CHAPTER 17

The Transfer Mechanism

HAVING FOLLOWED the matrices and spacebands from the time they were released by the operator from their respective magazines until the slug has been cast against them and they are freed from the "lock-up" so that they are again loosely held in the first elevator jaw, we come to the third major division of the Linotype mechanism. This major division is a very general division, and is referred to as "Distribution." But, it actually comprises all those mechanisms which serve to take the matrices and spacebands after they have served their purpose as a surface against which to cast the top, or face, of the Linotype slug, and return them to their proper places in the magazines from which they previously had been released.

All these mechanisms will be considered in succeeding chapters, and in their proper sequence. This chapter is confined to the description of the "Transfer Mechanism," which serves to remove the matrices and spacebands from the vise jaws, to place the matrices into the distributor box and to return the spacebands to the spaceband box.

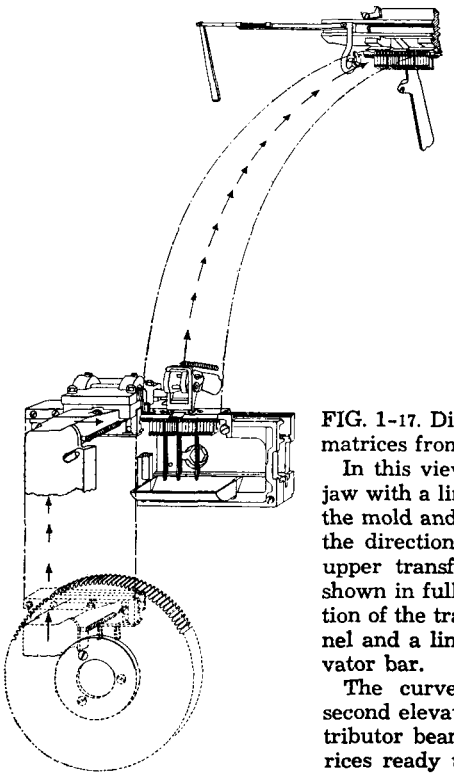


FIG. 1-17. Diagrammatic view of the transfer of a line of matrices from the casting point up to the distributor box.

In this view is shown in dotted lines the first elevator jaw with a line of matrices at the casting point in front of the mold and the mold disk. The vertical arrows indicate the direction of the first elevator jaw as it rises to the upper transfer channel. Here the first elevator jaw is shown in full lines. Horizontal arrow indicates the direction of the transfer of the matrices into the transfer channel and a line of matrices assembled on the second elevator bar.

The curved arrows indicate the movement of the second elevator bar upward until it rests against the distributor beam in front of the distributor box with matrices ready to be transferred by the distributor shifter.

It should be noted that previous to the transfer action, the teeth on the matrices have not been employed for any purpose. During the transfer they begin to be of use as hooks to hold the matrices onto the short toothed bar carried by the end of the second elevator which lifts them up to the distributor box, and also to keep the matrices from dropping while being pushed from the second elevator bar into the distributor box. It is only after matrices have been fed one at a time to the distributor bar and during their travel along the distributor bar, that the wonderful system of tooth combinations comes into use.

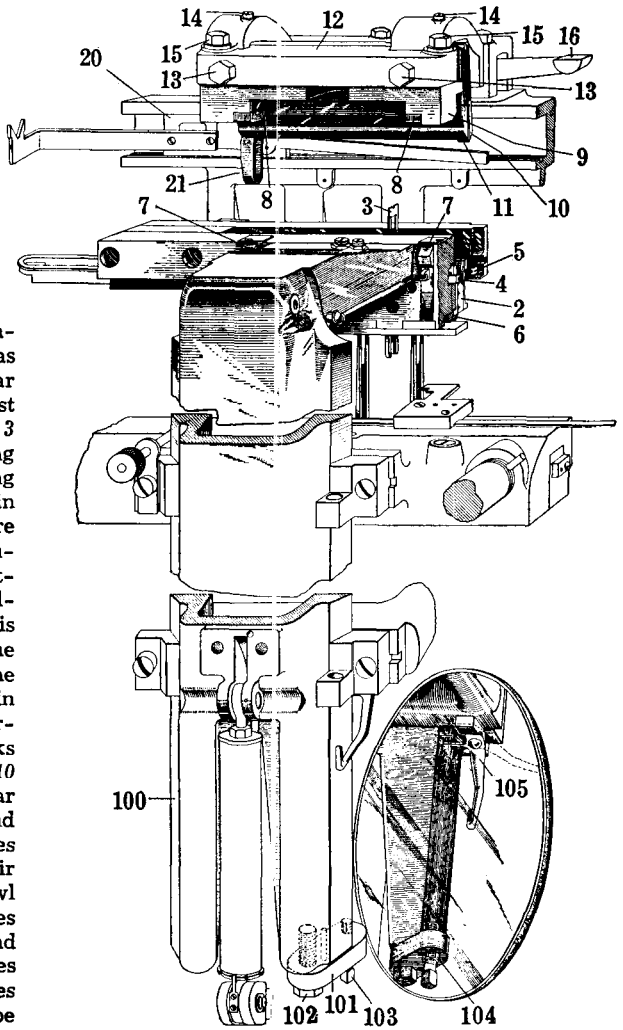


FIG. 2-17. View of first elevator jaw rising after cast has taken place, and reflected rear view of lower section of first elevator. *2* is a matrix and *3* the top of a spaceband long wedge. *4* and *5* are spring pawls and *6* slidable shelf in first elevator jaw. *7-7* are levers which operate to withdraw the shelf *6* from matrices held by it in the auxiliary position in the jaw. This withdrawal occurs when the beveled surfaces near the tops of the levers *7* come in contact with the beveled surfaces on the hardened blocks *8* on the adjusting strip *9*. *10* shows the intermediate bar which pushes down spaceband long wedges and matrices which do not drop of their own weight. *11* is the pawl which guides the matrices vertically onto the second elevator bar and also pushes the spaceband long wedges downward so they will not be caught by the end of the second elevator bar. The intermediate bar *10* is held on to the first elevator slide guide *12* by the screws *13*, and is adjusted for height by the screws *14*. The adjusting strip *9* is held to the guide *12* by the screws *15*.

THE FIRST UPWARD TRANSFER

The transfer operation begins with the rise of the first elevator from its lowest position, where it rests upon the vise cap, all the way up until it is stopped in register with the intermediate or transfer channel. This upper stopping position of the first elevator is regulated by the adjusting screw at the lower right corner of the first elevator slide and, at this time, there is a slight compression of the spring inside the spring link between the slide and the first elevator lever.

Because the line of matrices is loose in the first elevator jaw as the elevator rises, the long wedge portions of the spacebands usually drop by their own weight from the positions occupied by them when the line was cast. If any should not drop, they are forced down by coming in contact with the lower surface of the intermediate bar, held by the first elevator slide guide which accurately locates the first elevator jaw fore and aft when it is up at the transfer position.

