

## CHAPTER 4

# Magazines and Escapements

**AS STATED** and briefly described in Chapter 1, a magazine is a storehouse for matrices—generally a font of matrices with the necessary fixed spaces.

In the course of the development of the Linotype various types and sizes of magazines have been used, but because this book is intended to describe machines which are of current manufacture, only the latest types of magazines and other parts closely related to them will be considered in this chapter.

There are two general types of magazines—main magazines and auxiliary or side magazines, all of the same general construction, but of different sizes and shapes to serve their special purposes. Each consists of two brass or Linolite plates with channels cut in them for guiding the matrices. Each has side bars to separate the plates, other separating plates to add rigidity, and screws to fasten the parts together. Each also has cross bars underneath, and a guide bar, besides other banking surfaces to position it accurately on the machine.

### MAIN MAGAZINES

The main magazine is trapezoidal in shape, and the 90-channel magazine used on most machines has long been known as the "Model 5," because it was first used on the Model 5 Linotype. The magazine with 72 channels is often referred to as the "Model 20" magazine.

The channels cut in these magazines are not parallel, but converge toward the front, and are of different widths, governed by the thickness of the lugs on the

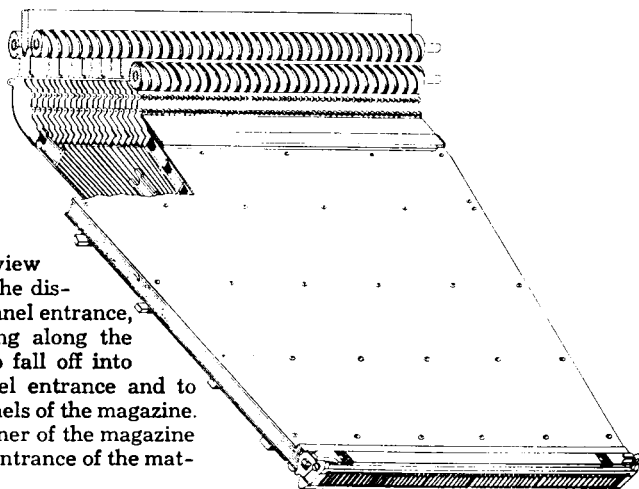


FIG. 1-4. Perspective view showing the magazine, the distributor screws, the channel entrance, and the matrices passing along the distributor bar ready to fall off into partitions of the channel entrance and to pass down into the channels of the magazine. The upper left-hand corner of the magazine is cut away to show the entrance of the matrices into the magazine.

matrices which are to run in them. They are  $\frac{1}{8}$ " deep, and are always .010" wider than the maximum matrix lug to allow the matrix to slide along freely. For the same reason there is  $\frac{1}{64}$ " clearance in the channel over the top of the lug on the reference side of the matrix when in the magazine, the character side of the matrix always being downward, toward the bottom plate of the magazine.

The Model 5 magazine has 91 channels for 90 different character and space matrices and an extra lower case "e" channel. The channels are spaced uniformly  $\frac{1}{4}$ " apart at the top, or rear, of the magazine and converge so as to make the bottom, or front, as narrow as reasonably possible.

The regular magazine for 72-character fonts is in every way like the Model 5 magazine except that the channels are not uniformly spaced but are spaced according to the variable set sizes of the matrices which it is designed to contain.

