock with lock nut. See figure 3.

SELECTOR ARMATURE STOP SCREWS

With the selector levers and latches engaged, adjust armature stop screw to give a slight clearance between armature screw and end of plunger. See figure 4.

SIXTH PULSE MAGNET ARMATURE

When armature is held against core there should be from ..010" to .015" clearance between armature lever and the clutch throwout lever; the throwout lever being in its up position. If the clearance is too great add shims between the armature and armature lever. See figure 5.

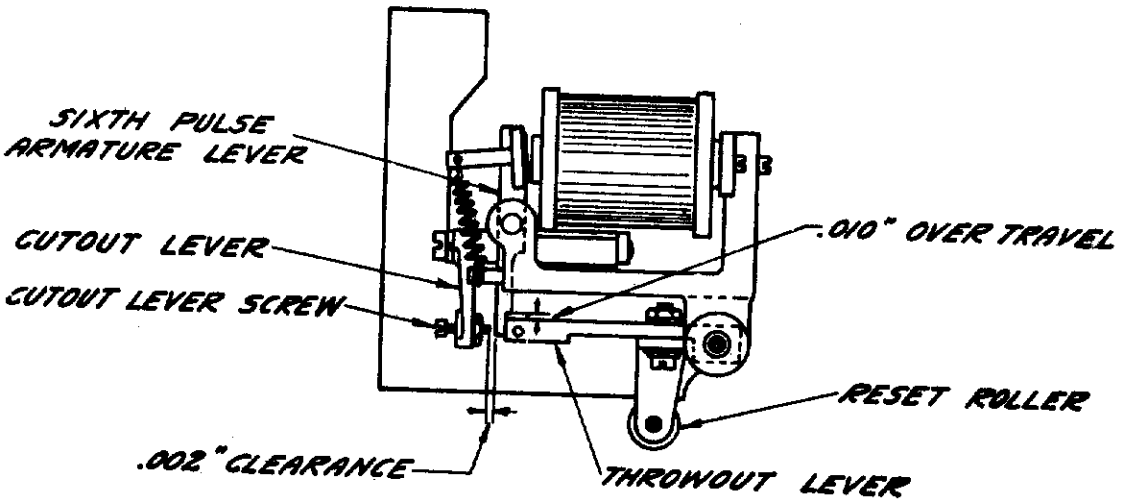


FIGURE 6.

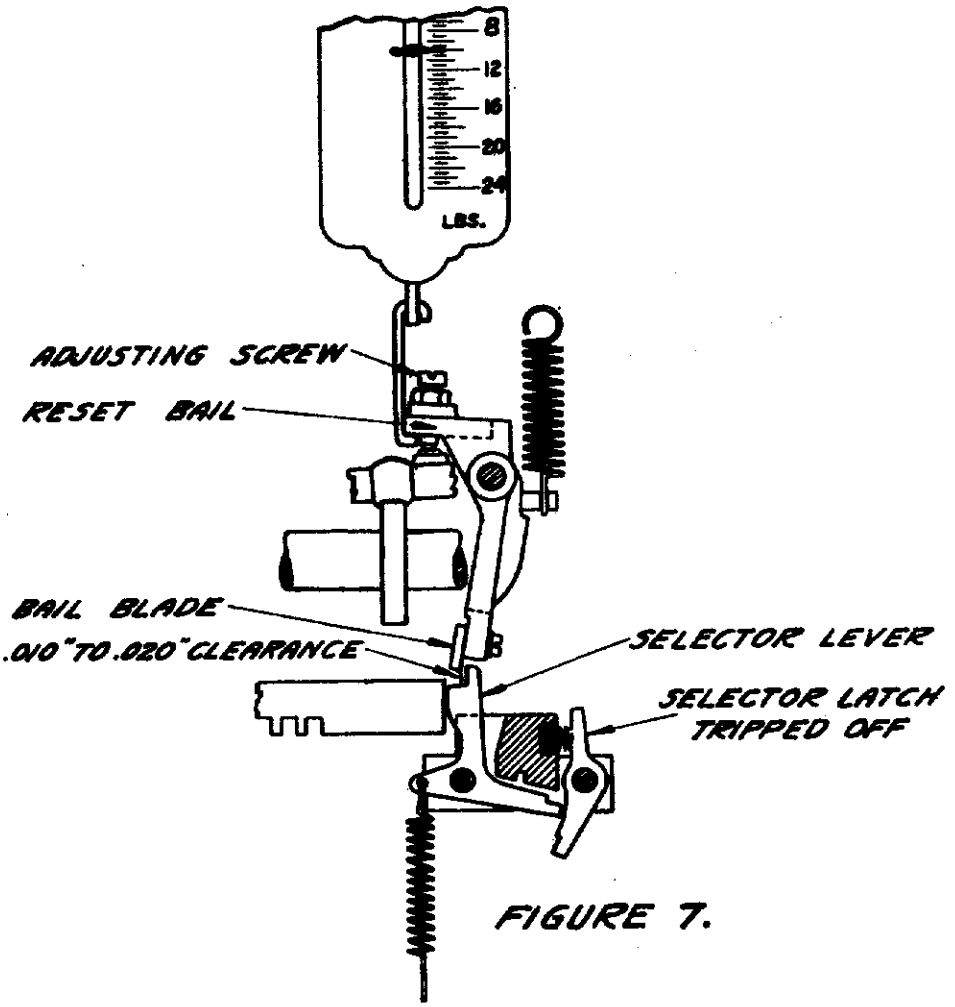


FIGURE 7.

SIXTH PULSE CUTOUT LEVER SCREW

With sixth pulse armature and clutch throwout levers engaged and sixth pulse cutout lever in its normal position there should be not more than .002" clearance between armature lever and cutout lever screw. See figure 6.

CLUTCH THROWOUT LEVER TRAVEL

The throwout reset cam roller bracket should be adjusted to permit throwout lever to over travel about .010". If overtravel is too great, move bracket toward front of printer. In order to gain access to bracket it is necessary to remove sixth pulse unit from printer. See figure 6.

SELECTOR LEVER RESET BAIL

Turn main shaft until clutch disengages. Trip off selector latches. There should be from .010" to .020" clearance between selector levers and blade on reset bail. This clearance is adjusted by means of the screw on top of reset bail casting. See figure 7.

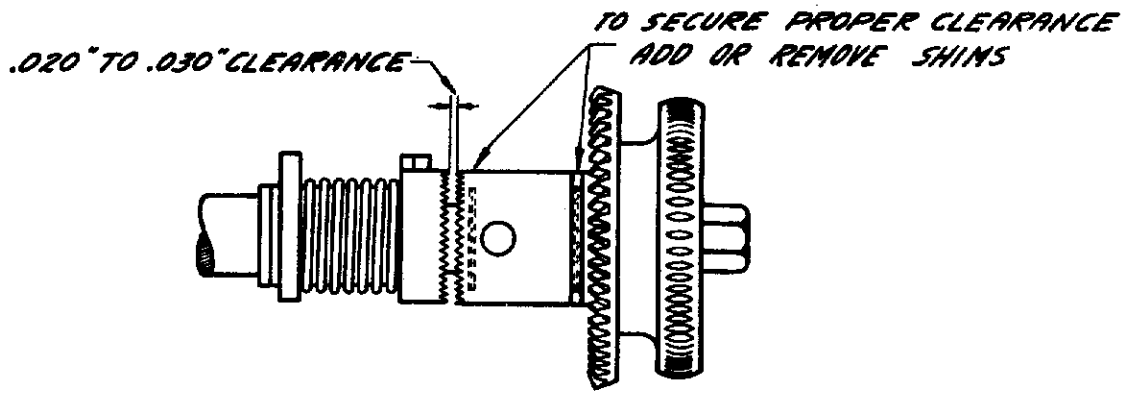


FIGURE 8.

