SPECIAL ATTACHMENTS

Magazine Frame Operating Mechanism (Power) For Universal Intertypes

The purpose of the new power-driven magazine frame operating mechanism, commonly known as the power shift, is to shift the magazine frames into their various operating positions through power furnished by a motor and worm drive assembly. The various models to which the power shift may be applied are designated as Universal 72-90 C2-4s.m., 72-90 C4, 72-90 C4-2s.m., 72-90 C4-4sm., F2-4s.m., F4, F4-2s.m., F4-4s.m., G2-4s.m., G4, G4-2s.m., G4-4s.m. At the present time the magazine frame power operating mechanism is not available for any of the single distributor models, which are designated as Universal Straight C and H machines.

The operating or control levers which start and stop the shifting mechanism are located at the right of the main keyboard. In the case of a double distributor Universal machine with four main and four side magazines, two operating levers are provided for the two magazine frame assemblies. The operating lever for the main magazine frame has three positions which locate the upper, middle and lower pairs of magazines respectively in operating position. The side magazine operating lever has two positions for the upper and lower pairs of side magazines. The shifting units for the main and side magazine frames operate independently and it is possible, therefore, to shift both frames simultaneously and in reverse directions if desired.

Before beginning the description of the magazine frame power operating mechanism, it should be noted that the side magazine frame mechanism is similar in many respects to that provided for the main magazine frame. In the text and illustrative material, therefore, attention will be devoted chiefly to the mechanism provided for the main magazine frame, but wherever a basic difference exists, both constructions will be noted.

Two Basic Assemblies

The magazine frame power operating mechanism is understood most easily in terms of two major assemblies:

1. **The Driving Assembly,** consisting of the parts which furnish the actual driving power for moving the magazine frame.

2. **The Control and Switch Assembly,** which starts and stops the motor and controls automatically the extent of movement of the magazine frame.

The first assembly is principally mechanical and includes those parts which connect the magazine frame with the operating worm driven by the motor. The second assembly is chiefly electrical and comprises a number of switches, relays and related parts required for starting and stopping the operating motor as the control levers are moved to their various positions. In describing the complete magazine frame operating mechanism, therefore, the driving mechanism will be presented first in order to establish the basic method used in moving the maga-

zine frames. Following this unit, the control and switch assembly will be outlined in relation to the driving mechanism in order to indicate how the extent of movement of the magazine frame is controlled automatically by the switches in the circuit.

Magazine Frame Driving Mechanism

It should be understood, at the outset, that the magazine frame is supported in the regular way on the left and right-hand supporting brackets of the machine. A shaft *2*, Fig. 203, is inserted through lugs of magazine frame and a roll at each end of the shaft supports the assembly on the left and right-hand brackets, the latter of which is shown at *1*. The magazine frame is further supported at its lower end by two rollers *3*, which run on two lifting cams *4* fastened to the supporting brackets. The magazine frame upper shaft *2* is connected with the lower shaft *5* by two links *6*. The lower shaft is provided with two pinions *7*, which run on racks *8* fastened to the supporting brackets. From the connections outlined above, therefore, it is apparent that the magazine frame lower shaft *5* promotes the forward and backward movements of the magazine frame. When the lower shaft moves forward, the magazine frame is moved in the same direction by links *6* and shaft *2;* backward movement of the magazine frame is effected by the same means. All of the parts just described are the same as parts used on similar machines without the power shift.

The following parts are applied only to machines equipped with the power shift. The driving mechanism, shown in Fig. 203, consists principally of a motor, worm and worm gear. The worm gear *9* is pinned to the lower shaft *5* and it meshes with the thread of operating worm *10*. The worm is supported in a front bearing *11*, a middle bearing *12* and a back bearing *13* fastened inside the right-hand magazine frame supporting bracket *1*. Thrust bearings *15* are placed on the worm between the front and middle bearings. At the rear end of the worm is pinned a pulley *14*, which is connected with the motor driving pulley by a V-belt *16*. When the motor is operated by the control and switch assembly, therefore, worm *10* revolves in its bearings and moves shaft *5* and the magazine frame forward or backward through the worm gear *9*. The magazine frame control and switch assembly operates on the basis of a reversing switch and as the control mechanism is operated, the direction of rotation of the motor driving shaft is automatically determined. When the operating lever *17* is lowered to its center or bottom position, the magazine frame is moved back to its center or rear position; when the lever is raised to the center or top position, the magazine frame is moved forward to its center or forward position.

Magazine Frame Control and Switch Mechanism

The magazine frame control and switch mechanism starts and stops the motor and controls automatically the extent of movement of the magazine frame. From the standpoint of the operator, the full results of the control mechanism are obtained simply by moving operating lever *17*, Fig. 203, to its various positions in locating plate *18* and holding the lever to the left until the magazine frame seats in position. The upper notch in plate *18* locates the lower pair of main magazines in operating position; the center notch locates the middle pair

of main magazines; the lower notch locates the upper pair of main magazines. The operating lever in each case is held to the left in the notch until the magazine frame seats in position. In the case of the side magazine frame, two notches are provided for the operating lever. The upper notch locates the lower pair of side magazines and the lower notch locates the upper pair.