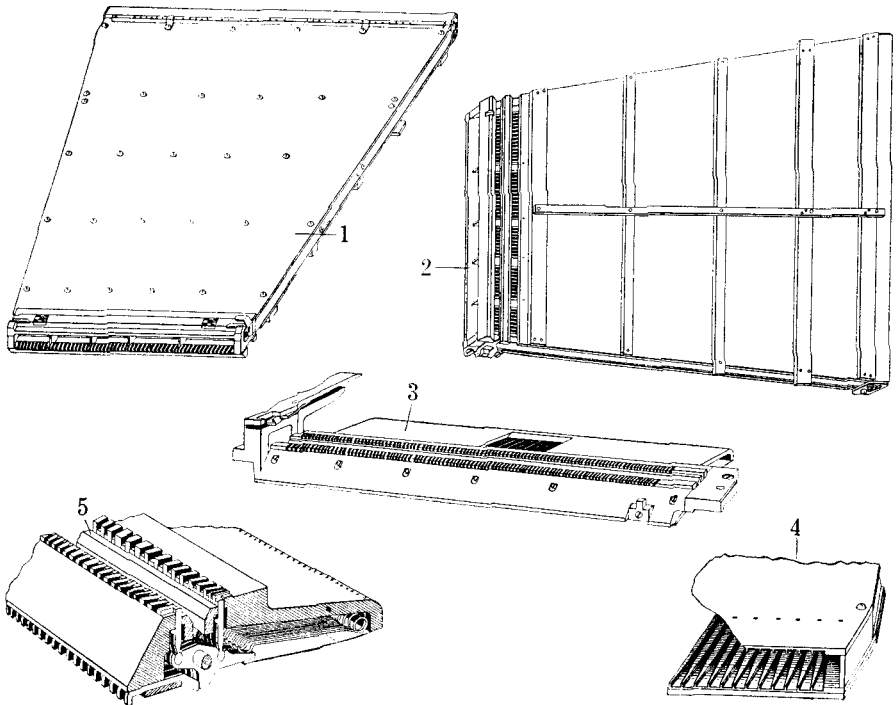


FIG. 2-4. A perspective view of the magazine which is most used in the different models of the Linotype is shown at 1. In this type of magazine the escapements are not fastened to the magazine, but are carried separately in a frame called the "escapement bar," shown in another view.

The under side of this magazine, with a light frame composed of a central bar and crossbars, is shown at 2. All of these bars are made of steel with the exception of the two at the lower end of the magazine, which are made of brass and serve as guides to bring the magazine to the proper position on the escapement.

A plan view of the escapement bar is shown at 3.

The upper part of the magazine with a portion cut away so as to show the channels made in V-shape at the top, is shown at 4.

A side view of the escapement bar is shown at 5. This bar remains on the machine and registers with and delivers the matrices from the magazines, which can be removed and replaced.

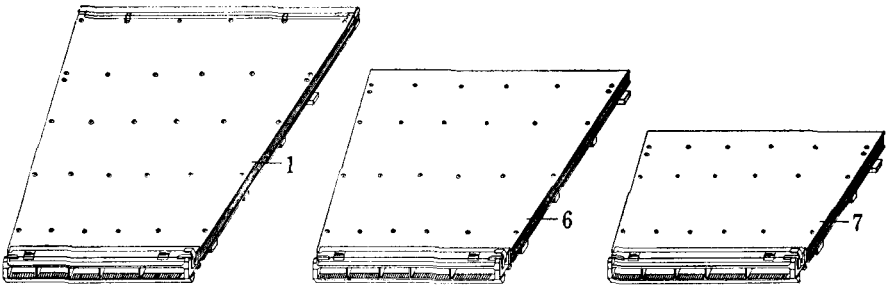


FIG. 3-4. A perspective view of a full length main magazine is shown at 1; a three-quarter length main magazine is shown at 6; and a one-half length main magazine is shown at 7.

A short or "split" magazine is actually a front portion of a main magazine, and is generally used for fonts of large matrices which fill a line of composition so rapidly that not many matrices of each character are required.

Of course, in the case of a short magazine, there must be attached to the magazine frame a section which when added to the length of the short magazine will equal the length of a standard magazine; and through the channels of which the matrices pass on their way from the channel entrance to the short magazine. This rear section is called the magazine entrance, and no matrices are stored in it.

### Multiple Key Rod Attachment

Because the lower case "e" is the most commonly used letter in our language, the main magazines on the Linotype have two channels for this character. They are at the extreme left side of the magazine in order that the matrices will be returned to the magazine as quickly as possible after being used. In long lines of composition of the smaller point sizes, many of these matrices are likely to be used. Matrices for the larger point sizes are often carried in short length magazines, one channel of which does not contain as many lower case "e's" as is required for some classes of composition.