In the composed line any matrices which are held in the auxiliary position by

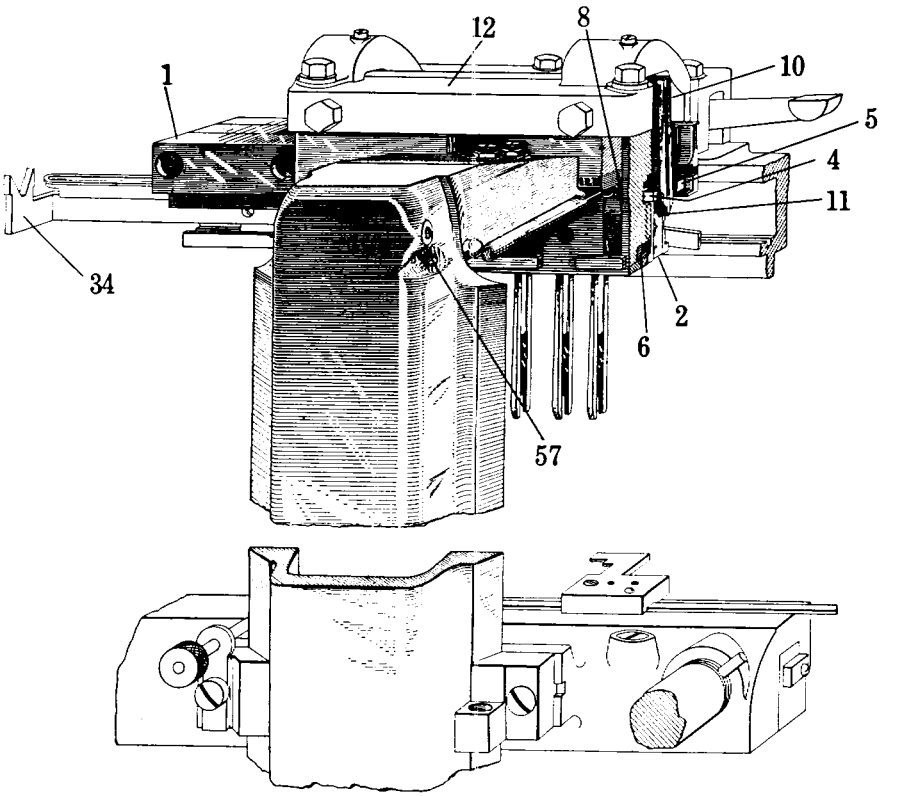


FIG. 3-17. Perspective view of the first elevator jaw *1* when it has risen to its highest position ready for the discharge of the matrices into the transfer or intermediate channel. The bar *10* has pressed the matrices and spacebands downward; and the pawl *11*, the bottom of which is in line with the bottom of the second elevator bar, compels the teeth of the matrices to register vertically with the second elevator bar, and the spacebands to clear the bar as they are pushed out of the first elevator jaw into the intermediate channel.

the slidable shelf in the front portion of the first elevator jaw are allowed room to drop by the withdrawal of that support just before the end of the upward motion of the first elevator. This withdrawal of their support allows matrices in the auxiliary position to drop by their own weight to the lower or regular position with the other matrices. Here again, if they do not so drop, they are pushed down by the beveled edges of the same intermediate bar whose bottom surface pushes any lagging long spaceband wedges downward. This intermediate bar has also, at its lower right-hand end, a pawl which is thin enough to pass between the lowest teeth in the tooth notch of the matrices. The bottom surface of this pawl is exactly on a line with the lower tooth of the second elevator bar and serves to hold down both the matrices and the long wedges of the spacebands so that the teeth on the matrices will register vertically correctly with the second elevator bar, and the spacebands will not be stopped by the end of the bar while being pushed from the first elevator jaw into the intermediate channel. All these parts are illustrated in Fig. 2-17, and explained in the description of that figure.

THE FIRST HORIZONTAL TRANSFER

The next operation, after the first elevator jaw has been stopped at its highest position, is that of pushing the assembled matrices and spacebands toward the right into the intermediate channel where the second elevator bar which has on it a series of teeth adapted to receive the toothed portion of the matrices, has already been accurately positioned ready to receive the matrices. The spacebands, having no toothed portion, pass under the second elevator bar and are supported against dropping, by horizontal surfaces in the intermediate channel upon which the ears of the spacebands rest. That is, the matrices hang on the second elevator bar, and do not rest on any ledge in the intermediate channel, while the spacebands are supported in the intermediate channel and are not lifted by the second elevator bar when the second elevator rises in order to convey the matrices up toward the distributor box. In order to avoid confusion, a description of the second elevator and its movements is considered in this portion of this chapter only so far as to show how the second elevator bar is accurately positioned in order to receive a line of matrices, and to show how the descent of the second elevator starts the movement of the line of matrices and spacebands out of the first elevator jaw and into the intermediate channel.

As can readily be seen from study of Fig. 4-17, and others accompanying this chapter, the second elevator bar is carried on the end of a long arm called the second elevator lever, by means of a forked link which hinges on the end of the second elevator lever; the second elevator bar itself is hinged to the lower ends of the link. On top of this bar is fastened a horizontal plate. The front of this plate which is called the second elevator bar plate, is substantially a long straight vertical surface that is parallel with the second elevator bar. This front surface is notched near the center of its length in order that the plate shall be guided in its descent toward the intermediate channel, by the second elevator guide, lower, which is fastened to the adjustable extension of the front plate of the intermediate channel. The long rear edge of the second elevator bar plate serves to align the bar with the distributor box when the second elevator is in its upper position.

A long flexible coil spring having its rear end fastened to the second elevator lever and its front end to the top of the second elevator bar link acts, while the bottom surface of the second elevator bar plate is resting on top of the inter-

mediate channel, to keep the long vertical front surface of the plate forward against the adjustable extension on the front plate of the intermediate channel. By this means, the second elevator bar can readily be adjusted forward or back so as to be exactly central with the intermediate bar *10*, already described. The vertical adjustment of the intermediate bar has also already been described. By means of these two adjustments, perfect alignment is made between the intermediate bar and the second elevator bar.

The slide which is operated to transfer the line from the first elevator jaw into the intermediate channel is shown in Fig. 4-17. As the second elevator bar is being seated and finally positioned exactly in the intermediate channel, an adjustable screw on the second elevator trips a releasing lever which allows this transfer slide to be carried toward the right by a mechanism which is called the "transfer mechanism."

The releasing lever, it should be understood, is another safety device, the purpose of which is to prevent the transfer of a line in case the second elevator does not descend, or in case the second elevator bar is not properly seated in the intermediate channel.

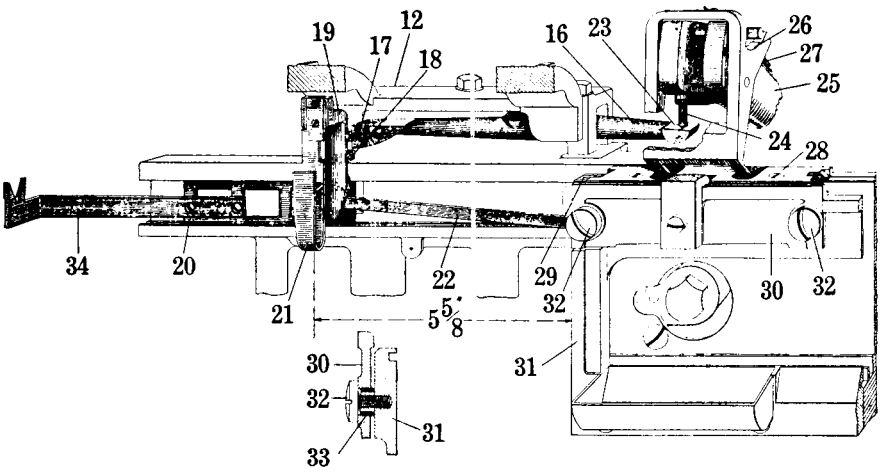


FIG. 4-17. This view shows a portion of the mechanism for transferring the line from the first elevator jaw into the intermediate channel, and also the releasing lever which normally locks the transfer slide, but, when tripped by the descent of the second elevator, allows the transfer mechanism to go into action.