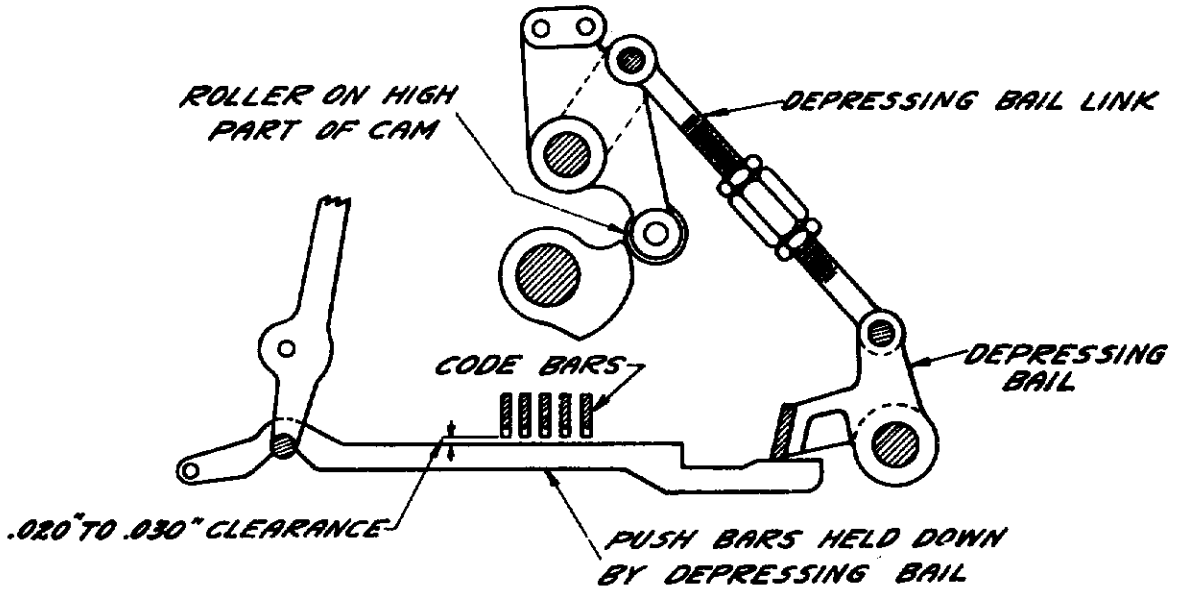


FIGURE 9.

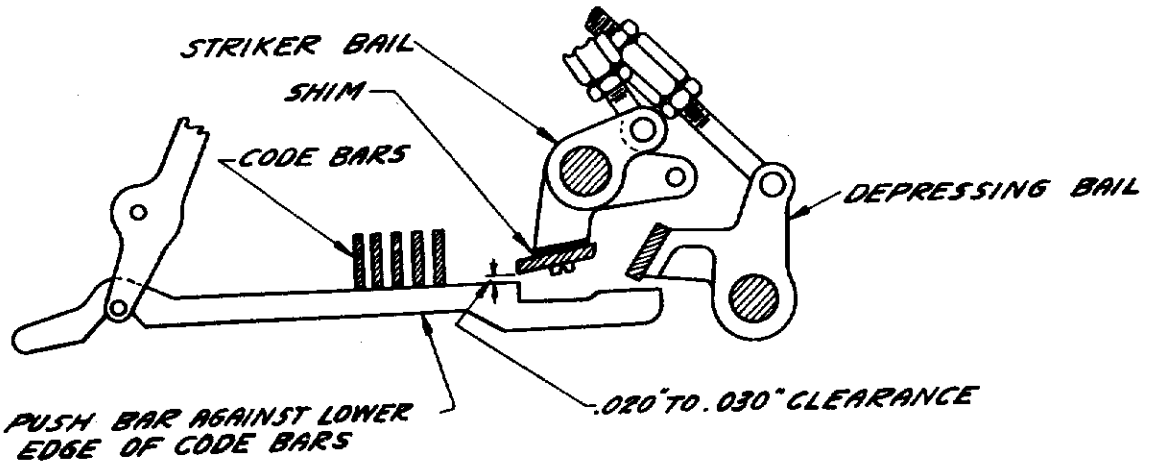


FIGURE 10.

CLUTCH TEETH CLEARANCE

When clutch is fully disengaged the teeth must clear by .020" to .030". Add or remove shims to secure proper clearance. See figure 8. Make sure that clutch is fully disengaged by pressing down on spacer rocker, thus forcing roller into indent in spacer cam.

GEAR AND PINION ADJUSTMENT

The driving gear and motor pinion should be set so that the teeth engage over their whole length and with a slight amount of play between them. It is readily seen that the position of the pinion on the motor shaft can be adjusted by loosening its clamping screw. To secure just the proper play between the teeth of the gear and the pinion, shims should be added or removed from the space between the gear and the driving clutch. (Figure 8)

DEPRESSING BAIL LINK

Turn mainshaft until clutch is fully disengaged. The depressing bail roller will then be on the high part of its cam and the bail blade will be depressing push bars. There should be .020" to .030" clearance between push bars and code bars. The proper clearance is secured by lengthening or shortening the depressing bail adjusting link. See figure 9.

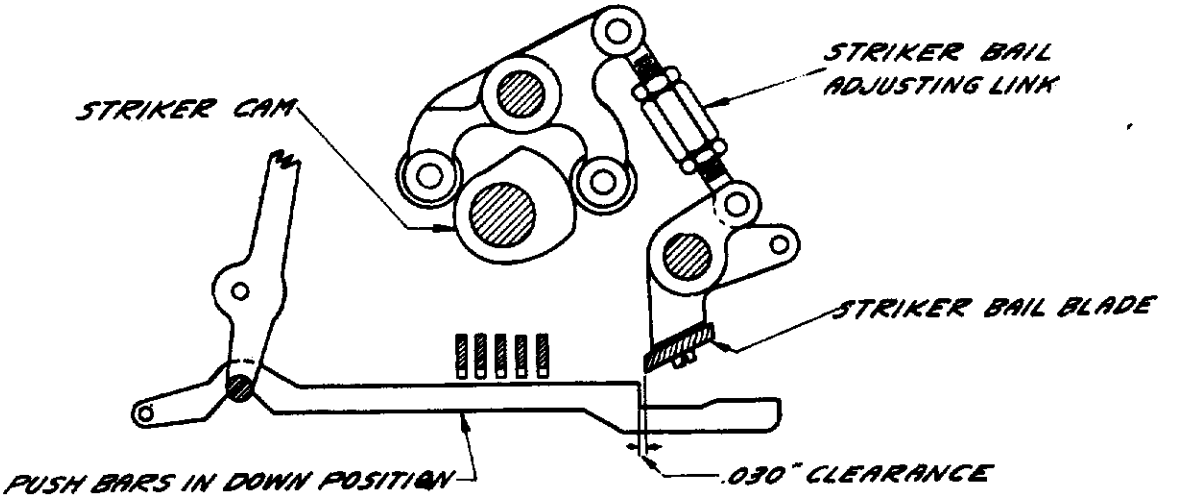
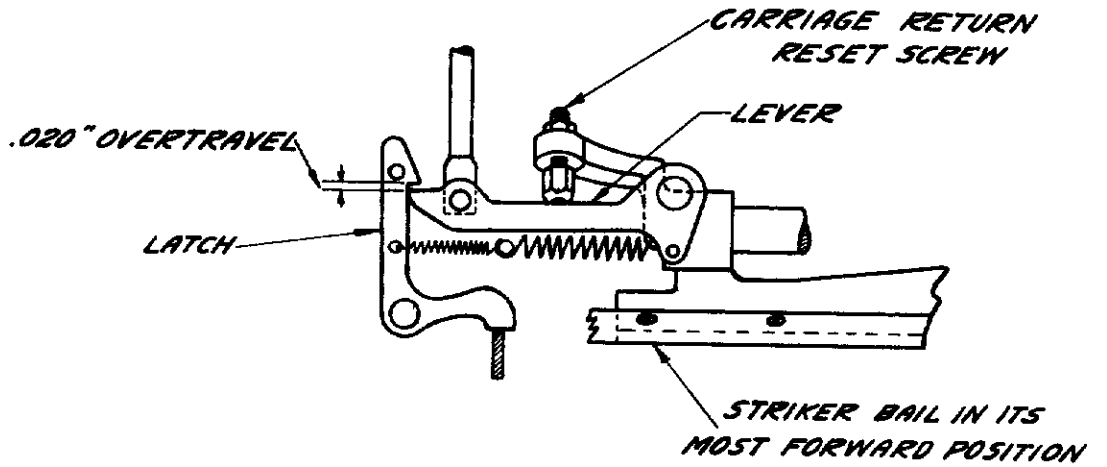


FIGURE 11.