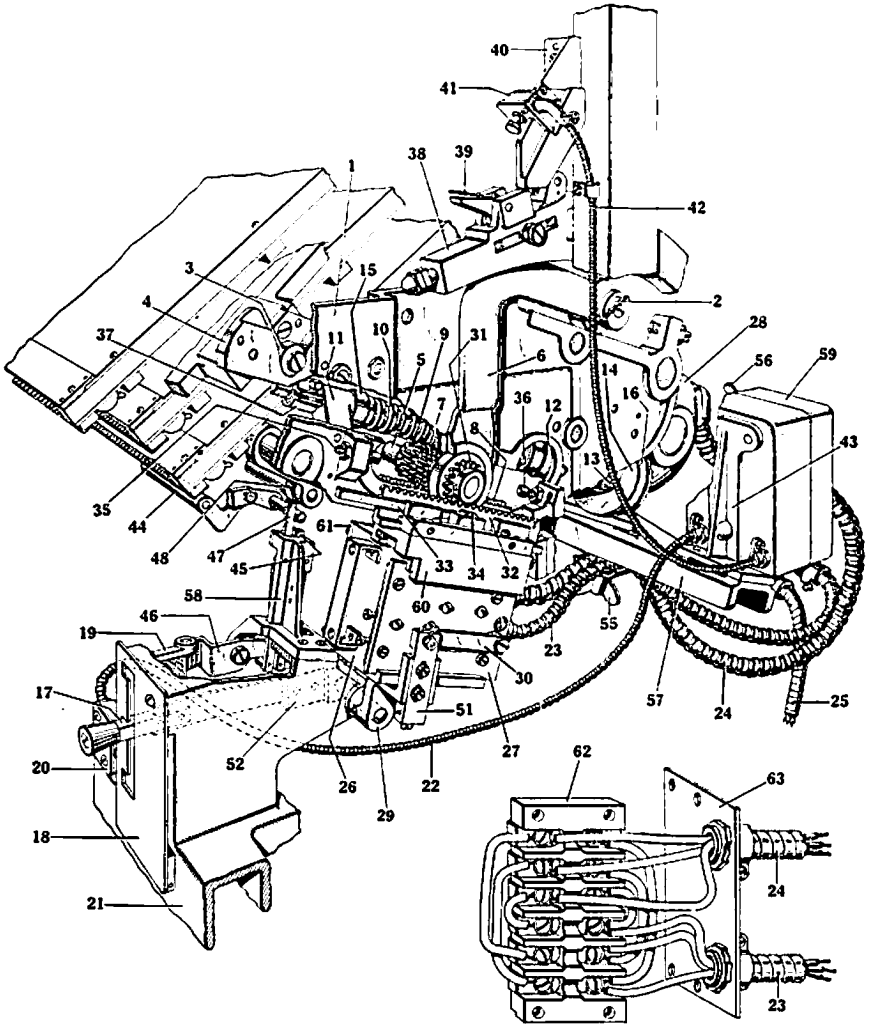

Fig. 203. Intertype Magazine Frame Power Operating Mechanism and Related Parts in Assembly. This view shows the driving and control parts provided for shifting the main magazines into their various operating positions. The side magazine control assembly is similar in construction and operates on the same basic principles described for the main magazine unit. Power for shifting the magazine frame is furnished by the motor *28*, which is started when the operating lever *17* is moved to a notch in plate *18* and is held to the left against plate *19* and switch *20*. The stopping of the motor is accomplished automatically by switches inside box *26*, which are cut out by cams fastened to the inside of plate *27*.

From the standpoint of operation, the starting of the motor is controlled by a switch *20* at the left of operating lever *17*, Fig. 203. When the operating lever is moved to a notch in plate *18* and is held to the left, actuating plate *19* bears against switch *20* and closes the electrical circuit which controls the operation of the motor and the magazine frame operating switch box. The connections between the switch *20*, the motor *28* and the operating switch box *26* are indicated by cables *22*, *23* and *24*. The line cable *25* supplies current to the circuit and is connected with the main machine motor switch at the right of the vise frame. When operating lever *17* is held to the left, therefore, plate *19* closes the switch *20* and starts the motor *28*. Worm *10* is thereby rotated and the magazine frame begins to move through the driving connections outlined previously.

The stopping of the motor and consequently, the seating of the magazine frame in its various operating positions, is controlled by the position of the cam plate *27*, Fig. 203, with respect to two switches mounted inside switch box *26*. As operating lever *17* is moved to the notch positions in plate *18*, arm *29* and links *51* and *30* move cam plate *27* forward or backward with respect to the switches in box *26*. Cams fastened to the inside of the cam plate are thereby located in precise positions with respect to the two switches. The switches in the switch box are moved forward or backward whenever the magazine frame is shifted into a new position and the stopping of the motor is controlled by the breaking of the circuit as either switch is operated by its cam.

For the purpose of clarifying the operation of the switch control mechanism, let us assume that the magazine frame is to be moved forward from its extreme rear position to full forward position. In this case, operating lever *17*, Fig. 203, would be moved from the bottom notch in plate *18* to the top notch, causing cam plate *27* to move back with respect to switch box *26*. Cam *53*, Fig. 208, which causes the motor to be cut off when the magazine frame moves *forward* to its various positions, is thereby located in its proper position with respect to its switch inside the switch box.

When operating lever *17*, Fig. 203, is held to the left against plate *19* and the switch *20*, the circuit is closed and worm *10* begins to rotate and to move the magazine frame forward through the lower shaft *5*. As shaft *5* moves forward, pinion *31* pinned to the shaft moves the control switch rack *32* backward. The rack is connected through a bolt *34* with the switch box *26*, with the result that as the magazine frame is moved forward, the rack and the switch box are moved backward. As the magazine frame nears its full forward position, one of the switches in box *26* rides up on cam *53*, Fig. 208, breaking the circuit and cutting off current flowing to the motor. The slight overmotion drive of the motor then causes the magazine frame to continue moving forward until link *6* banks against screw *35*, Fig. 203, which stops the frame in its precise seating position when it is fully forward.