The Multiple Key Rod Attachment, shown in Figs. 4 and 5-4, is thrown in or out of action by movement of the lever 40, mounted on the side of the spaceband chute. When the open end of this lever reveals "e-e," operation of the lower case "e" keyboard lever will cause matrices to escape alternately from both "e" channels of the main magazine. When the open end of the lever reveals "e," matrices will be released from the second "e" channel only.

In this latter case, the mechanism will appear as shown in the right-hand view in Fig. 5-4. Only the right-hand long multiple key rod 41 will be lifted, by being in contact with the top of the hook on the slide 42 when the slide is raised by the lower case "e" cam yoke.

When it is desired to release matrices alternately from both channels, the mechanism will appear as shown in the left-hand view in Fig. 5-4. A shelf 43 is riveted to the slide 42, and each of the multiple keyrods, right-hand and left-hand, carries a hinged reversing pawl 44 and 45. The right-hand multiple key rod 41 cannot be lifted by the top of the hook on slide 42, but is lifted by the upward movement of slide 42 because the projection 46 of the hinged reversing pawl 44 rests on shelf 43 of slide 42. Hinged reversing pawl 45 is held out of operation by the projection 51 contacting projection 48 on pawl 44.

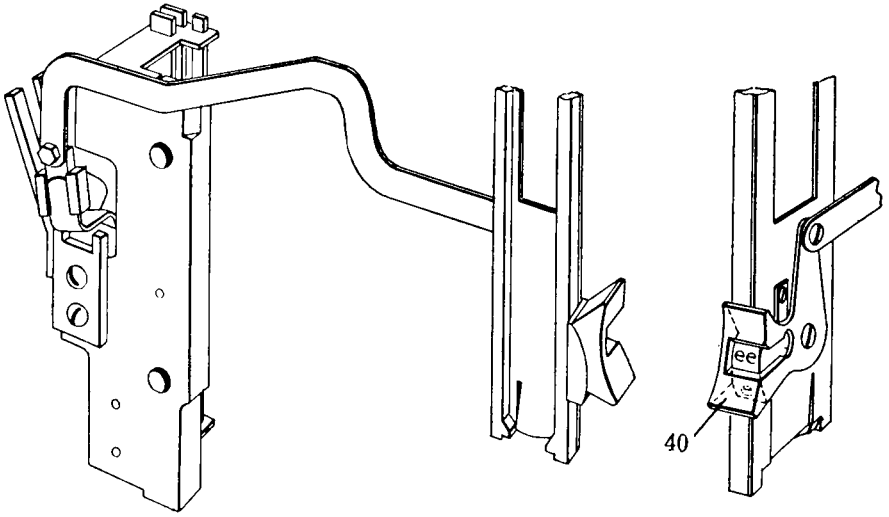


FIG. 4-4. Perspective views of the multiple key rod shifter lever handle. When the open end of the lever 40 reveals "e-e," matrices are released alternately from both "e" channels of the magazine. When the lever reveals "e," matrices are released from the second "e" channel only.

As the right-hand multiple key rod descends, the projections 48 and 51 act on each other so as to place projection 47 of reversing pawl 45 over the shelf 43 and hold projection 46 of reversing pawl 44 away from the shelf 43. This allows the left-hand long multiple key rod to be lifted by the next upward movement of slide 42. When the left-hand long multiple key rod descends, the projections 51 and 48 act upon each other to place projection 46 of reversing pawl 44 again over shelf 43 and hold projection 47 of reversing pawl 45 away from the shelf 43. Therefore, as the slide 42 is raised by the keyboard cam yoke, there will be a continuous alternation in the operation of the escapements on the two lower case "e" channels.

## AUXILIARY OR SIDE MAGAZINES

These are short or "split" magazines. They are rectangular in shape and their matrix channels are parallel to one another and parallel to the sides of the magazine.