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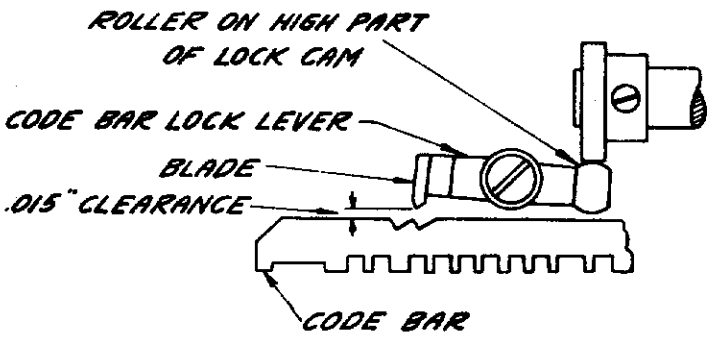


FIGURE 13.

STRIKER BAIL BLADE

Turn mainshaft until depressing bail permits push bars to rise and rest against code bars. The upper edges of push bars are now in line with edge of striker bail blade. There should be from .020" to .030" clearance between edge of push bar and bail blade. If clearance is not great enough, add shims between blade and casting. See figure 10.

STRIKER BAIL LINK

Turn mainshaft until clutch is fully disengaged. The striker bail roller will then be on the high part of its cam and the depressing bail will be holding the push bars down. There should be .030" clearance between the edge of the striker bail blade and the edge of push bar notch. The proper clearance is secured by lengthening or shortening the striker bail adjusting link. See figure 11.

CARRIAGE RETURN RESET SCREW

Adjust carriage return reset screw in striker bail casting extension so that carriage return lever and latch engage with .020" overtravel when striker bail is in its most forward position. See figure 12.

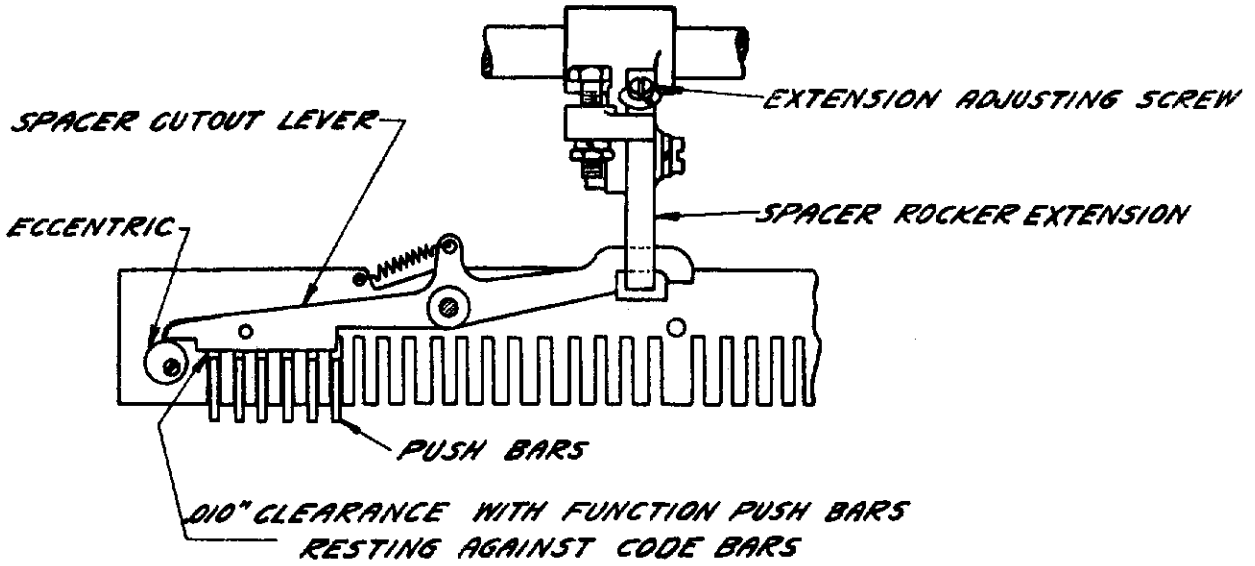


FIGURE 14.

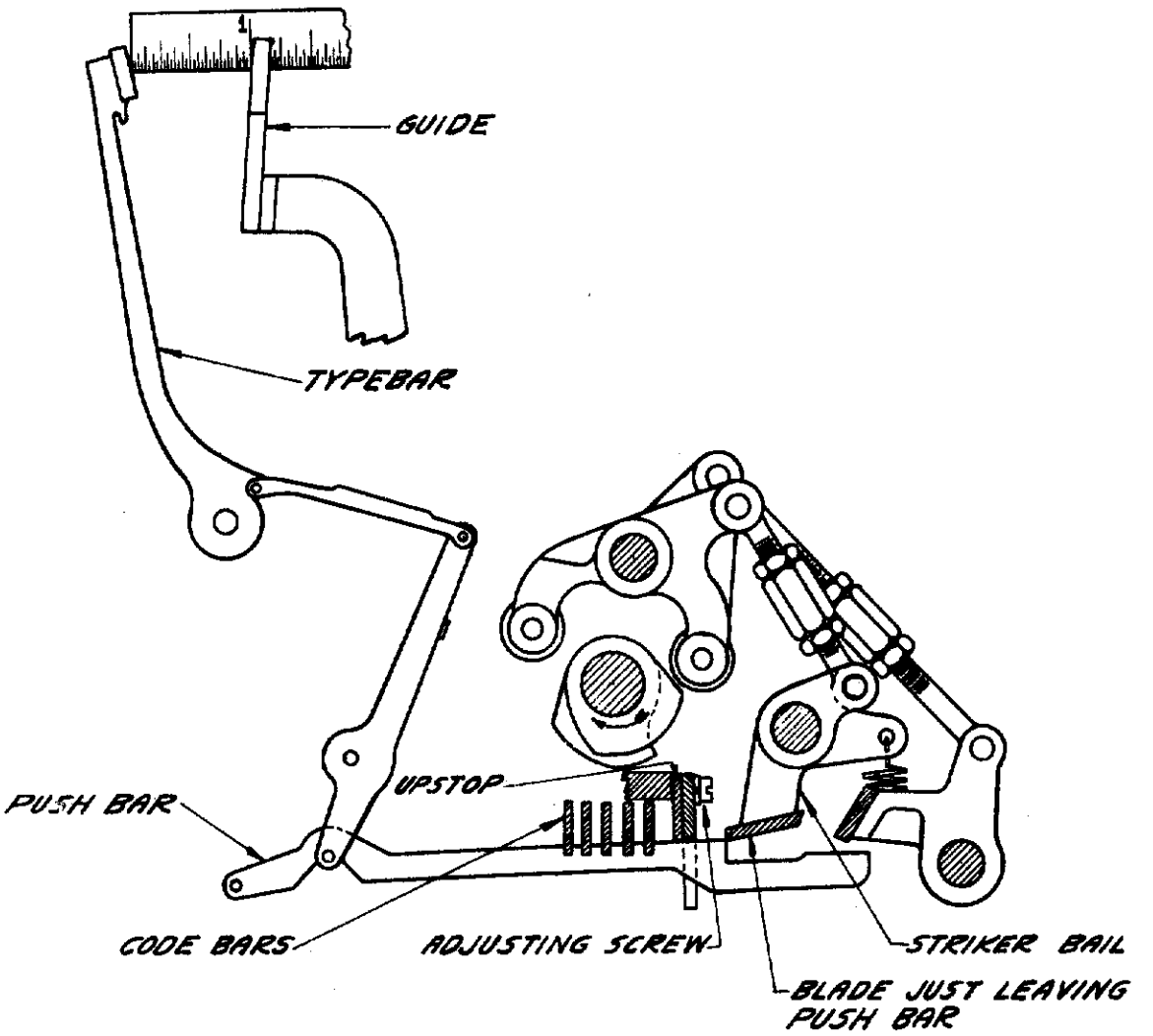


FIGURE 15.