The releasing lever *16* is hinged at about the center of its length on the first elevator slide guide *12*. Its left-hand end *17* is normally forced downward by a light coil spring so as to be in the path of a projection *18* on a vertical arm *19* of the transfer slide *20* which has on it a finger *21* adapted to push the line toward the right, out of the first elevator jaw into the intermediate channel. The slide *20* is connected to the link *22* through which link it is actuated.

The end *17* of the releasing lever *16* is raised when the end *23* is depressed by being struck by the end of the adjusting screw *24* on the second elevator *25*. The screw *24* should be adjusted so that the end *17* of the lever *16* is raised only $\frac{1}{32}$" above the top of projection *18* on the arm of the transfer slide *20*. *26* is the second elevator bar link, and *27* is a long coil spring which forces the plate *28* forward against the adjustable plate *30* which is fastened to the intermediate channel front plate *31* by the screws *32* through the hollow adjustable bushings *33* which are threaded through the adjustable plate *30*. *29* is the second elevator bar.

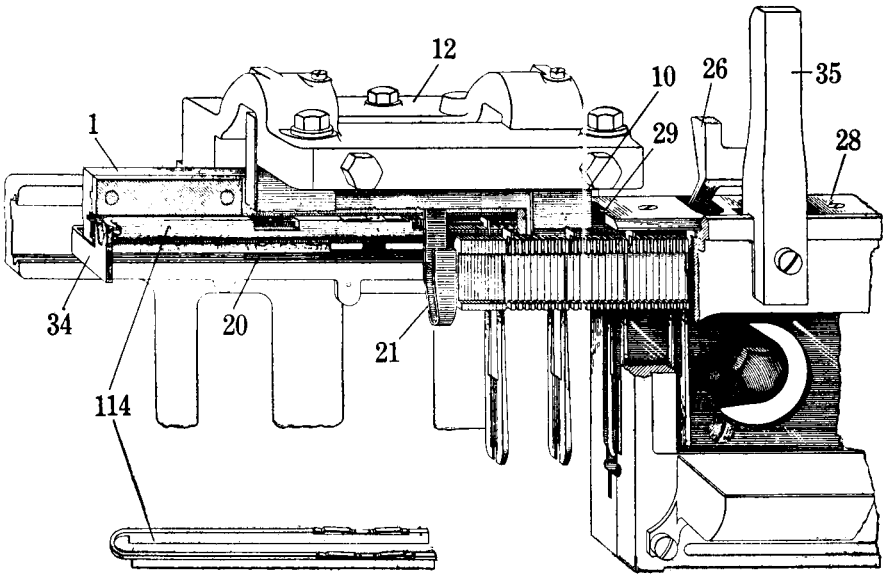


FIG. 5-17. This view shows the line of matrices and spacebands being transferred from the first elevator jaw into the intermediate channel. A part of this channel is cut away in order to show the transfer more clearly.

The vertical adjustment of intermediate bar *10* and the adjustment for centering the second elevator bar *29* with intermediate bar *10*, have already been explained.

When a 30-em Linotype machine is in normal position, 5⅝″ should be allowed from the left-hand end of the intermediate channel front plate, to the right-hand side of the transfer slide finger *21*, as illustrated. On a 42-em Linotype, this distance should be 7⅝″. The method of adjusting this distance is detailed with the description of the cam and lever mechanism for operating the transfer slide and the spaceband lever.

The adjustable extension of the intermediate channel front plate has through it two hollow threaded bushings with screw driver slots in their front ends. This permits the adjustable plate to be adjusted forward or backward relative to the intermediate channel front plate into which are tapped holes for two large headed screws. These are inserted through the threaded bushings in the adjustable plate as shown at *32*, Fig. 4-17.

Mechanism for the First Horizontal Transfer

The transfer slide which pushes the matrices and spacebands into the intermediate channel runs in grooves in the face plate frame, and is operated through a link connection to the elevator transfer lever. This is pinned to the front end of a horizontal shaft which extends from the front to the back of the machine column and has its two bearings in the column. At about the middle of the length of the shaft, and within the column, there is a short hook lever having on its hub a bayonet lock cut which connects the lever to the shaft by engaging a large pin projecting out of one side of the shaft. This hook lever has between it and the upper web of the column, a long coil spring which does the actual work of pushing the line into the intermediate channel, controlled by a cam surface which is

part of the delivery cam on the cam shaft. At the rear end of the long shaft, a short cam lever with a long split hub is held to the shaft by two clamp screws. This lever carries a roller in contact with the aforesaid cam surface which is called the elevator transfer and spaceband shifter cam.

The setting of the transfer slide finger at 5⅝″ from the left-hand end of the intermediate channel front plate on a 30-em machine, and at 7⅝″ on a 42-em machine, is made when the machine is stopped in normal position. The two clamp screws on the hub of the short cam lever are loosened; the slide finger is then held at the position above designated while the cam lever is moved around its shaft until the cam roller bears against the cam. The clamping screws are then tightened.

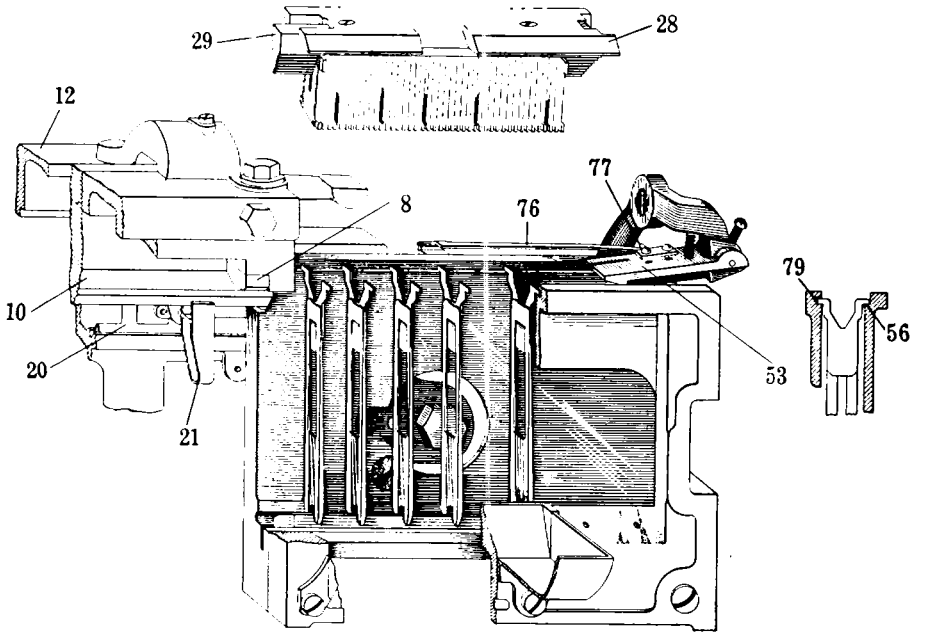


FIG. 6-17. Another view showing the second elevator bar with the matrices being carried upward by the second elevator lever, leaving the spacebands below in the intermediate channel. The spacebands have no teeth to register with the second elevator bar, and the ears of the wedges are wider than the ears of the matrices and register in a groove *79* on the front side of the intermediate channel. This groove prevents the spacebands from rising when the second elevator bar goes up. A shelf *56* also supports the spacebands during their travel through the intermediate channel. Also shown in this view is the spaceband lever pawl guide rail *76* on which the projection *77* on the spaceband pawl *53* travels, holding the spaceband pawl above the tops of the spacebands while moving over to gather them. At the extreme left-hand position of the spaceband pawl, the projection drops off the end of the guide rail and the pawl then engages the spacebands to carry them into the spaceband box, the projection *77* on the spaceband pawl *53* passing under the guide rail *76* which is hinged at the left-hand end.