There is also an upper section through which the matrices pass on their way from the channel entrance to the magazine; on many machines, there is but one such rear section, or magazine entrance. It is set so as to be stationary on the machine while the front sections containing the matrices are raised and lowered to register with it and the escapement mechanism and assembler front. On some later machines equipped with multiple auxiliary magazines, there are several such rear sections—one for each of the auxiliary magazines on the machine. These entrances, or rear sections, are raised or lowered in unison with the auxiliaries (front sections containing the matrices) as they are shifted, and the condition may be then considered as quite similar to that existing on the main side of the machine when split magazines are in use. On still other machines, full length auxiliaries are used.

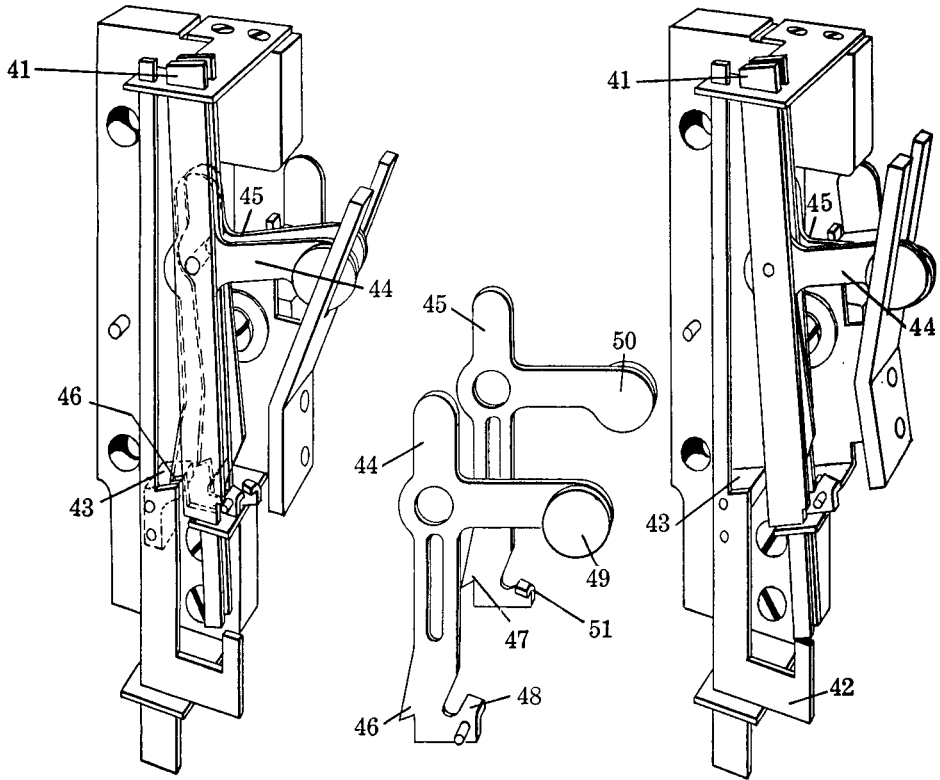


FIG. 5-4. View showing in detail the mechanism of the multiple key rod attachment.

## Shifting Mechanism

When making a change to bring a different magazine into operation, it is done in the following manner:

At the right of the operator there is a control lever 16, Fig. 6-4. Before the crank handle 17 can be turned, the pointer of this lever must be moved to the left for the main magazines, or to the right for the auxiliary magazines. This movement operates the automatic matrix guards 19 and also the magazine frame banking blocks 20, and a pawl which engages one of three ratchet teeth at the rear of the main elevating member to automatically lock each magazine frame when it reaches the proper position. This procedure differs from that used on models previous to Blue Streak Linotypes where a slight pressure is first needed on the elevating crank handle to relieve the weight from banking blocks, similar to 20, before the matrix guard lever can be depressed to allow a shift to be made.

The crank handle 17 is connected through a universal shaft to a worm gear, and one complete turn of the crank handle will turn the worm 18 through one revolution, which will rotate the worm wheel through an arc of approximately one-third revolution, raising or lowering the magazine frame two and one-half inches.

Further information on the shifting mechanism will be found in Chapter 27.