The same basic principle of operation holds true for the other positions of the magazine frame. When the frame is to be moved back to its center or rear position, the cams on plate *27*, Fig. 203, are located in their proper positions through lever *17* and plate *18*, and the switches inside of box *26* automatically cut off the motor when the frame reaches its seating positions. The side maga-

zine switch mechanism operates on the same basic principle for the forward and backward positions of the magazine frame.

In addition to the front stop screw *35,* Fig. 203, a similar screw *36* is provided to stop link *6* positively when the magazine frame reaches its seating position to the rear. For the center position of the main magazine frame, a brake *37* is mounted on the front end of operating worm *10* to stop the frame when it reaches its seating location. As the frame begins to seat in its supporting blocks, a lug on the frame banks on the adjustable screw in the brake, causing the brake to grip the worm and to overcome any overmotion which would tend to drive the frame slightly past its seating location.

Safety Devices

Two electrical and two mechanical safety devices are applied to the magazine frame operating mechanism to permit operation only when the various parts of the machine are in their correct positions. These safeties protect the parts if an obstruction is present and indicate to the operator or the machinist the mechanism which is out of position. Knowledge of the safety devices and their functions will enable the machinist to locate the obstructing condition and will help him in restoring the machine to safe operating condition.

Magazine Frame Operating Safety Switch. On all Intertype machines of the double distributor type, two basic operations precede the shifting of the magazine frame: the channel entrance is opened and the magazine in the lower operating position is withdrawn from between the escapement rods and is locked in its raised or "shifting" position. Both of these actions occur simultaneously and are controlled by magazine lifting levers, one of which is shown at *38,* Fig. 203. When the lifting levers withdraw the lower magazine and open the channel entrance, spring *39* bears against switch *41* on guide *40.* The switch is connected with the magazine frame operating circuit through cable *42,* and when the switch is closed as described, the magazine frame mechanism will operate normally. If an obstructing condition is present, however, lifting lever *38* will not move back far enough to close switch *41* and it will be impossible to start the magazine frame operating motor. The solution to this problem is to locate and correct the obstruction which is preventing the channel entrance from opening all the way or the condition which is interfering with the raising and latching of the magazine in the lower operating position.

Magazine Frame Operating Switch. The starting of the motor, as previously described, is controlled by operating switch *20,* Fig. 204. When operating lever *17* is moved to a notch in plate *18* and is held to the left, plate *19* bears against switch *20* and closes the circuit. The motor is thereby started and the magazine frame is shifted to its new position, at which point one of the switches in box *26,* Fig. 203, automatically breaks the circut and stops the motor when magazine frame seats in position.

From the foregoing, it should be clear that in order to start motor *28,* Fig. 203, and cause the magazine frame to shift, switches *20* and *41* as well as one of the switches in box *26* must be closed. If any of the three switches is cut out or open, the motor will either stop when rotating or it will not start at all. Switch *41* is

closed when the channel entrance is fully opened and the lower magazine in operating position is raised and latched. Switch *20* is closed when operating lever *17* is held to the left. One of the switches in box *26* is closed when operating lever *17* is moved to a new location. The switch which closes inside box *26* depends upon whether the operating lever is moved upward or downward.

In shifting the magazine frame, *the operating lever should be held to the left until the magazine frame seats fully in position*—releasing the lever prematurely will cause the frame to stop in an intermediate position. If the operating lever is released before the frame seats fully in position, the switch inside the control switch box may not be able to establish contact again when the lever is reoperated in the same notch. To remedy this situation, the operating lever should be moved to another notch to start the motor, then the lever should be returned to the desired notch and held to the left until the magazine frame seats in position.

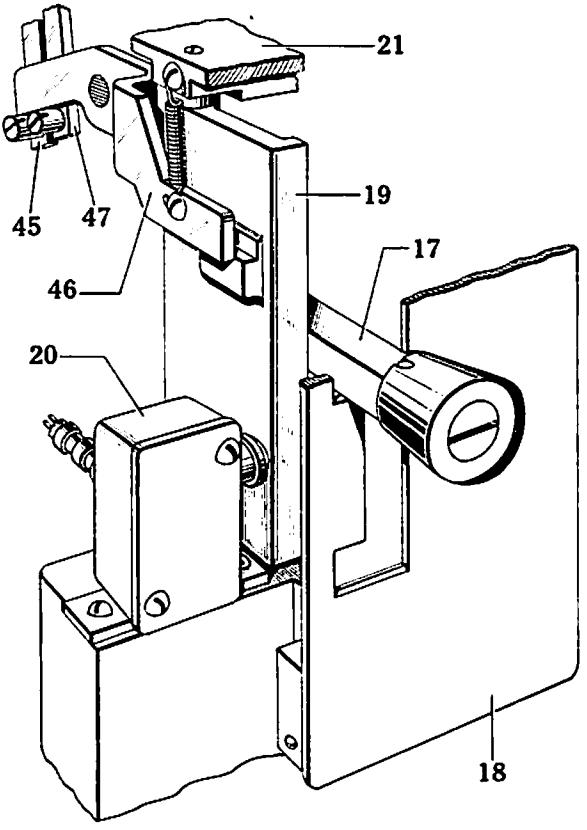

Fig. 204. Magazine Frame Operating Control Lever. When the control lever *17* is moved to a notch in plate *18* and is held to the left, actuating plate *19* closes switch *20* and starts the magazine frame operating motor. Safety lever *46* is provided to prevent plate *19* from closing switch *20* if the magazine frame is lifted for a change of magazines or if a matrix is protruding from the magazine in the lower operating position. The matrix detector plunger *45* or the safety lever plunger *47* operates safety lever *46* when either of the two conditions is present.