CODE BAR LOCK LEVER

There should be about .015" clearance between code bars and code bar lock lever blade when the roller is on the high part of the cam. See figure 13.

SPACER CUTOUT LEVER

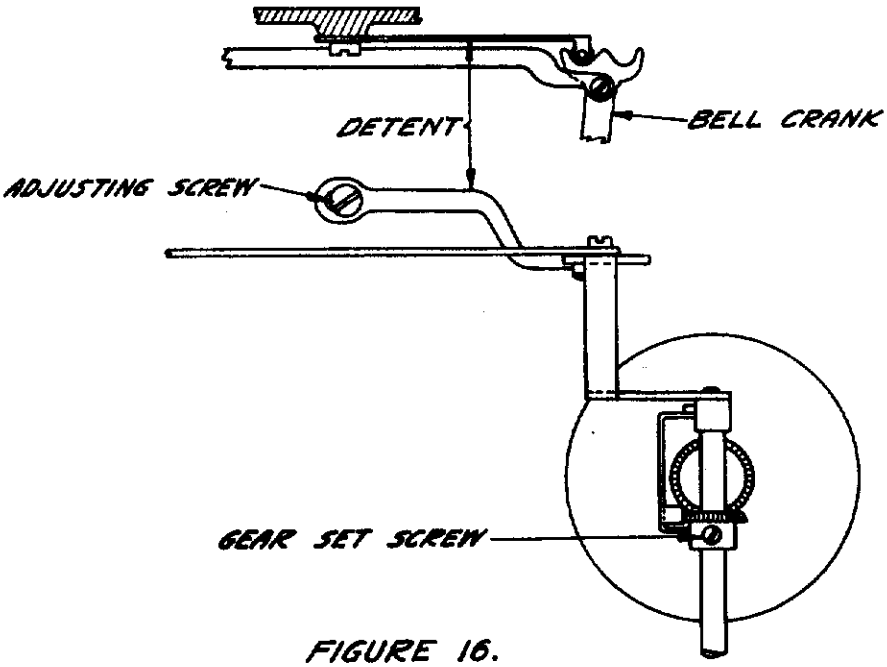
With the function push bars resting against code bars there should be .010" clearance between top of bars and spacer cutout lever. This clearance is adjusted by moving spacer cutout lever eccentric. See figure 14.

SPACER ROCKER EXTENSION

With the spacer cutout lever in the above position the spacer rocker extension should pass through hole freely. The extension may be shifted by loosening the clamping screw. See figure 14. Operate a function push bar and see if extension is properly blocked.

TYPEBAR TRAVEL

The typebars should be carried to within 1" of the guide by the striker bail and the actual striking accomplished by the momentum of the typebar. The distance that the typebars will be carried by the striker bail depends upon the height that the push bars rise into the notches of code bars. This height is limited by the position of the push bar upstop. This upstop is adjusted by loosening the screws at either end. In making this adjustment be sure that ends of upstop are at the same height. Try the two extreme letters, which



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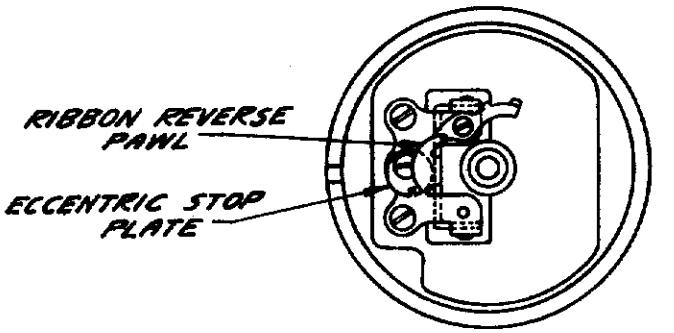

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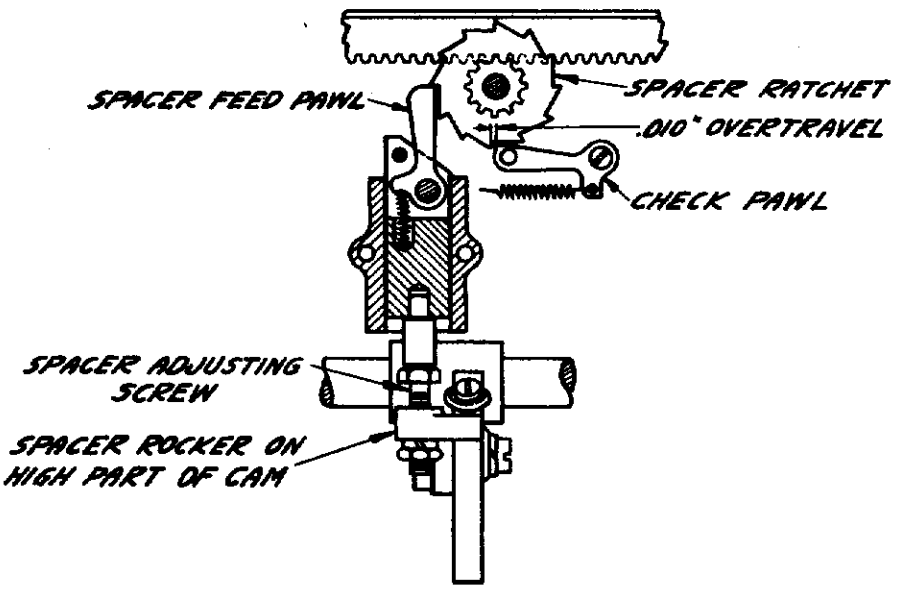

FIGURE 18.

should cut off at the same point of their travel. See figure 15. The tails of typebars should pass into guide freely.

RIBBON REVERSE GEARS

See that ribbon reverse gears on platen top mesh properly. They may be moved by loosening set screws which hold them to shaft. See figure 16.

RIBBON REVERSE LINK DETENT

When the right hand ribbon reverse gears are engaged, the detent roller should fit snugly into right hand notch of the bell crank. The detent may be moved by loosening clamping screw which passes through an elongated hole. When left hand reverse gears are engaged detent should fit into left hand notch of bell crank. See figure 16.

RIBBON REVERSE PAWL

Remove ribbon spools. With the left hand ribbon reverse gears out of mesh move lower end of left hand ribbon reverse pawl into engagement with horizontal bevel gear, then adjust eccentric stop plate so it just touches upper end of pawl. There should be slight play between gear and lower end of pawl, when upper end of pawl rests against eccentric stop plate. See figure 17. Make same adjustment on right hand pawl.