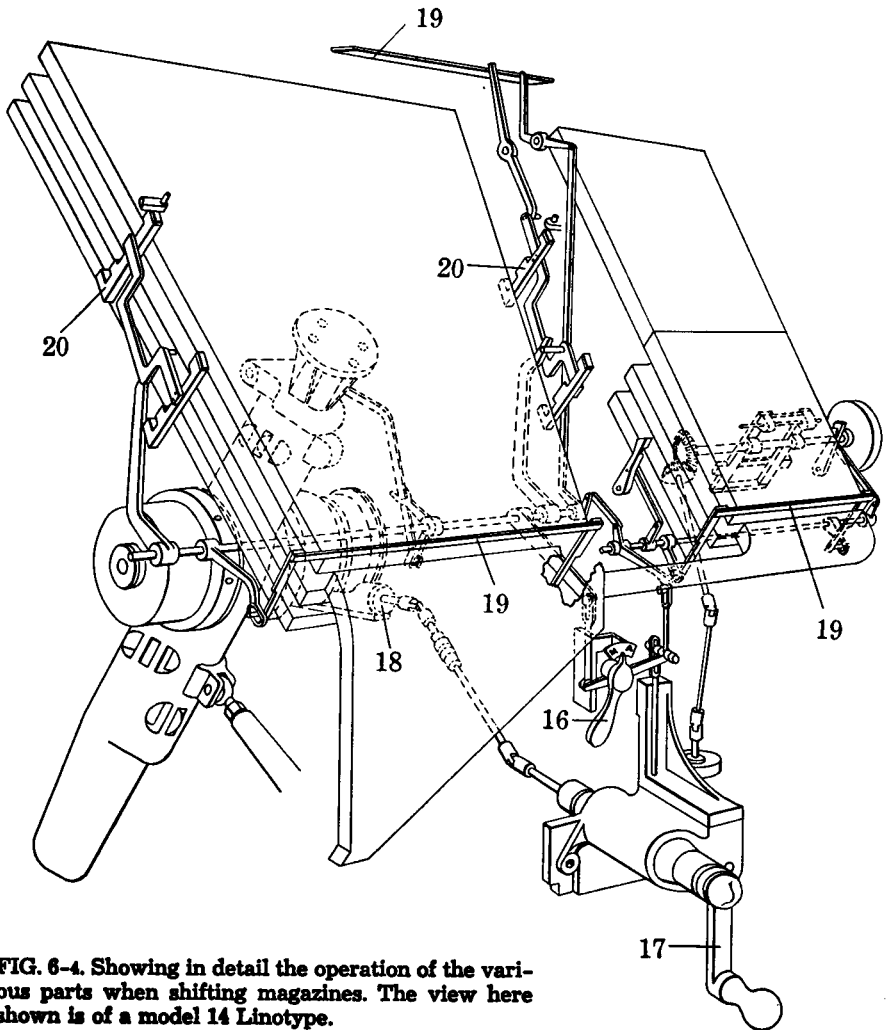


FIG. 6-4. Showing in detail the operation of the various parts when shifting magazines. The view here shown is of a model 14 Linotype.

### Escapements

On all Linotypes, except Model 9, the escapements which release the matrices from the magazine are substantially the same, whether they are fixed on the magazine or contained in an escapement bar.

As shown in Fig. 8-4, the action of the escapement is very simple. The rearward motion of the plunger 11, by rocking the verge 8, withdraws the top of the front pawl down to the level of the bottom of the magazine channel and thereby allows the top lug of the first matrix to pass over it, and the matrix to escape from the magazine. At the same time the rear pawl has been raised so as to be in the path of the top lug of the second matrix, which can follow the first matrix only until thus stopped. The distance between the lugs on the matrix is great enough so