Matrix Detector Plunger. The matrix detector plunger *45,* Fig. 203, is one of the mechanical safety devices mentioned previously. The plunger registers at its lower end with safety lever *46,* which is pivoted at the left of the switch actuating plate *19.* The plunger is operated at its upper end by a stud in the right-hand lever of the matrix detector rod *44.* When the channel entrance is opened and the lower magazine in operating position is withdrawn from between the escapement rods, the matrix detector rod moves up in front of the magazine. If the front of the magazine is clear, the rod moves up to its full stroke and plunger *45* is depressed all the way. The front end of safety lever *46,* Fig. 204, is then permitted to rise clear of the pad on plate *19,* leaving operating lever *17* and the plate free to be moved against switch *20.* The magazine frame power operating mechanism will operate normally under these conditions.

If a matrix is protruding from the magazine in the lower operating position, however, the matrix detector rod *44,* Fig. 203, will bank against the matrix and will be prevented from making its full upward stroke. Plunger *45,* Fig. 204, will not be depressed in this instance and safety lever *46* will remain in front of pad on plate *19.* It will be impossible under these conditions to move lever 17 and plate *19* far enough to the left to close switch *20.* To remedy the obstructing condition, it is necessary only to move forward the hinged upper assembler entrance. The protruding matrix can then be removed and safety lever *46* will assume its normal position.

Magazine Frame Operating Safety Lever Plunger. The safety lever plunger *47,* Fig. 203, is the second mechanical safety. This plunger registers at its lower end with safety lever *46* and operates the lever exactly as described in the case of the matrix detector plunger. The safety lever plunger is operated at its upper end by a roller *48* on the magazine frame lifting shaft. When the magazine frame is lifted at its front end in preparation for a change of magazines, the plunger permits safety lever *46* to lock plate *19.* It is impossible, therefore, to start the magazine frame operating mechanism when the magazine frame is raised. As soon as the frame is lowered, roller *48* depresses plunger *47* and permits safety lever *46* to rise to its inoperative position.

Summary of Safety Devices and Testing Procedures. From the foregoing description of the two electrical and two mechanical safety devices applied to the magazine frame power operating mechanism, it should be apparent that any obstruction which prevents the parts from being operated can be located and corrected with speed. For convenience of reference, the essential points for the operator and the machinist to check are listed below.

1. If the magazine frame operating motor does not start when the lever *17,* Fig. 203, is moved all the way to the left against plate *19* and switch *20,* check switch *41.* The switch is closed by spring *39* only when the channel entrance is fully opened and when the magazine in the lower operating position is withdrawn and locked in its raised or "shifting" position. Any obstruction to the opening of the channel entrance or to the lifting of the lower magazine carriage will prevent spring *39* from closing switch *41.* The switch must be closed for the magazine frame motor to operate.

2. If safety lever *46*, Fig. 204, locks in front of plate *19*, making it impossible to move operating lever *17* all the way to the left, open hinged upper assembler entrance and make sure that no matrices are protruding from the magazine in the lower operating position. It is apparent also that if the magazine frame has been lifted for the purpose of changing magazines, lever *46* will lock in front of plate *19* because the magazine frame cannot be shifted until it is lowered to the operating position. When either of these conditions has been corrected, the mechanism will operate normally.

3. If a thorough check indicates that the foregoing parts are operating correctly, it may be assumed that an electrical part is at fault. Before testing the various switches in the circuit, make sure that the main machine motor switch is on. The magazine frame operating circuit receives current only when the main machine motor is running. Make sure also that the cut-out switch *56*, Fig. 203, is on. This switch is provided for the safety of a person working at the rear of the machine and must be turned on before normal operation can be resumed.

4. If switches *20* or *41*, Fig. 203, are not closed, magazine frame operating mechanism will not function. Failure of the switches to close may be due to either of two causes: the switches are not being pushed in far enough to establish contact or the switches are electrically defective. Before testing either of these conditions, it is understood, of course, that the main line fuses are all right and that the main machine motor is running.

To test the first condition, *first make sure that the channel entrance is fully opened and that the magazine in the lower operating position is fully raised and latched in its shifting position.* This condition is usually verified by observing the magazine carriage catch at the right of the lower magazine carriage in position. The catch snaps to the right when the magazine and its carriage are fully raised to the shifting position.

Next, with machine motor running and switch *56*, Fig. 203, turned on, close switches *20* and *41* by hand. If the relay in box *59* at the rear of the machine can be heard closing, it may be assumed that the switches are not being pushed in far enough by their operating parts to establish contact. The procedure for setting the switches with respect to their operating parts is described in the section dealing with adjustments.