Because the guide rail *76* is hinged near its left-hand end, and is bent downward at its right-hand end, that end is lifted by the projection *77* which passes under it and beyond it at the end of the movement of the spaceband pawl *53*.

When the spaceband pawl *53* is again moved toward the left, its projection *77* again rides up the inclined end and on top of the guide rail *76*.

The adjustment for the travel of the transfer slide should be such that the cut in the slide finger *21* comes just flush with the right-hand end of the first elevator back jaw, when the transfer slide is all the way over toward the right. This adjustment is made by the screw *49* in the automatic safety pawl after the other adjustments of that pawl as described in Chapter 21, have been made. These parts are shown in Fig. 9-17, and are described in the explanation of that figure.

The transfer lever has a short bent arm extending below its hub. Between this short arm and the long spaceband lever, which is pivoted lower down in the column, there is an adjustable link generally called the spaceband lever turnbuckle. Through this link connection, the same cam surface controls the movements of both levers.

Because these levers and their actions can be more readily seen and studied from the rear of the machine, Fig. 9-17 consists of such views.

Strokes of the Transfer and Spaceband Levers

Having described the various parts which serve to transfer the line horizontally, it may be well to repeat just enough of the foregoing description to make the movements of the transfer lever and the spaceband lever better understood.

The contour of the elevator transfer and spaceband shifter cam causes the levers to have two separate and distinct strokes.

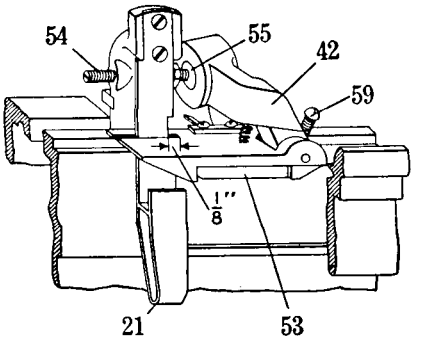


FIG. 7-17. Showing the spaceband pawl and the slide finger closest together. The spaceband pawl is here in position to pull the spacebands toward the spaceband box, or magazine.

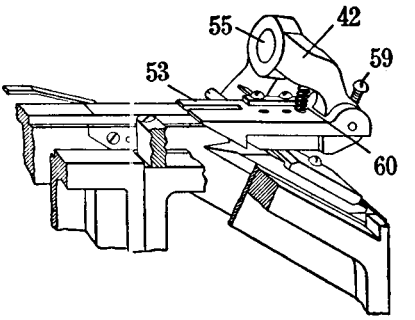
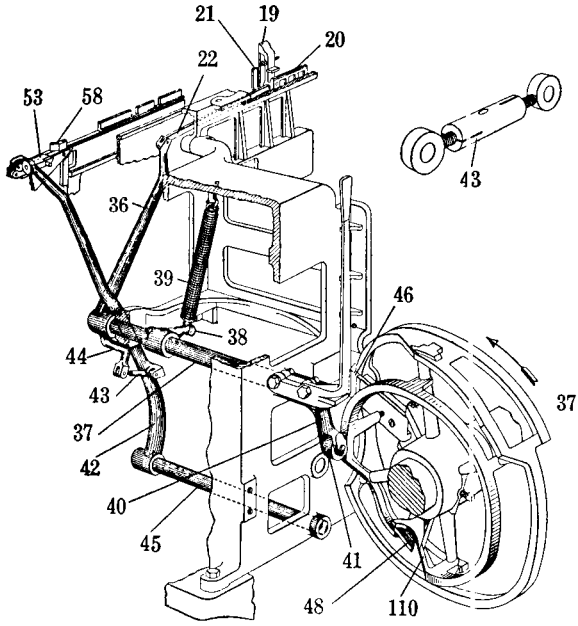


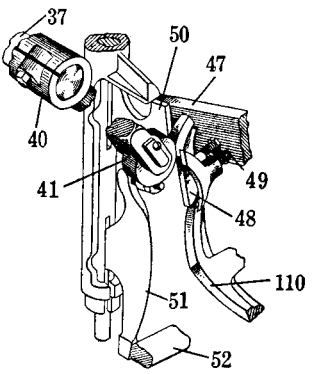
FIG. 8-17. This view shows the spaceband pawl at its extreme right-hand position from the front of the machine. At this position the spaceband pawl should have delivered the spacebands into their magazine.

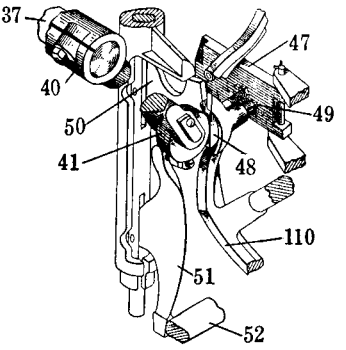
Transfer Lever First Stroke

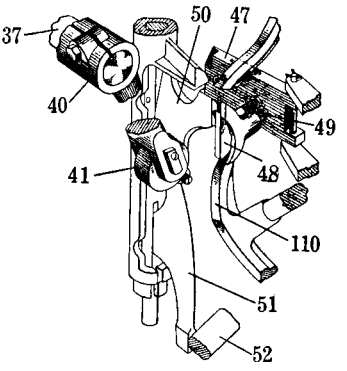
The first stroke begins when the cam roller descends the incline on the cam. This stroke carries the line of matrices and spacebands into the intermediate channel. This is done by the transfer lever. And, though the spaceband lever is pulled toward the left, it returns again part way toward the right at the same time as the transfer lever returns part way toward the left.

These part-way return movements of both levers make room and provide time for the second elevator to lift the matrices upward out of the intermediate channel, and leaves only the spacebands which are supported by the ears of their short wedges and kept straight by the slot in the lower ends of their long wedges straddling a rail at the bottom of the intermediate channel.









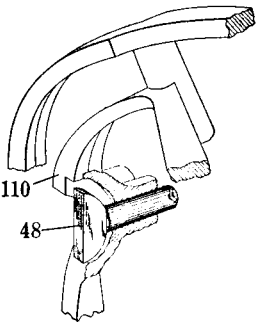


FIG. 9-17. View showing the levers, cam and other parts comprising the mechanism for the horizontal transfer of a line of matrices and spacebands.

The transfer lever *36* is connected to the transfer slide *20* by the link *22*. The lever *36* is pinned to the forward end of the shaft *37* which has bearings in the machine column. This shaft *37* has on it a hooked lever *38* which is pulled by a large coil spring *39*, the other end being fastened to a hook in the top of the column. The spring *39* does the actual work of the horizontal transfer. At the rear end of the shaft *37* is a short cam lever *40* with a split hub and clamping screws to hold the lever to the shaft. The cam lever *40* carries a cam roller *41* which is held against the surface *110* of the elevator transfer and spaceband shifter cam by the spring *39* when a line is transferred.

The spaceband lever *42* is operated by means of the turnbuckle *43* which connects the spaceband lever *42* to the short arm *44* of the transfer lever *36*. The spaceband lever *42* is on a shaft *45* which also has its bearings in the machine column. This lever carries at its top end, the spaceband lever pawl *53*.

The adjustment of the length of the turnbuckle link *43* determines the movement of the spaceband lever toward the right in order to carry the spacebands into the spaceband box, as shown in Fig. 9-17.

The adjustment of a screw near the top of the upward projecting arm on the transfer slide *20* determines the movement of the spaceband lever toward the left in order to allow the pawl *53* to go far

enough toward the left to take hold of the spaceband farthest to the left in the line. This adjusting screw *54* strikes against a spring buffer *55* at the top of the spaceband lever *42*. Fig. 7-17, is a view from the front, and shows these parts more clearly.