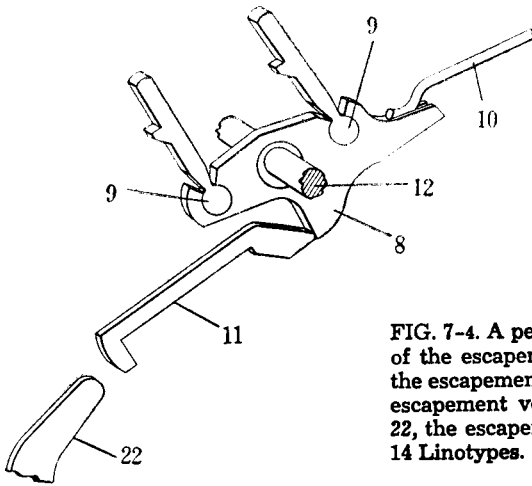


FIG. 7-4. A perspective view of the working parts of the escapement. 8 is the escapement verge; 9, the escapement pawls; 10, the verge spring; 11, the escapement verge plunger; 12, the fulcrum rod; 22, the escapement lever, as used on Model 8 and 14 Linotypes.

that when the pushing action of the plunger ceases and the parts are being returned to their normal positions by the action of the verge spring 10, the front pawl rises to form a stop for that same surface of the upper lug of the second matrix while the rear pawl descends so that the lug can slide over its top surface.

A perspective section through the main magazines of Models 8 and 14 is shown in Fig. 9-4 which indicates the train of action from the keyboard cams up through the escapement levers 22 to the escapements, and illustrates how those levers operate the escapements. On many earlier model Linotypes the keyboard rods, similar to 21, act directly on the escapement verges. A bail box, described later in this chapter, is used on the Model 14 but is omitted from Fig. 9-4 for the sake of simplicity.

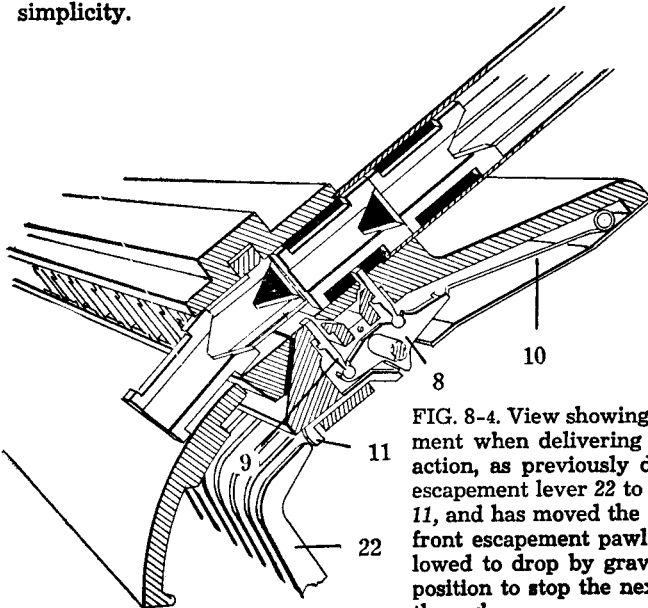


FIG. 8-4. View showing the action of the escapement when delivering a matrix. The keyboard action, as previously described, has raised the escapement lever 22 to push against the plunger 11, and has moved the verge 8 to pull down the front escapement pawl 9, and the matrix is allowed to drop by gravity. The back pawl is in position to stop the next matrix from following through.