If the relay does *not* close when switches *20* and *41* are pushed in by hand, it is possible that either of the switches is defective or that the relay coil is not operating properly. The procedure for testing the various parts of the electrical circuit is outlined below, but before beginning any of the tests, *always make sure that the channel entrance is fully opened and that the magazine in the lower operating position is fully raised and latched.*

5. To test the main magazine relay coil, remove the cover from the magnetic switch box *59*, Fig. 203, secure a piece of insulated wire about six inches long and trim both ends of the wire. Make sure that the main machine motor is running and that switch *56* is on. To test the main magazine relay coil on *single and three-phase A.C. installations,* touch terminals *A* and *B*, Fig. 205, with ends of the wire. If the relay closes, the coil is all right. The side magazine relay coil is tested similarly by connecting terminals *C* and *D* with the test wire.

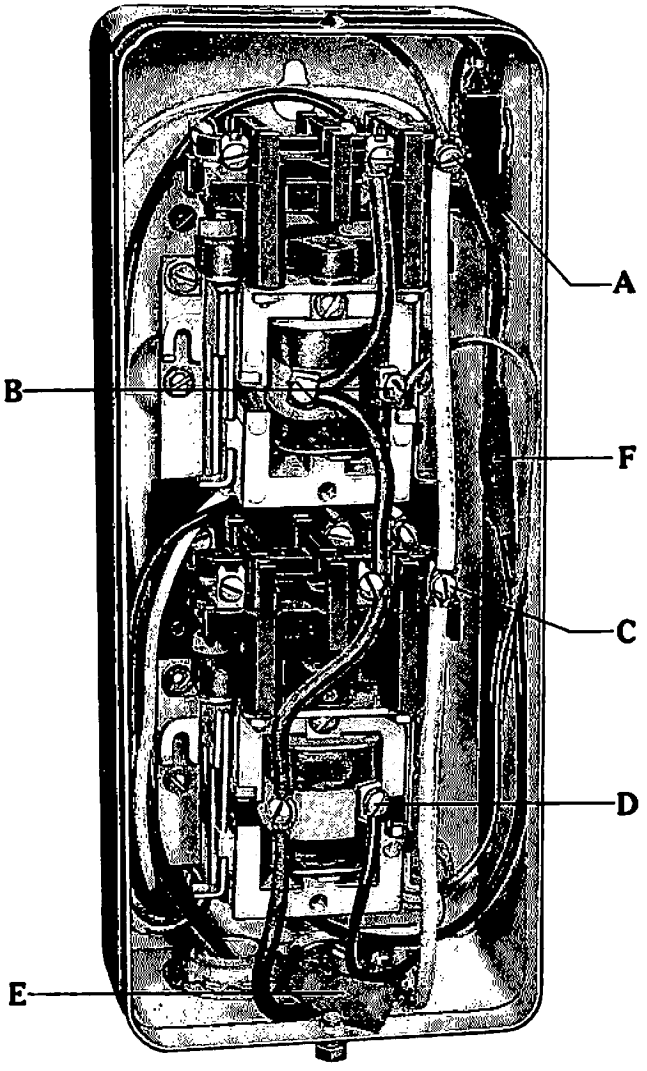

Fig. 205. Single and Three-Phase A.C. Magazine Frame Operating Motor Switch. The switch shown in this illustration is for machines equipped with both a main and a side magazine power shift. The wiring shown in this instance is for the single phase installation, but the tests outlined in the text are made in the same way for both single and three-phase systems. The terminals bearing reference letters are used for testing various parts of the power shift circuit, as described in the text.

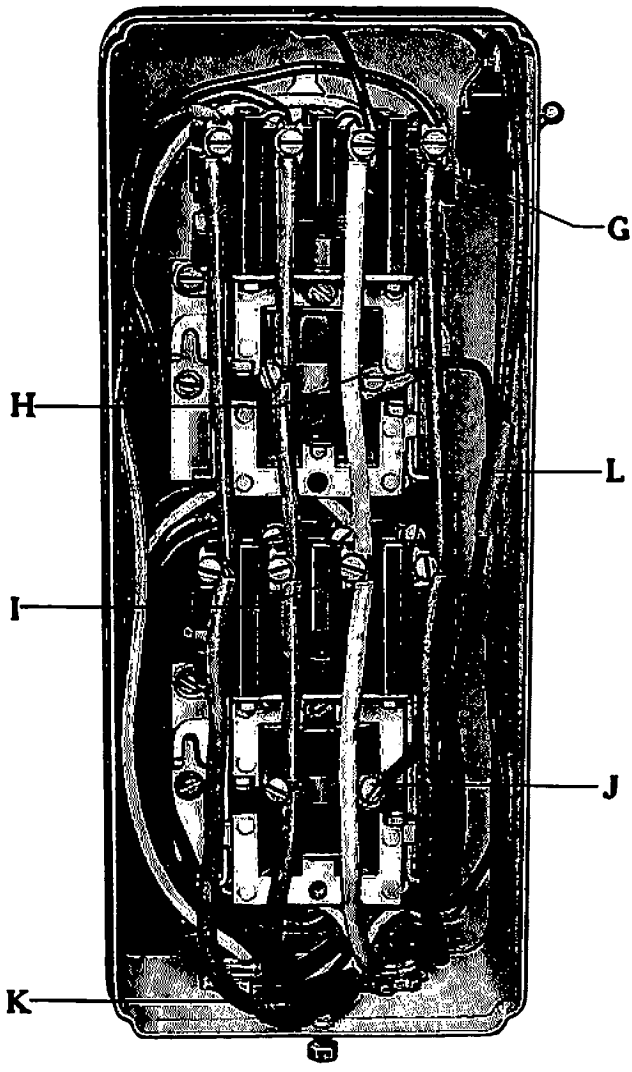

Fig. 206. Two-Phase A.C. Magazine Frame Operating Motor Switch. The switch shown in this illustration is for machines equipped with both a main and a side magazine power shift. The wiring shown in this illustration is for a two-phase four-wire installation. The terminals bearing reference letters are used for testing various parts of the power shift circuit, as described in the text.