The delivery cam which carries the surface *110*, carries also the automatic starting and stopping pawl *46*, the automatic safety pawl *47*, the automatic safety pawl buffer *48* and the adjusting screw *49* on the pawl *47* which regulates the travel of the transfer slide toward the right, because it regulates how far the surface of the buffer is pushed in by the cam lever roller *41* as that roller descends the incline of the cam. If the roller cannot push the buffer far enough, the finger on the transfer slide will not push the last matrix of the line on to the second elevator bar.

The lower illustrations are enlarged views of the automatic safety pawl. The contour of the cam surface *110* is such that when the cam roller *41* descends into the hollow, it strikes the buffer *48* which in turn strikes the adjusting screw *49* on the automatic safety pawl *47*. This action pushes the pawl out of the way so that it misses the stopping lever, upper, *50*. If, however, the second elevator should be "hung up," or the second elevator bar should not be correctly seated in the intermediate channel, or if for any other reason the cam roller *41* does not descend the cam incline to push the buffer far enough, the safety pawl *47* will strike the stopping lever *50*, and, through the levers *51* and *52* the clutch will be released and stop the rotation of the cam shaft. This constitutes a very valuable safety device.

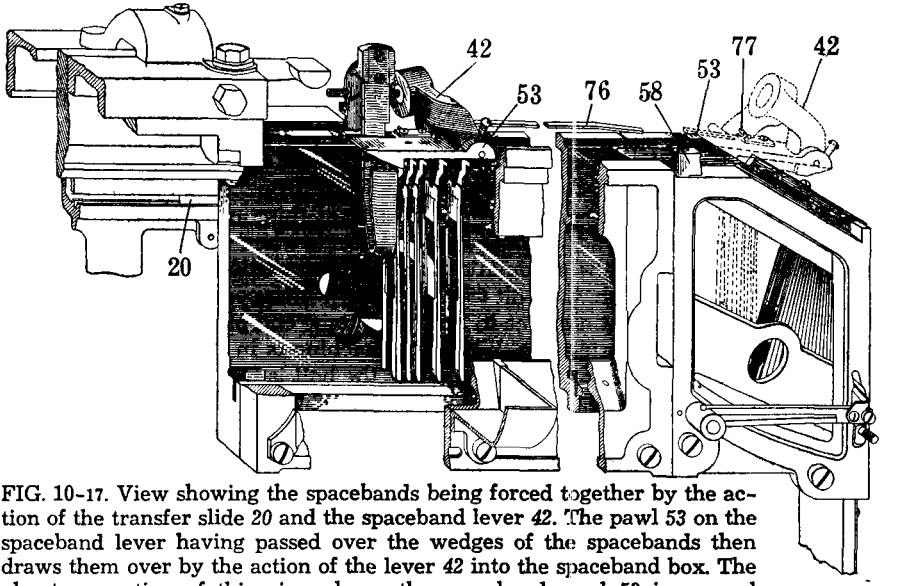


FIG. 10-17. View showing the spacebands being forced together by the action of the transfer slide *20* and the spaceband lever *42*. The pawl *53* on the spaceband lever having passed over the wedges of the spacebands then draws them over by the action of the lever *42* into the spaceband box. The phantom portion of this view shows the spaceband pawl *53* in normal position, with the projection *77* not held up by the guide rail *76*. A section of the spaceband pawl latch is shown at *58*.

Transfer Lever Second Stroke

During the second stroke the levers approach each other more closely, and at the end rest exactly where they were at the beginning of the first stroke. This second stroke is to allow the spaceband lever pawl to pull the spacebands toward the right, back into the spaceband box, to be used over again.

On top of the spaceband box is the spaceband lever pawl latch (*58*, Fig-10-17, shows a part of the latch) which, when pushed into the path of the spaceband lever pawl, acts to prevent the transfer so that the line may be re-cast as many times as desired.

The turn buckle between the transfer lever and the spaceband lever should be adjusted so that if the latch has been thrown into its path the spaceband pawl will travel only a short distance before being stopped. Excessive travel not only makes noise, but may cause the transfer slide finger to come in contact with the line of matrices in the first elevator at the very time when the line should not be distributed, i.e., between casts.

THE SECOND UPWARD TRANSFER

This rather long distance lift of the matrices from the intermediate channel to the level of the distributor box takes place while the spacebands are being conveyed to the spaceband box. This is accomplished by the second elevator.

The second elevator, in its simpler form, consists of a long lever connected by a bolt and a cushion spring to a short cam lever, carrying a cam roller which operates on the second elevator cam. The parts on the end of the long lever have already been described in some detail, except to mention that at the right end of the second elevator bar plate there is a stop pawl, plunger and spring. During the horizontal transfer and the rise of the second elevator, the stop pawl extends out into the path of the matrices and prevents them from being pushed too far toward the right during the transfer, and it also keeps the matrices from striking the distributor box when the second elevator is being raised toward the box. While the elevator is being seated, the stop pawl is raised by the plunger so that there is no obstruction in the path of the matrices to the distributor box bar.

Adjustment for Second Elevator Bar Plate

In order that the second elevator bar plate shall seat properly on top of the intermediate channel, it is not controlled by the cam at this time. The cam roller is then free of the cam. The adjustment for this is made when the machine is at rest in normal position with the automatic stopping pawl resting on the upper stopping lever. In this position, the bolt *69*, Fig 11-17, which connects the long lever should be adjusted so that it is free to turn with some end play between the head of the bolt and the adjusting nut. When the machine is in normal position, the second elevator is all the way up; and, unless the bolt is free to turn, the second elevator is not properly seated in the distributor shifter guide, and the second elevator and distributor box bars do not align.

On the multiple distributor Linotypes where the distributor box is higher than on the single distributor models, the second elevator lever and the second elevator cam lever do not turn together on the same shaft as on the single distributor machines. But, instead, the cam lever is on a lower shaft and is connected by a link to the second elevator lever link lever which is on an upper shaft with the second elevator lever. These two levers on the upper shaft are connected together by a bolt and a cushion spring, exactly as are the long lever and the cam lever in the case where they are together on the same shaft.

Second Elevator Starting Spring

The second elevator starting spring *78*, which is shown in Fig. 11-17, provides a positive contact between the second elevator cam and cam roller at all times except when the second elevator bar plate is resting on top of the intermediate channel. This spring also serves as a cushion for seating the second elevator bar at the upper transfer position; and besides giving the second elevator a steady movement while being raised and lowered it helps to start the elevator down from the distributor box.