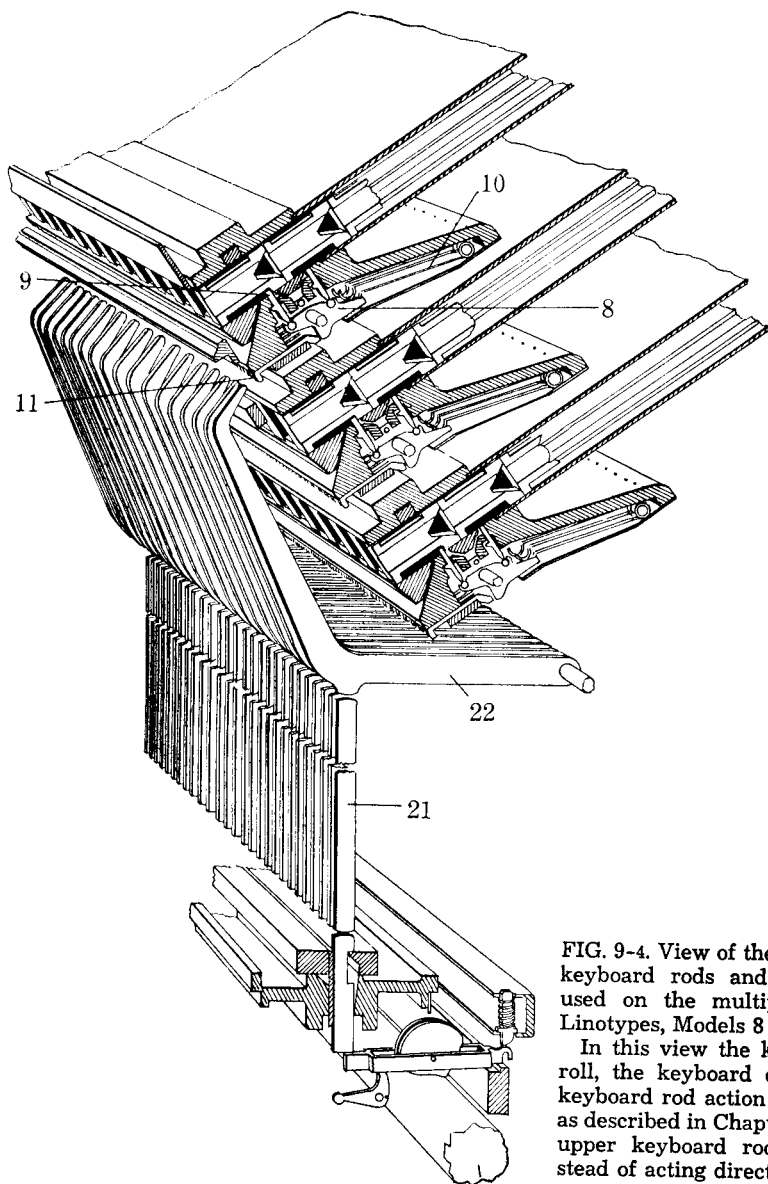


FIG. 9-4. View of the action of the keyboard rods and escapements used on the multiple magazine Linotypes, Models 8 and 14.

In this view the keyboard cam roll, the keyboard cam, and the keyboard rod action are the same as described in Chapter 3. 21 is the upper keyboard rod, which instead of acting directly on the escapement, acts on escapement lever 22. This escapement lever works against plunger 11, called the "escapement verge plunger," which operates the verge 8, operating the pawls 9.

This view shows how the escapement levers 22 act upon the escapements when the top magazine is in operating position.