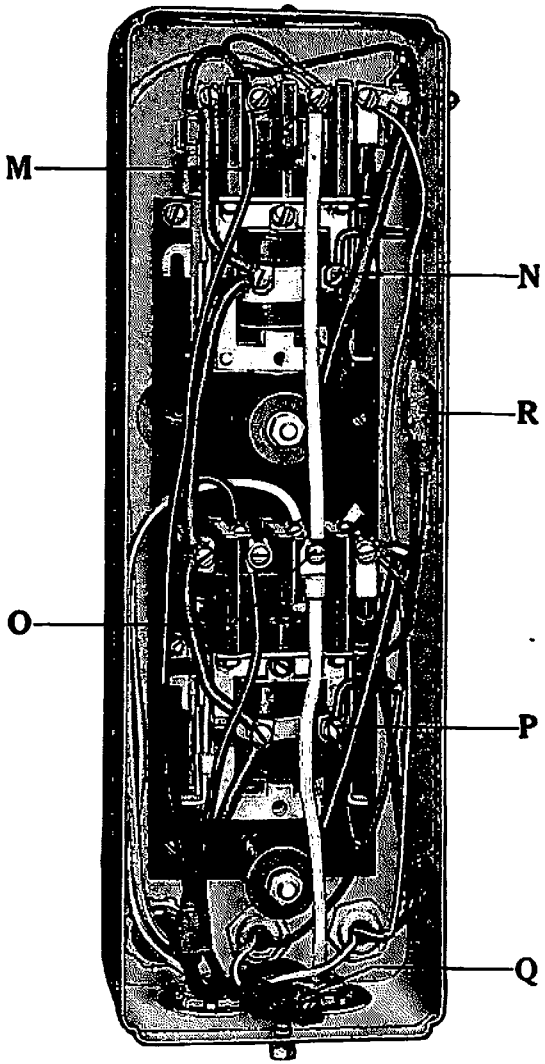

Fig. 207. D.C. Magazine Frame Operating Motor Switch. The switch shown in this illustration is for machines equipped with both a main and a side magazine power shift. The terminals bearing reference letters are used for testing various parts of the power shift circuit, as described in the text.

On *two-phase A.C. installations,* the main magazine relay coil is tested by connecting terminals *G* and *H,* Fig. 206, with the piece of insulated wire. The side magazine relay coil is tested by connecting terminals *I* and *J.* If the relays close, the coils are all right and the defect may be assumed to be in the control circuit.

On *D.C. installations,* the main magazine relay coil is tested by connecting terminals *M* and *N,* Fig. 207. The side magazine relay coil is tested by connecting terminals *O* and *P.* If the relays close, the coils are all right and the defective part may be assumed to be elsewhere in the control circuit.

6. To test switch *41,* Fig. 203, on *single and three-phase A. C. installations,* untape splice *E,* Fig. 205, and connect the splice with terminal *D* or *B.* If the relay closes, switches *41* and *56,* Fig. 203, are all right and switch *20,* either main or side, is defective. The indication as to which of the switches *20* is defective will be in the magazine frame which does not operate.

To test switch *41* on *two-phase A.C. installations,* untape splice *K,* Fig. 206, and connect the splice with terminals *J* or *H.* If the relay closes, switches *41* and *56,* Fig. 203, are all right and the main or side magazine operating switch *20* is defective.

To test switch *41* on *D.C. installations,* untape splice *Q,* Fig. 207, and connect the splice with terminal *P* or *N.* If the relay closes, switches *41* and *56,* Fig. 203, are all right and the main or side magazine operating switch is defective.

7. If the relays do *not* close when the above test is made, the defect is in switch *41* or *56,* Fig. 203. To find out which one is not operating properly, on *single and three-phase A.C. installations,* untape splice *F,* Fig. 205, and connect the splice with terminal *B* or *D.* If the relay closes, switch *56,* Fig. 203, is operating properly and switch *41* is defective.

To find out which switch is defective on *two-phase A.C. installations,* untape splice *L,* Fig. 206, and connect the splice with terminal *H* or *J.* If the relay closes, switch *56,* Fig. 203, is all right and switch *41* is defective.

The same test on *D.C. installations* is made by untaping splice *R,* Fig. 207, and connecting the splice with terminal *N* or *P.* If the relay closes, switch *56,* Fig. 203, is all right and switch *41* is defective.

8. If up to this point all of the parts tested are all right, switch *20,* Fig. 203, either main or side, is definitely defective. The indication as to which of the switches is not operating properly will be in the magazine frame which does not move when the main operating levers are held to the left. In the case of D.C. installations, however, the resistors should be taken into consideration before replacing either of the operating lever switches. Indication of a defective resistor will be that the relay will keep moving up and down rapidly while the operating lever is held to the left.

9. If the relay can be heard closing when operating lever *17,* Fig. 203, is moved to the left in the notches in plate *18* and the magazine frame fails to move, move the magazine frame to its center position with the crank wrench provided with the machine. Move operating lever *17* to the upper and the lower notches in plate *18* and operate the lever to the left to see whether the frame will move in either direction. If the frame moves in one direction only, it may be assumed that a part inside switch box *26* is defective.