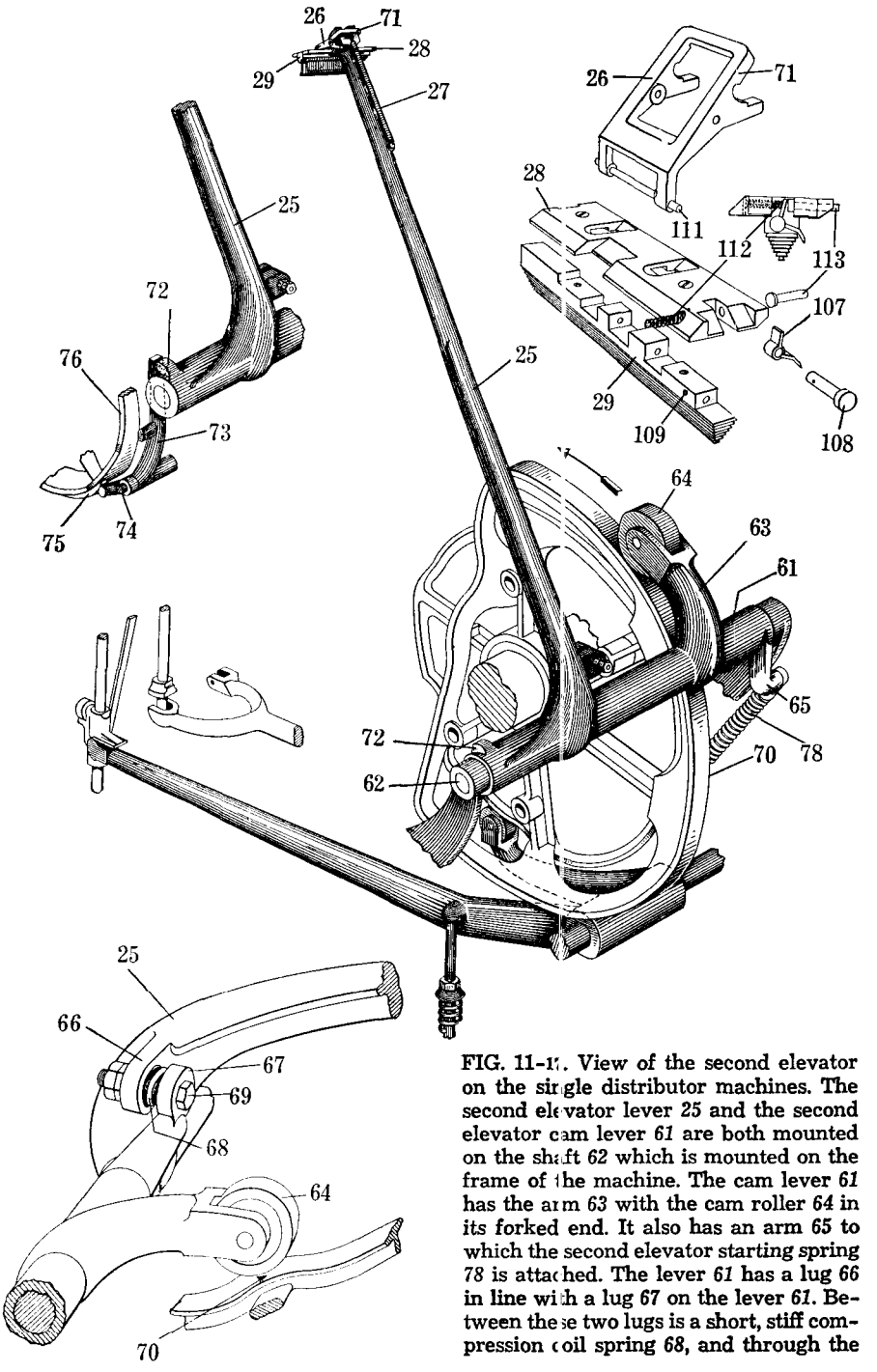


FIG. 11-17. View of the second elevator on the single distributor machines. The second elevator lever *25* and the second elevator cam lever *61* are both mounted on the shaft *62* which is mounted on the frame of the machine. The cam lever *61* has the arm *63* with the cam roller *64* in its forked end. It also has an arm *65* to which the second elevator starting spring *78* is attached. The lever *61* has a lug *66* in line with a lug *67* on the lever *61*. Between these two lugs is a short, stiff compression coil spring *68*, and through the

lugs and the spring a bolt 69 passes. The threaded end of the bolt has on it a ball-end nut and also a lock nut.

The spring 68 acts as a cushion when the second elevator bar plate is stopped by the distributor shifter guide, and also in case the second elevator accidentally strikes the distributor shifter slide should it be stopped in the path of the second elevator. Moreover, it is compressed during the whole time that the second elevator is in its upper transfer and holds the second elevator bar steady while the second elevator cam 70 continues to rotate and the cam roller 64 rolls on the high part of the cam. The back portion 71 of the second elevator bar link 26 is contacted by a cam surface on the second elevator guide, upper, and aids to seat the second elevator bar in its upper transfer position.

The link 26 is hinged on a pin through the end of the lever 25 and carries at its own lower front end the second elevator bar 29, to the top of which is fastened the plate 28. These parts and their actions have been described.

On the hub of the second elevator lever 25 is a projection 72. This projection is in line with a two-armed pawl 73, fulcrumed on the frame of the machine at 74. The short arm of the pawl 73 is engaged by a small cam 75 on the periphery of the line delivery cam 76, and is acted upon to remove the long arm of the pawl from the path of the projection 72 so that the projection 72 can pass back of the pawl during the descent and ascent of the second elevator. The small cam 75 acts upon the pawl just before the second elevator should start down. The pawl 73 is kept out of the path of the projection 72 on the lever hub, just long enough to allow that projection to pass, if the second elevator starts down on time. If the second elevator is at all delayed, it is held up by the pawl 73 until the operator remedies whatever may have caused the delay in the descent of the second elevator lever. This is a very important safety device.

Second Elevator Safety Catch

When the second elevator descends at its proper time, there is nothing to interfere with its cam roller following the cam. But in case the elevator should be "hung up" for any reason, such as clogging of the distributor box, the rotation of the cam shaft may leave a gap between the cam surface and the cam roller. If the second elevator should then be freed to descend, the descent until the roller again contacted the cam surface would be very rapid, and might cause damage. Therefore, a safety device has been provided.

This safety device consists of a projection on the second elevator lever in line with a safety pawl on the machine frame. When the second elevator descends at its proper time, the safety pawl then held out of the path of the projection on the lever by a raised piece on the delivery cam surface cannot act to stop the lever. But if the lever is at all late in starting its descent, the cam allows the pawl to get into the path of the projection on the lever, preventing its descent until the operator frees the lever and lets it down slowly, by hand, until the cam and cam roller are again in contact.

THE SECOND HORIZONTAL TRANSFER

The distributor shifter acts to push the matrices from the second elevator bar into the distributor box, which action constitutes the second horizontal transfer. It acts immediately after the second elevator has lifted a line of matrices and seated it in register with the distributor box. During the time the second elevator bar is away from the upper transfer position, the distributor shifter continues to exert a pressure back of the line of matrices in the distributor box and it is moved back by cam action only just in time to be out of the way when the new line is lifted so that it can act back of the new line on the second elevator bar.