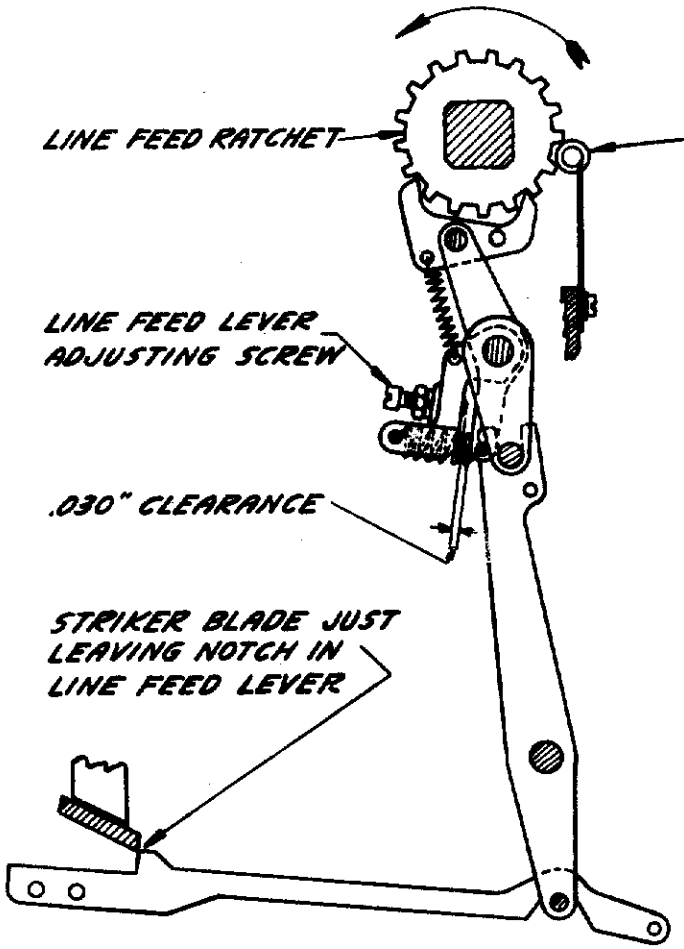

FIGURE 19.

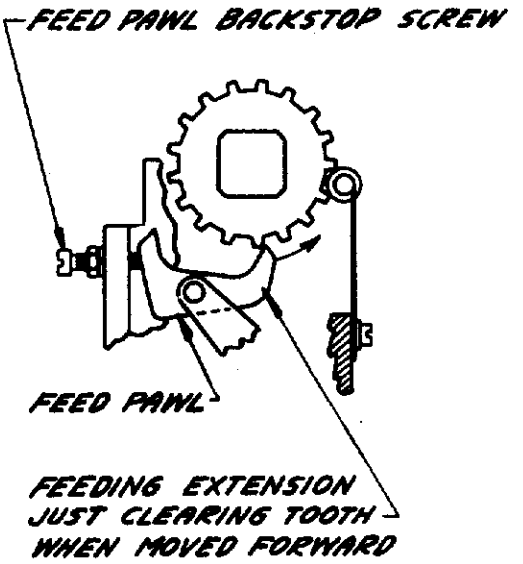

FIGURE 20.

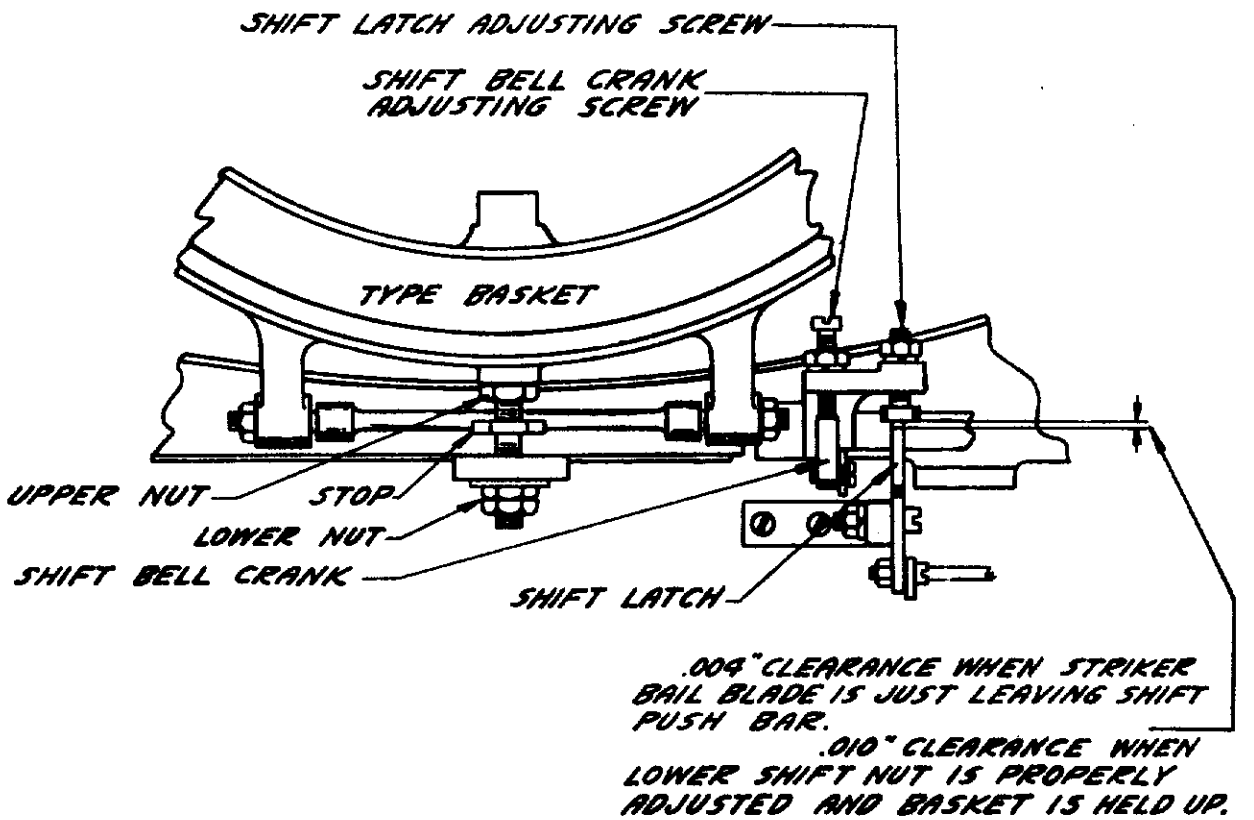

FIGURE 21.

THE PLATEN TOP SHOULD NOW BE PLACED ON PRINTER

RIBBON CARRIER

The ribbon carrier should move freely in its guide.

SPACER ADJUSTING SCREW

Turn mainshaft until spacer rocker roller is on high part of spacer cam. Move spacer adjusting screw until spacer feed ratchet rotates far enough to engage check pawl with .010" overtravel. See figure 18.

LINE FEED DETENT

Move the line feed lever by hand until both ends of the line feed pawl are fully engaged in the line feed ratchet. Now set the detent so that the roller is in a hollow between two teeth.

LINE FEED LEVER ADJUSTING SCREW

Set up line feed combination and turn mainshaft until striker bail blade is just leaving notch in line feed push bar. Move line feed lever adjusting screw until there is .030" clearance between lever and end of screw. See figure 19.

LINE FEED PAWL BACKSTOP

Adjust backstop screw so that when line feed lever is operated feeding extension on feed pawl just clears tooth on the line feed ratchet behind the one it will next engage. See figure 20.

EE 105
Chicago, Ill.
Feb. 13, 1925.

CHANGE IN BULLETIN 110 and W.S.8
TYPEBAR PRINTER ADJUSTMENTS

In order to properly adjust the shift mechanism on Typebar Printer it is essential that the adjustments be made in the sequence given on page 19 of adjustment bulletin.

After adjusting the upper shift limit nut and before making the shift latch adjusting screw adjustment, BACK OFF LOWER SHIFT LIMIT NUT.

Note that any change in the striker link adjustment will alter the shift and lining adjustments.