Before attempting to remove the switch box, *turn off the main machine motor switch or the cut-out switch 56, Fig. 203.* Move the magazine forward with the crank wrench until the lower pair of magazines is in operating position. Remove the screw at the rear of link *30,* loosen screw *55* and disconnect the cables from the clamp. Pull cam plate *27* out of the switch box, depress lever *33* and pull the assembled switch box *26* out to the front of the machine. Examine all of the tension springs connected to the operating levers in the switch box and make sure that the contacts are raised and lowered positively with respect to the terminal contact plates. If the springs are operating correctly, insert the cam plate in the switch box, remove the back cover *61* and insulating plate from the switch box, then slide the cam plate forward and backward to observe the contacts at the bottom of the switch box. The contacts should meet fully and should disengage with a positive action as the cam plate is moved back and forth. Make sure also that the contacts are in good condition.

As a general solution to any electrical problem, the machinist should remember that the magazine frames can always be operated manually with the crank wrench provided with the machine. The crank fits on the square lug at the front of the magazine frame operating worm and can be turned forward or backward as required after the channel entrance has been opened. This feature makes it possible to operate the machine normally under all conditions and to obtain full production until competent electrical service can be obtained.

Adjustments

Several parts of the magazine frame power operating mechanism have been made adjustable to compensate for wear over long periods. All of the settings outlined below are made correctly when the machine is assembled and will require changing very infrequently, if at all.

Magazine Frame Pinion Link Stop Screws. Stop screws *35* and *36,* Fig. 203, serve a very important function in that they stop the magazine frame in its precise operating locations when fully forward and fully back. The operating location of magazine frame is indicated clearly in Fig. 209, which shows one of the lugs of the frame resting in one of the supporting blocks *49.* It is necessary to remove screw *50* from the left-hand magazine frame supporting bracket in order to see the relationship between the locating lug on the magazine frame and the seat in the supporting block.

In adjusting the pinion link stop screws *35* and *36,* Fig. 203, the magazine frame should be moved forward until the lower pair of magazines is in operating position. Since it is necessary that the frame be stopped at the precise moment when the lug on the frame seats in the supporting block, it is advisable to move the frame manually with the crank wrench to secure better control. Turn the front stop screw *35* until it banks against link *6,* then tighten the lock nut securely. The same procedure should be used to set the back stop screw *36,* which stops the magazine frame when the upper pair of magazines is in operating position. When the pinion link stop screws have been adjusted, replace screw *50,* Fig. 209, turn it until it banks lightly against the magazine frame, then tighten the lock nut.

Magazine Frame Operating Switch and Safety Switch. The operating switch *20*, Fig. 203, and the safety switch *41* are adjustable in relation to the parts by which they are operated. Switch *20* is shown clearly in relation to its operating parts in Fig. 204. The switch should be located close enough to plate *19* so that circuit will be closed when operating lever *17* is held to the left in a notch in plate *18*. The channel entrance should be open when testing the closing of the circuit. In addition, the sidewise position of the switch must be set so that the circuit will *not* be closed when safety lever *46* is in front of the pad on plate *19* and when operating lever *17* is held to the left. The safety lever may be held down in front of the plate when testing this condition. The switch is held in the casing *20* by two lock nuts and can be located sidewise by turning the nuts on the threaded sleeve. Set the switch for the two conditions outlined and tighten the lock nuts securely.

Safety switch *41*, Fig. 203, is adjusted in a similar manner. The switch should be closed by spring *39* only when the lifting levers *38* have made their complete opening stroke. The lifting levers operate fully only when the channel entrance is opened all the way and when the magazine in the lower operating position is raised and locked in its upward or "shifting" position. Adjust the safety switch until the circuit is just closed by spring *39* when the lifting lever *38* is fully back, then tighten the switch lock nuts. The safety feature of switch *41* lies in the fact that spring *39* will not move far enough back to close the switch if any obstruction prevents the channel entrance from opening all the way or if the lower magazine in operating position is not raised and locked in its shifting position.

Magazine Frame Operating Control Switch Cams. The extent to which the magazine frame moves, as previously described, is controlled automatically by the position of the control switch cams with respect to the operating switches inside the movable switch box. The switch cams are fastened to the inside of the plate *27*, Fig. 203, and operating switches are pivoted inside switch box *26*. The switch cams are located with respect to the switches when operating lever *17* is moved to its various notch positions in plate *18*. The switch cams *53* and *54* are shown in a detail view in Fig. 208. Cam *53* cuts off the circuit when magazine frame moves *forward* and cam *54* fulfils the same function when the magazine frame moves *backward* to its various operating positions.

When the machine is in the process of assembly, the stop screws *35* and *36*, Fig. 203, are first set to limit the movement of the magazine frame forward and backward. The setting of the stop screws has been described in the preceding text. The control switch cams on plate *27* are then fastened in position so that the clamping screws are approximately centered in relation to the elongated slots in the plate.

Next, in order to move the magazine frame fully between its extreme forward and backward positions, it is necessary to provide sufficient movement for the cam plate *27*, Fig. 203. It has been found that an approximate movement of 1-11/16″ is required for the main magazine cam plate as operating lever *17* is moved from the bottom notch in plate *18* to the top notch. To verify the stroke of the cam plate, scribe a connecting mark on the plate and its stationary guide, move operating lever *17* to the upper notch, then measure the distance from the mark on the cam plate to the original mark on the stationary guide. If the move-

ment of the cam plate is greater or less than the specified stroke, adjust lever *51* until the correct stroke is obtained, then tighten the clamping screws. It should be understood at this point that the 1-11/16″ movement established for the cam plate is only approximate and is recommended merely to provide a beginning point for the adjustment of the switch cams. When setting the center position of the main magazine frame, it may be necessary to reset lever *51* slightly. The procedure for establishing a basic movement for the side magazine cam plate is similar to that outlined for the main magazine cam plate except that the movement of the side magazine plate should be approximately 1-11/64″.