The distributor shifter consists mainly of a slide having a bearing in a bracket

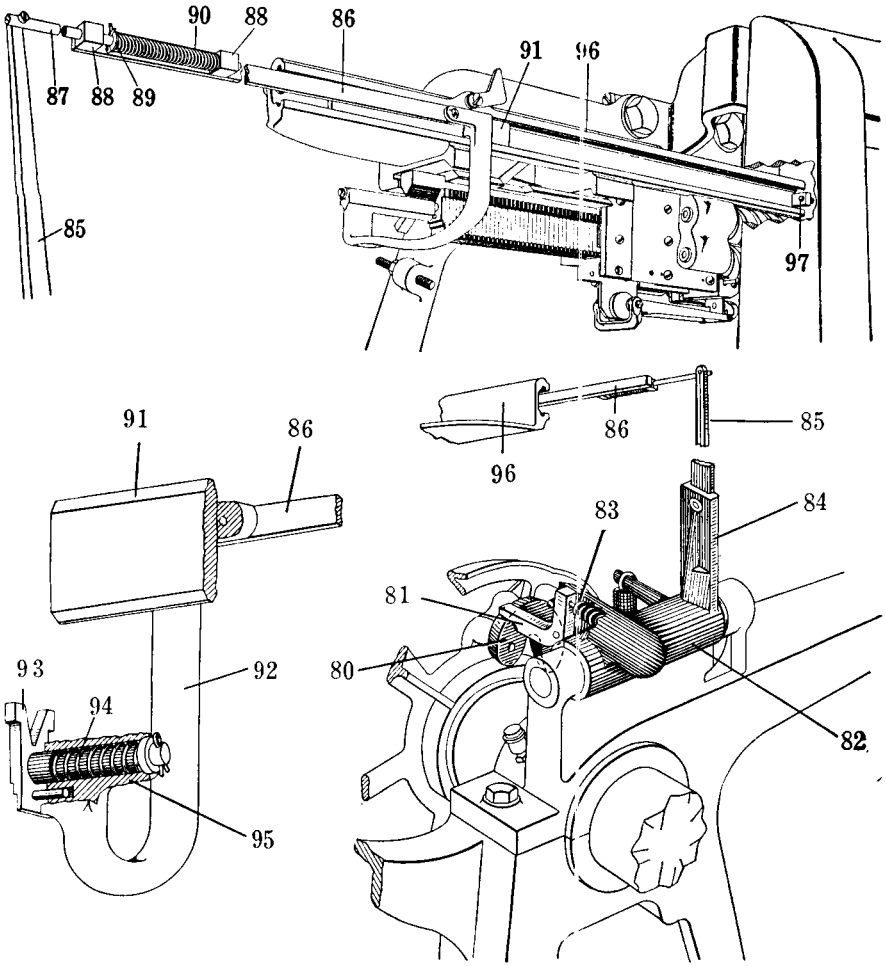


FIG. 12-17. This view shows the distributor shifter cam *80* mounted on the side of the mold turning cam casting. The cam *80* acts to move the distributor shifter slide toward the left (viewed from the front of the machine) by its action on a small bell crank lever, or rider *81*, which is hinged on the casting *82* fulcrumed on the mold turning arm bracket. The compression spring *83* between the vertical arm of the cam rider *81* and the hub casting *82* acts as a safety device in case the movement of the shifter slide toward the left, out of the distributor box is in any way obstructed. The arm *84* of the hub casting *82* has mounted on it the long steel distributor shifter lever *85* on the end of which is pivoted one end of the rod *87*. This rod *87* has its other end sliding in two bearings *88* which are part of the link *86*. The sliding rod *87* has a collar *89* fastened to it and spring *90* around it between the collar *89* and the right-hand bearing *88* on the link. This provides a cushioned pressure for the matrices while they are being pushed from the second elevator bar and through the distributor box. It also reduces wear on the vertical shoulders of the distributor box rails. The distributor shifter slide *91*, to which is attached the link *86*, has on it the hook-shaped arm *92*. The upturned end of the arm *92* carries the distributor shifter slide buffer *93* which is also provided with a buffer spring *94* inside the hub *95* on the end of the arm *92*.

attached to the distributor beam of the machine. This slide carries an arm on which is a spring-cushioned pusher in line with the matrices to be transferred. The shifter slide is connected by a spring link to the long arm of a lever fulcrumed on the mold turning arm of the machine. The short arm of this lever is spring-cushioned to the lever hub, and is in contact with a small flat steel cam fastened to the side of the mold turning cam casting. A long coil spring extending vertically downward just inside of the frame of the machine near the cam shaft does the work of pushing the line of matrices, and the cam acts against this spring while withdrawing the shifter slide toward the left, as above stated.

MAINTENANCE

This chapter dealing with the transfer mechanism should be very carefully studied for the reason that with improper adjustments the combinations or teeth on the matrices would be quickly damaged, and would affect the distribution of the matrices as they are carried along the distributor bar.

If a small piece of metal becomes wedged between the adjusting screw *103*, Fig. 2-17, and where it banks against the cross section at the lower part of the vise frame, it will interfere with the transfer. Also a screw may have worked loose in the second elevator bar where it is fastened to the bar plate. Sometimes the recasting block *105*, Fig. 2-17, may be accidentally moved part way under the elevator slide stop, or it may be left completely under. In either case it would interfere with the transfer.

When the machine is in the transfer position, see that the second elevator cam roll *64*, Fig. 11-17, is adjusted to clear the cam *70*, and also see that the cam is free from gum which might interfere with the cam roller. If after checking the above items the transfer does not work properly, it will be necessary to make some adjustments to correct the transfer alignment.

Adjusting the Transfer Alignment—Before making any adjustment, refer to Fig. 2-17, and see that the screw *102* is tight against the slide stop *101*. The screw may be loose, bent or broken; if it is damaged, replace it before attempting to make the adjustment. Also try a matrix in the first elevator jaw and see that the back jaw is straight and holds the matrix correctly without being too loose.

Start the machine and allow it to revolve until the first elevator slide is part way on its upward travel, then open the vise and insert a thin pi matrix between the elevator jaws near the right-hand end, close the vise, lock the spaceband lever so the transfer will not operate; and then have the machine revolve until the elevator slide comes to rest against the top slide guide, which will bring the machine to the transfer position. Then move the matrix in the jaw toward, but not quite against, the second elevator bar, and insert a strip of white paper in an upright position just to the left of the spaceband pawl. Place a light so it will shine on the left side of the paper, and by looking through the elevator jaws from the left-hand end, the reflection of light on surface of the white paper will clearly show the alignment of matrix teeth with the second elevator bar, and the adjustment must be made so that matrix teeth show a slight clearance at all points.

If the matrix teeth are too high to align with the second elevator bar, loosen the lock nut *104*, on the adjusting screw *103*, Fig. 2-17, and turn in on the screw until the elevator slide has been lowered enough to show light equally at the top and bottom of the teeth. Reverse the movement of the adjusting screw if the matrix teeth are too low. After the height of the elevator slide has been correctly set, hold the head of the adjusting screw *103* with a pair of pliers to keep it from moving when the lock nut is tightened.

After the elevator slide has been adjusted to the proper height, see that the matrix teeth show light equally at the front and back.

After the machine has had considerable use the second elevator bar plate may show a slight wear on its front surface; to compensate for this wear there is an adjusting plate *30*, shown in Fig. 4-17, resting against two adjustable bushings *33*, through which the screws *32* pass to hold the plate in place; after the screws *32* are removed, the bushings may be turned in the direction to bring the second elevator bar in alignment with the matrix teeth. In most cases it will be found necessary to turn the adjusting screws out to move the adjusting plate farther back. All these adjustments must be carefully made and if correct, the light will show evenly between each matrix tooth.

While the machine is still in the transfer position, test the intermediate bar *10*, Fig. 2-17, to see that it has the correct setting after the transfer adjustment has been made. Move the matrix the entire length of the elevator jaws and see that there is a slight clearance between the matrix teeth and the bottom of the bar *10*, and also see that the pawl *11* is free and in line with the second elevator bar.

The intermediate bar *10* is held in place with two screws *13*, and its top banks against two adjusting screws *14*. If the bar is to be raised, turn out slightly on the adjusting screws *14*, loosen the screws *13*, and press the bar upward against the adjusting screws while the other screws are being tightened.

To have the transfer operate smoothly, the matrix retaining pawls *4* and *5*, must have an equal amount of tension; if one is stronger than the other, the matrices are apt to be forced sideways when they pass the pawls.

The pawl on the back jaw of the first elevator is fastened with two small screws, which must be entirely removed to release the pawl. The pawl on the front jaw has a long slot at one end, and to remove it use a long thin screwdriver and pass it through the hole shown at *57* in the elevator slide, Fig. 3-17, which will bring the screwdriver in line with the screws which bind the pawl. Turn out slightly on the screws and pawl can easily be withdrawn without removing screws. To get even tension on the pawls it may be necessary to bend them with pliers.