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UPPER SHIFT LIMIT NUT

With the type basket in its unshifted position, loosen upper shift limit nut and adjust stop so that the upper and lower portions of the letters print equally well. Lock the nut carefully. See figure 21.

SHIFT LATCH ADJUSTING SCREW

Set shift latch adjusting screw so that figures will be in alignment with letters when carriage is in its shifted position. See figure 21.

SHIFT BELL CRANK ADJUSTING SCREW

Set shift bell crank adjusting screw so that shift latch screw overtravels the shift latch by .004" when striker bail blade is just leaving shift push bar. See figure 21.

LOWER SHIFT LIMIT NUT

Adjust lower shift limit nut so that there is .010" clearance between shift latch and shift latch screw when basket is held up. Be sure to tighten the lock nut. See figure 21.

AIR BUFFER VALVE SCREW

Loosen the set screw in the side of buffer and adjust valve screw in end so that carriage is stopped without bouncing and with minimum shock. See figure 22.

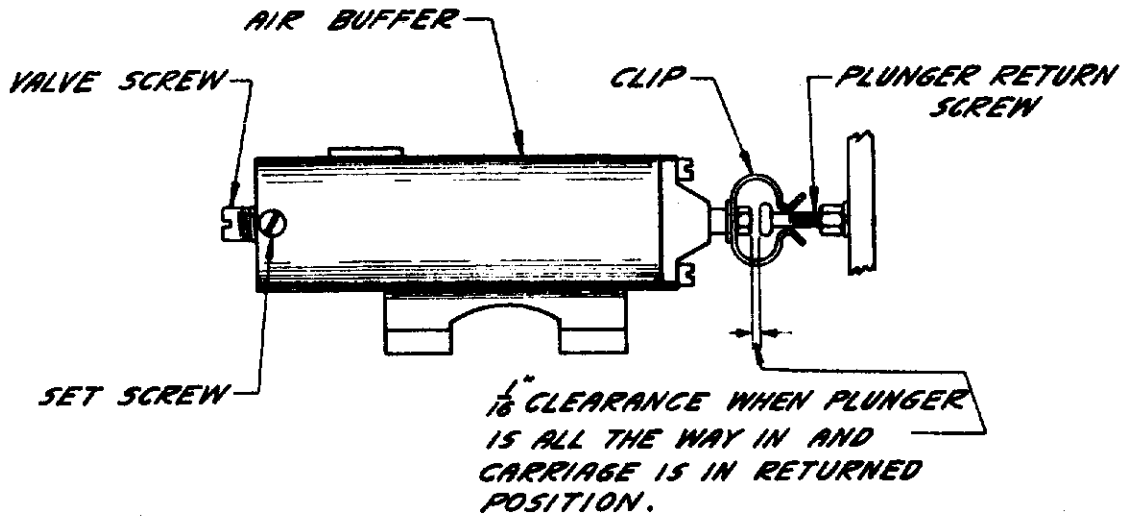


FIGURE 22.

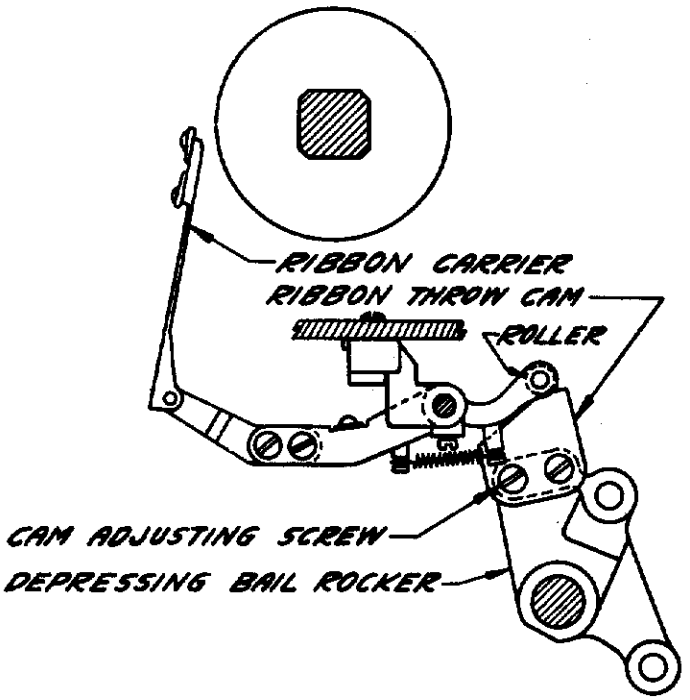


FIGURE 23.

BUFFER PLUNGER RETURN SCREW

The plunger return screw passes through the carriage end casting and engages with the clip on the buffer plunger, thus serving to draw it out of the buffer as the carriage spaces. This screw should be adjusted so that when the carriage is in its returned position and the plunger is pushed all the way into the buffer there is 1/16" clearance between the end of the screw and the nut on the end of the plunger. See figure 22.

RIBBON THROW CAM

With the ribbon switch handle to the right and the clutch disengaged, adjust the ribbon throw cam so that ribbon carrier will be moved downward far enough to bring top of ribbon just below the bottom of the printed letter. See figure 23.

BELL LETTER AND BELL PUSH BAR EXTENSIONS

(Used on printers with the bell signal operated on a shifted letter.)

With the type basket in its shifted position and the depressing bail in its up position, set the bell letter push bar adjusting screw so that there is .004" clearance between its head and the bottom of the shift bar extension. Then place the typebasket in its lower position and adjust the plate which carries this screw so that there is .010" clearance between the side of its head and the side of the extension on the shift push bar.

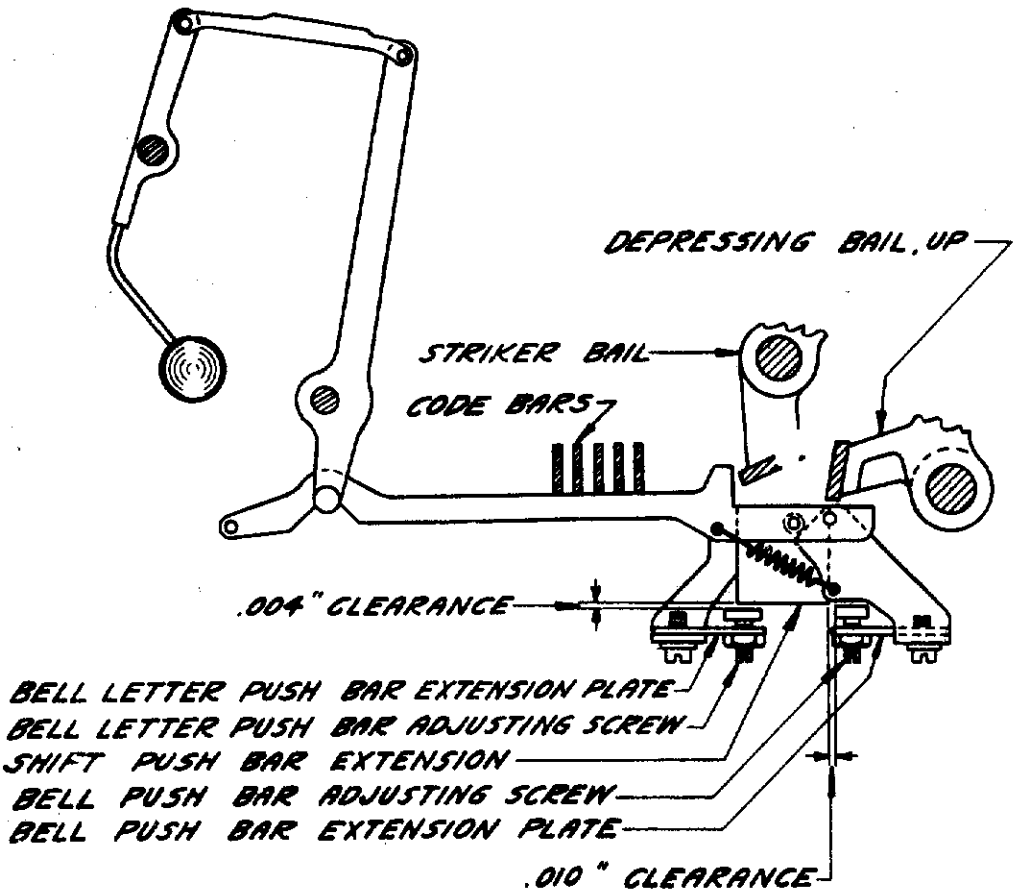

DEPRESSING BAIL, UP
STRIKER BAIL
CODE BARS
.004" CLEARANCE
BELL LETTER PUSH BAR EXTENSION PLATE
BELL LETTER PUSH BAR ADJUSTING SCREW
SHIFT PUSH BAR EXTENSION
BELL PUSH BAR ADJUSTING SCREW
BELL PUSH BAR EXTENSION PLATE
.010" CLEARANCE

FIGURE 24.