Having established the basic movements of the main and side magazine cam plates, the next step is to adjust the cams on the plates to stop the magazine frames in their various operating positions. While the following outline of switch cam adjustments is presented in terms of the main magazine frame, it is understood that the same procedure is used when setting the side magazine frame. The chief difference between the two magazine frames, as previously indicated, is that the side magazine frame does not have a center operating position, so in setting the side unit, the description of the center operating position should be disregarded.

In setting the switch cams on the cam plate, the basic condition to establish first is the full movement of the magazine frame pinion link *6*, Fig. 203, between the front stop screw *35* and back screw *36*. The full complement of magazines and matrices should be inserted in the magazine frame at this point and the magazine frame counterbalance springs should be adjusted correctly. Move the main magazine frame under power to its full forward and backward positions to

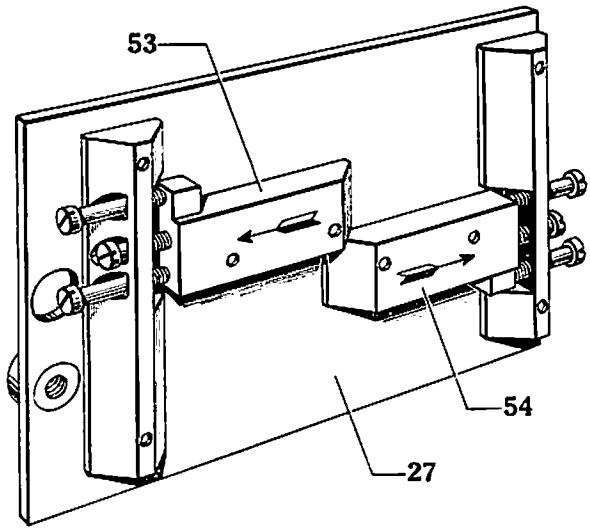

Fig. 208. Magazine Frame Operating Control Switch Cam Plate. This view of the plate is from the left-hand side of the machine and shows the cams *53* and *54* which automatically cut off the control switches as the magazine frame seats in its various operating positions. Cam *53* breaks the circuit when the magazine frame moves *forward* to its various positions and cam *54* fulfils the same function when the frame moves *backward* to its various operating positions.

try the approximate settings of the switch cams. The cams should break the circuit slightly before link *6* reaches the stop screws *35* and *36*. The slight overmotion drive of the magazine frame operating parts will move the link to its final position against the screws.

Cam *53*, Fig. 208, breaks the circuit when magazine frame moves *forward* to its operating positions. If the magazine frame does not move far enough forward to bank against the front stop screw, cam *53* should be adjusted in the direction of the arrow. Cam *54* breaks the circuit when the magazine frame moves *backward* to its operating positions. If the pinion link does not move far enough back to meet the rear stop screw, therefore, cam *54* should be adjusted in the direction of the arrow. The front cam *54* can be reached for adjustment simply by opening the assembler entrance cover. To adjust the rear cam *53*, it is necessary to remove cam plate *27*, Fig. 203, from box *26*. First, move the magazine frame forward until the lower pair of magazines is in operating position. *Turn off the main motor switch or the cut-out switch 56, Fig. 203, at this point*—if this is not done, all of the control switch contacts inside box *26* will establish contact when cam plate *27* is removed and a short circuit will result. Disconnect link

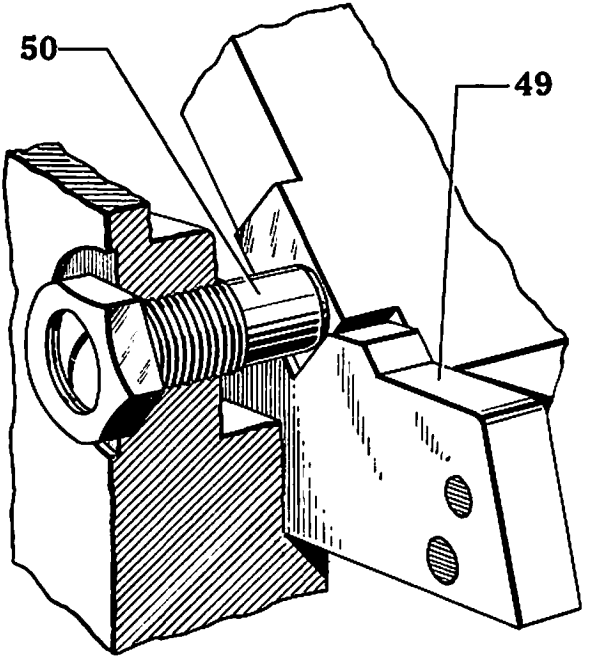

Fig. 209. The Magazine Frame Supporting Blocks *49* locate the magazine frame in its precise seating locations. When making any adjustment relative to the operating locations of the magazine frame, screw *50* should be removed from the left-hand magazine frame supporting bracket in order to make visible the relationship between the lug of the magazine frame and the seat in the supporting block.