Another important point is to have the transfer slide finger *21*, Fig. 4-17, perfectly straight. The edges must be straight to press squarely against the matrices when the transfer is being made.

On all late model machines the line stop *114* is automatically carried to the right by the line stop transfer rod *34*, shown in Fig. 5-17. The line stop should move freely so as not to interfere with the transfer action or retard the movement of the line of matrices and spacebands as it enters the elevator jaws. Fig. 9-17 shows the action of the transfer mechanism, and the means of adjusting the transfer slide as shown in Fig. 4-17, to bring it the proper distance of 5⅝″ from the left-hand side of the intermediate channel at which position it will come beyond the left-hand end of the releasing lever *16*.

Adjusting the Transfer Lever—Fig. 9-17 shows how the spaceband lever *42* is connected to transfer lever *36* with a turnbuckle *43* having eyebolts with right- and left-hand threads to adjust the position of the spaceband lever, but the movement of the turnbuckle has no effect on final adjustment of transfer lever.

When an adjustment is to be made with the turnbuckle it can be done from the front of the machine by using a punch or a short steel rod that will pass through the hole as shown in the enlarged view of the turnbuckle *43*, and can be adjusted by reaching the hand back at the left-hand end of the keyboard.

It will generally be found that if the left-hand side of the transfer slide finger is slightly beyond the intermediate bar the setting will be nearly correct.

When the transfer lever is correctly set the distance between the transfer slide

finger *21* and the left-hand end of the intermediate channel front plate *31* should measure 5⅝", as shown in Fig. 4-17.

If adjustment is necessary, have the machine in normal position. Loosen the two screws in the split cam lever *40*, Fig. 9-17. To loosen the front screw it will be necessary to have a very thin open-end wrench, or if that is not available, remove the line delivery air chamber to expose the end of the front screw and use a socket wrench. Push the latch *58* in front of the spaceband pawl *53*, Fig. 10-17, so that it will lock. Then adjust the turnbuckle *43* in the direction to move the pawl to the left until it strikes the latch, then continue to move the turnbuckle in the same direction as before and it will be noticed that the transfer slide will be moved to the left far enough to give the 5⅝" distance. Move the split cam lever *40* until the roll *41* is against the cam and tighten the two screws for a permanent setting.

After the transfer lever adjustment has been completed adjust the turnbuckle back until the spaceband lever pawl will carry the spacebands into the box, but do not adjust it so that the spaceband pawl will be too far away from the latch, for the reason that when recasting a 30-em line there might be enough movement of the transfer slide to allow the transfer finger *21* to strike the end matrix. The latch usually should just about clear the pawl.

Adjusting the Transfer Safety Pawl—When the transfer of a line of matrices is about to take place, the cam shaft revolves until the roller *41* which is connected to the transfer lever comes in contact with the automatic safety pawl buffer *48*, the end of which comes against an adjusting screw *49*, in the safety pawl *47*. A test should be made to see that the safety pawl is not carried too far beyond the vertical lever pawl *50*.

The automatic safety pawl carries also two stop screws which should be adjusted, as described in Chapter 21, to provide stops to limit the motion of the automatic safety pawl in both directions. Their adjustments should be tested; and when they are correct, the screw *49* should be adjusted.

When the machine is in the transfer position with a 30-em line of matrices in the first elevator jaws, release the spaceband pawl latch and allow the lever to go across very slowly and see that the transfer finger *21* carries the last matrix well onto the second elevator bar before safety pawl is tripped to start machine.

If the automatic should trip too soon, and a line of matrices should be slow in transferring, the automatic might trip off before the last matrix was carried in place on the second elevator bar and it would place a heavy strain on the bar as it started to rise, as some of the matrices would still be in the first elevator jaws.

To correct this, move the adjusting screw *49*, in the safety pawl *47*, farther away from the end of the buffer *48*, which will allow the matrices to go farther on the second elevator bar before the automatic trips off.

Adjusting the Spaceband Lever Pawl—Fig. 7-17 shows an enlarged view of the spaceband lever pawl *53*, and it fulcrums on a pin which passes through a split bushing which is compressed and held in place with the screw *59*, and is adjustable from front to rear. The narrow straight surface on the bottom of the pawl should be in line with center bar of the spaceband box.

If the spaceband lever pawl *53* fails to carry the spacebands from the intermediate channel, especially if a large number of bands have been used in the line, the spring *60* may be broken or too weak.

Adjustment and Care of the Second Elevator Bar—If the matrices should be carried too far in the transfer and drop off the right-hand end of the second elevator bar, examine the delivery pawl *107*, Fig. 11-17, the upper end of which

extends into the second elevator bar plate *28*, and see if the return spring *112* is broken or too weak to hold the pawl in its downward position.

The pawl *107* is fastened to the second elevator bar *29* with a stud *108*, which fits in a hole at the right-hand end of the elevator bar and is held in place by a pin *109*, which passes through the bar *29* and the end of the stud. If necessary to replace the pawl, drive out pin *109*, after which stud can be withdrawn; when new pawl is in place, see that it works freely after the pin *109* is driven tight.

The second elevator bar is fastened to the bar plate with two screws. If for any reason it is necessary to take the bar off, remove the screws and force the bar from the bar plate and remove the hinge pin *111* which connects the bar to the second elevator link *26*, by sliding it to the right; in reassembling, the link must be passed through the bar plate before the hinge pin is put back, and when the bar is fastened to the bar plate the upper end of the pawl must be between the spring and the end of the pawl plunger *113*.

When the second elevator has risen to its full height and is in position to transfer matrices to the distributor box, see that alignment is perfect between the second elevator bar and distributor box bar. Any roughness or unevenness on either bar at this point would have a tendency to destroy matrix combinations.

There are two guides for the second elevator to position it sidewise. The front side of the elevator bar plate near the center has a portion cut away for a distance of about $\frac{5}{16}$" and as it descends the notched portion fits over the second elevator guide *35*, Fig. 5-17, which brings it to the correct position. There is also a slot cut in the end of the second elevator lever *25*, Fig. 11-17, and this slot fits over a guide which is fastened to the back of the distributor shifter guide when the second elevator reaches the upper transfer position.

The two guides should receive a small amount of oil occasionally, applied with the finger tip, but the top of the second elevator bar plate and the seat where it rests when the machine is in normal position should be kept perfectly dry and clean. A small amount of graphite may be used occasionally if necessary.

Fig. 11-17 shows the second elevator starting spring *78*. The smoothness of the second elevator lever operation depends largely on the proper tension of this spring. When correct it helps the second elevator to start downward and it also cushions the second elevator lever on its upward travel. The spring can easily be changed when the machine is in the transfer position.

Care of the Distributor Shifter and Slide—Fig. 11-17 shows a line of matrices about to be transferred to the distributor box. It is very important that the bearing of the distributor shifter slide *91* and the groove in which it travels be kept clean and free from gum and oil. If any lubricant is needed use graphite.

At the right-hand end of the distributor slide guide *96* there is a block *97* which has an adjusting screw to form a stop for the distributor shifter slide. It should be adjusted to come just far enough to allow the matrix buffer *93* to carry a thin matrix to the distributor box lift.

The older machines have a ¼" round stop screw in place of the adjustable block *97*, and if the screw becomes bent or broken it should be replaced to prevent the distributor shifter slide from striking the distributor box font distinguisher block when lines are being recast when there are no matrices on the second elevator bar.

The tension of the spring *94* on the matrix buffer *93* must be strong enough to carry the matrices against the distributor box matrix lift after the distributor shifter slide has reached the stop screw on the block *97*.

The face of the shifter must be square and straight to carry the matrices evenly against the distributor box matrix lift.