With the typebasket still in its lower position set the bell push bar adjusting screw so that there is .004" clearance between its head and the bottom of the shift push bar extension. Then shift the typebasket and move the plate which carries this screw so that there is .010" clearance between the side of the head and the side of the shift push bar extension. See figure 24.

FAULTS DUE TO IMPROPER ADJUSTMENTS.

LOSING OR GAINING PULSES

The operations of tripping the selector levers and resetting them are so positive that if this portion of the printer is once properly adjusted it seldom gives trouble. Occasionally after adjusting the selector armature or backstop screw the lock nut is not tightened and consequently the screw will work loose, causing a failure of that particular pulse.

This sometimes happens to the selector reset bail adjusting screw. If this screw works loose the clearance between the bail and the selector levers in the set position will be decreased until finally the levers cannot move far enough to fully set the code bars.

Of course if the code bar lock bail does not rise far enough to permit the code bars to move freely when they are being set or fails to lock them properly after they are set, errors will occur which will appear to be due to lost or gained pulses. Such trouble could be due to

the screws holding the blade on the bail or the screw which holds the cam to the shaft coming loose, or to a broken spring.

A bent connecting clip or a loose or broken wire leading to any of the selecting magnets would of course cause a lost pulse. Such a condition can easily be found by inspection.

Occasionally a typebar will become bent, causing it to strike the side of the guide. This will result in a failure to print this letter and in some cases the trouble will appear to be due to a lost pulse. For instance a space for an N could easily be due to this cause while apparently it is due to the loss of a fourth pulse.

It is assumed also that the attendant will check the adjustment of the contacts or brushes of the receiving distributor in the case of trouble of this nature.

THE FIRST LETTER OF THE LINE PRINTS LIGHTER OR HEAVIER THAN THE OTHERS.

This is generally due to the carriage return lever failing to latch after it has been tripped. If the carriage return resetting screw in the striker bail extension is improperly adjusted so that it fails to reset the lever immediately after it is tripped, an extra load is placed

upon the striker bail when it is printing the first letter of the line. This may result in faint printing of this letter or the letter may be printed by the action of the safety cam instead of by the striker spring in which case the impression will be exceptionally heavy.

CAUTION - If the resetting screw is adjusted so that it resets the lever with a large amount of overtravel it may cause faint printing at any part of the line.

CARRIAGE FAILS TO RETURN ALL THE WAY

This may be due to the failure of the carriage return locking devices to hold the spacing and check pawls out of engagement with the spacing ratchet. It may also be due to the carriage return spring not being wound up sufficiently or the carriage not being free on its shaft. It may also be due to the needle valve of the air buffer being screwed in too far.

FAILURE TO SPACE AFTER A CARRIAGE RETURN

This would generally be due to failure to trip off the carriage return locking devices.

SPACING WITH A FUNCTION, SUCH AS LINE FEED OR FIGURES

This would be due to improper adjustment of either the position of the spacer cutout lever or the spacer rocker extension.

FAILING TO SPACE AFTER A FUNCTION

This would be due to failure of the spacer cutout lever to return quickly to its normal position, due to a bind or perhaps to gummy oil between the back of the lever and the push bar comb to which it is attached.

UNEVEN PRINTING, (SOME LETTERS ARE FAINT.)

This may be due to the two ends of the upstop bar being set at different heights. Under such circumstances the typebar stroke at one side of the typebasket will be cut off at a different place from that at the other side. Of course if a certain letter is persistently faint the trouble is perhaps due to the typebar not being free in the type guide. A very slight amount of friction at this point, due to the type pallet rubbing against the side of the guide, will absorb much of the momentum imparted to the typebar by the striker bail, though of course this trouble can be caused by undue friction in any part of the linkage from the push bar to the typebar.

FAILURE OF A FUNCTION

In general the persistent or occasional failure of any function should call for a checking of the adjustment of that particular part of the mechanism. While the wearing surfaces of this printer are exceptionally

generous, still after a long period of operation, parts may wear sufficiently to necessitate a readjustment to compensate for the wear. It is also well to bear in mind that where one part acts upon a number of other parts that there may be slight variations in the parts which make it advisable to check the adjustment with reference to several rather than one only. This is particularly true of the depressing and striker bail adjustments. In the case of the depressing bail there may be a slight variation in the distance between the push bars and the code bars and when most of the push bars are held clear of the code bars there may be one still in contact with the code bars. None of the adjustments of the printer require absolute exactness and in many cases even .010" more clearance than is prescribed will have no ill effect.

If a printer develops a fault which is not readily cleared by individual readjustments it is best to check every adjustment in the printer. First, however, make certain that the trouble is not due to some other piece of apparatus upon which the printer depends for operation.

PRINTER FAILS TO START

That is, it does not respond to any signal combination. First turn the hand wheel of the main shaft to determine if the shaft turns freely. A lock nut on the

striker bail or depressing bail link may have been left loose allowing the link to change its length, and cause the mechanism to jam. Of course if the printer is not oiled for a long period of time the main shaft can become seized in a bearing. If the main shaft is free and the motor does not turn, examine the table clips to see if they are making contact with the printer clips and if also they are alive. If there is voltage on the clips make sure that the circuit is not broken between the clips and the motor. If the circuit is complete examine the motor brushes and, in the case of an alternating current motor, examine the starting mechanism.

If the motor runs but the printer does not operate see whether the selecting magnets are operating. If they are not, the trouble may be in the table clips, or the receiving distributor or the common return wire may be broken. If the selecting magnets are operating properly but the clutch does not engage test whether the sixth pulse magnet is receiving current. A faulty adjustment of the sixth pulse armature travel or of the throwout lever might prevent the clutch from engaging even though the magnet is receiving current in the proper manner. A faulty adjustment of the sixth pulse cutout or undue friction in its bearings would have the same effect.

Much trouble can be avoided if all adjustments are securely locked after they are made.

FAILURE OF THE RIBBON TO REVERSE

Check all adjustments of the reversing mechanism and see that all gears in the ribbon feeding train are properly meshed. See that all parts move freely.

PRINTER DOUBLE TRIPS

That is the main shaft fails to stop at the end of each revolution.

This may be due to a broken sixth pulse armature spring or to a faulty adjustment of the throwout lever reset roller. It can also be due to the latching edge of the sixth pulse armature lever becoming rounded.

The printer will behave in a similar manner if the motor speed is too low. The gearing is such that at its normal speed it will drive the main shaft fast enough to receive signals at the rate of not more than 65 words per minute. If the supply voltage is abnormally low or if there is undue friction in the motor bearings the speed will be so reduced that the starting and stopping of the main shaft will be irregular. Of course an open armature coil will also reduce the speed of the motor. With the supply voltage at 110 the motor speed should be about 1800 R.P.M.

PRINTER SPACES ON BLANK SIGNAL

Printers equipped with sixth pulse cutout mechanism should not space on the blank signal. If the adjusting screw is not properly adjusted to block the sixth pulse armature when no selecting magnets have been operated, the spacing will not be suppressed. This trouble may also be due to the sixth pulse cutout lever not moving freely.

HINTS ON TAKING THE PRINTER APART

To remove the top it is only necessary to remove the four corner screws. When the top is replaced, however, be sure that the lower end of the spacer block registers with the adjusting screw in the spacer rocker, also be sure to slip the crank bell on the line feed shaft into the forked end of the vertical line feed lever.

The main shaft may be removed by taking out the screws which hold the two brackets carrying the rocker shaft and the screws which hold the casting on which are mounted the sixth pulse and the throwout mechanism. The selector reset bail must also be removed by loosening the set screw and pulling out its shaft and the wire bail must be unhooked from the sixth pulse cutout.

The main shaft bushings may be removed by removing the cams and slipping them off. Note that there is a hole in the underside of each bushing which engages a dowel in the main casting. There is also an oil hole approximately opposite this dowel hole. In re-

placing the bushing at the clutch end of the shaft adjust the end play collar by means of the two screws that hold it to the shaft so that this bushing has the slightest appreciable end play between the collar and the throwout resetting cam.

It should be noted that there is a saw slot through the thinner part of each cam so that when cam screws are replaced they should be very well tightened with a strong screw driver in order to spring this part of the cam and clamp it firmly on the shaft.

The striker bail shaft and the depressing bail shaft may be removed by unscrewing the oiler adapter and pushing the shaft endwise.

The push bars may be removed easily by unhooking the spring and pushing the front end upward out of engagement with the vertical sub-lever.

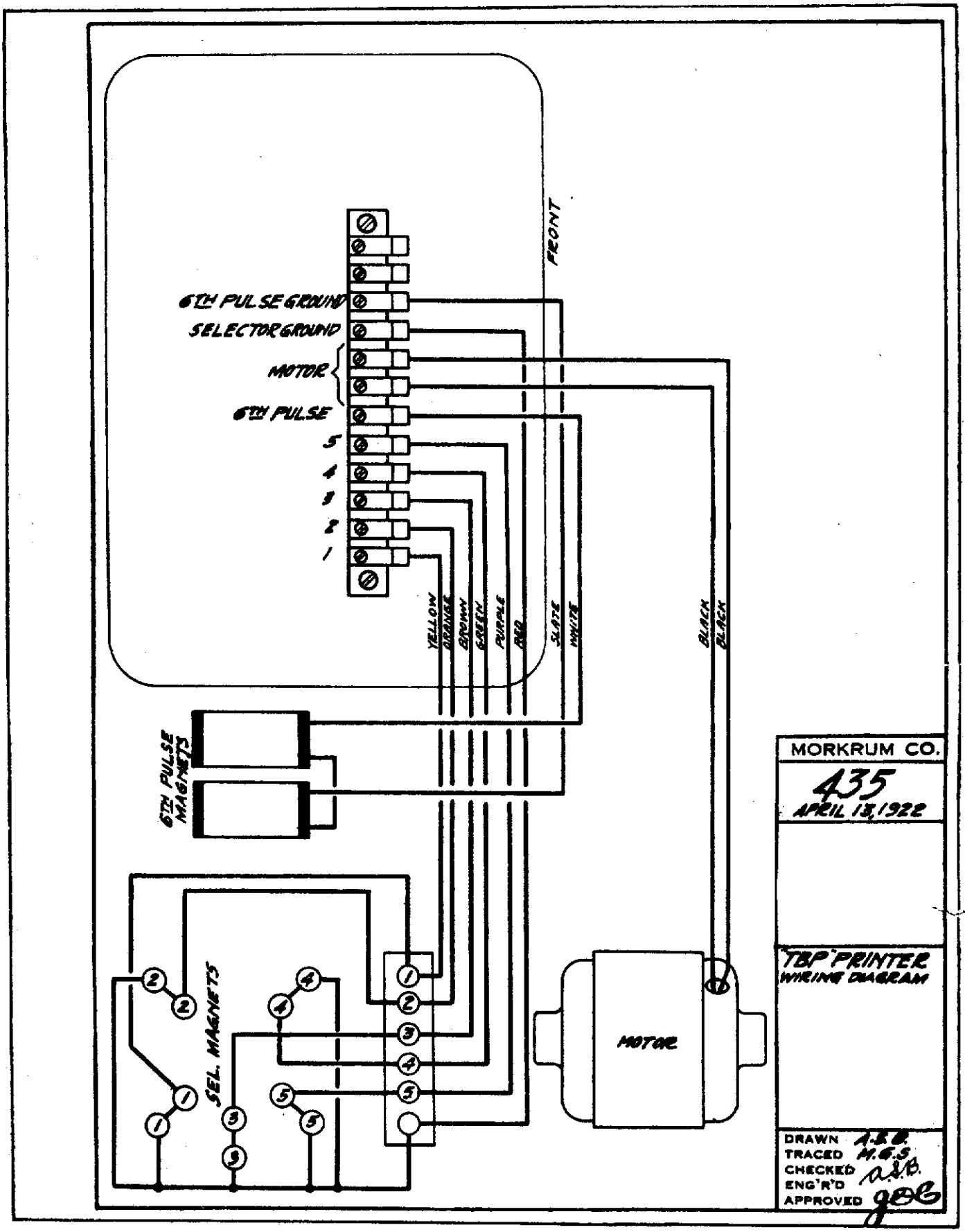
The vertical sub-levers may be removed by loosening the two clamps which bear upon the curved bearing rod and slipping this rod along until the desired sub-lever is free. The front end of the horizontal link which connects the sub-lever to the typebar may be sprung open and unhooked from the typebar. In replacing be sure the end of the link is fully closed.

ALIGNING THE TYPE

This is an operation which requires considerable practice to accomplish properly and really should not be attempted without the special bending pliers made for this work. However, the following general instructions will assist in accomplishing the desired result should it become necessary to change a typebar or align one which has been bent out of place. Typebars should not be removed unless absolutely necessary. The typebars can be removed or shifted up or down by loosening the large headed screws which hold them to the typebar segment. All of the letters are usually aligned with reference to the letter N. Therefore it is necessary that the position of this letter be adjusted so that it strikes the platen squarely and its impression is uniform at all parts of the letter and not tilted one way or the other.

The letter to be aligned is then printed several times alternately with the N thus ANANAN BNBNBN CNCNCN. If the letter prints too high or too low, alter its position by loosening the screw which clamps the typebar to the segment. If the top or bottom of the letter is faint bend the type pallet slightly forward or backward. If tilted sidewise correct this by bending in the proper direction. If the secondary character prints faint squeeze the sides of the pallet near the bottom which tends to move the character forward.

In case it is necessary to replace a type pallet on a typebar it is best to hold it on the bar by squeezing the split part of the pallet together thus allowing it to be moved slightly to get it in approximately the right position. Then solder it in place. All old solder should first be removed from pallet and typebar. It is absolutely essential for good printing that the guide lug on the lower end of the type pallet enter the guide freely for if it rubs against either side in its natural movement the resulting friction will cause a light impression or may result in a failure to print the character.


FRONT
6TH PULSE GROUND
SELECTOR GROUND
MOTOR
6TH PULSE
5
4
3
2
1
YELLOW
ORANGE
BROWN
GREEN
PURPLE
RED
SLATE
WHITE
BLACK
BLACK
6TH PULSE MAGNETS
SEL. MAGNETS
MOTOR
MORKRUM CO.
435
APRIL 13, 1922
TBP PRINTER
WIRING DIAGRAM
DRAWN A.S.B.
TRACED M.E.S.
CHECKED A.S.B.
ENG'R'D
APPROVED GBG