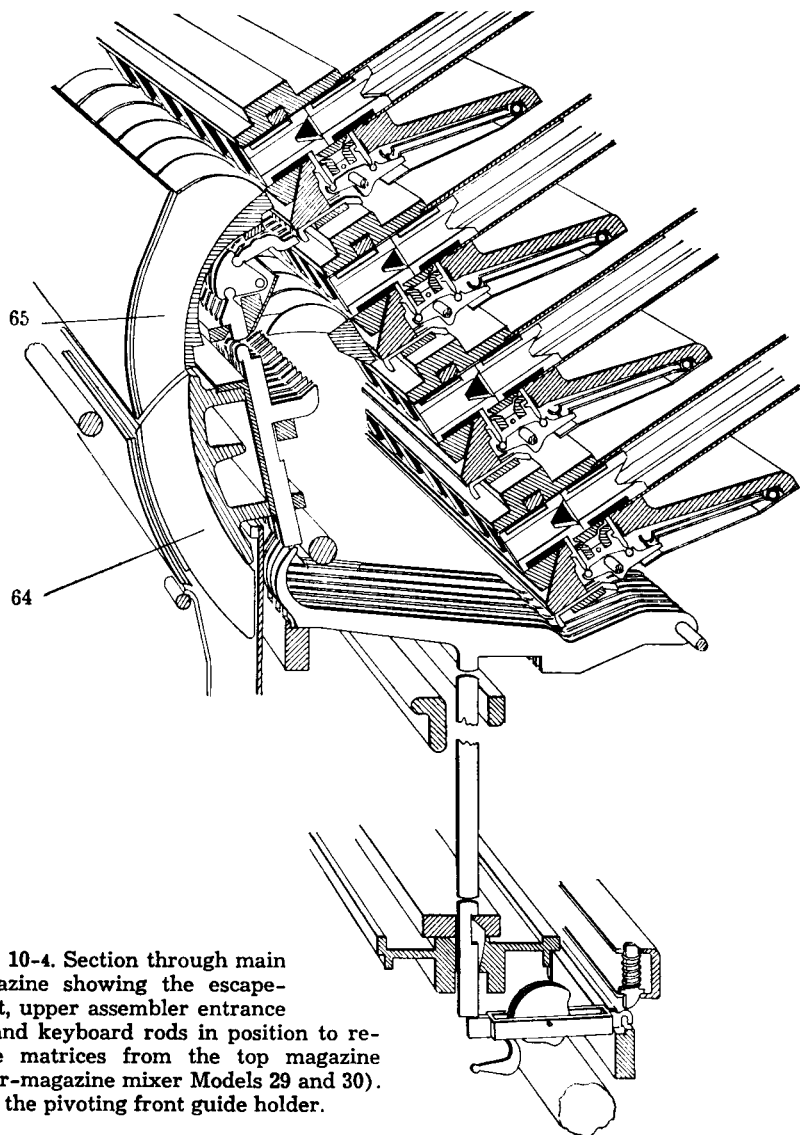
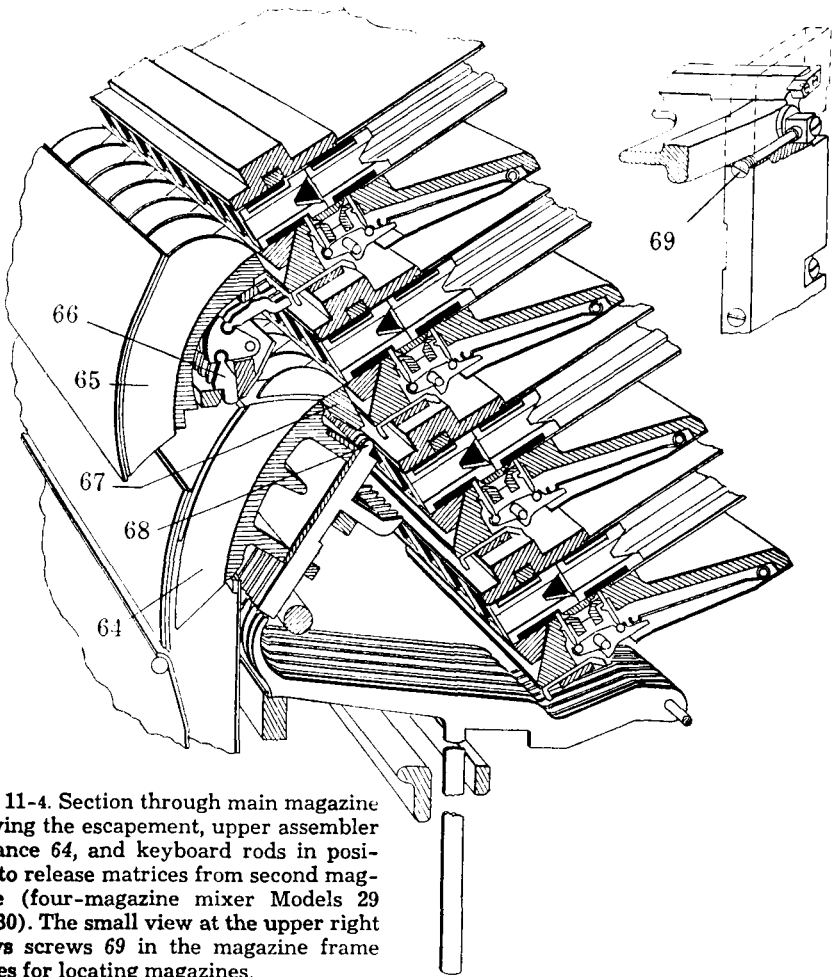


FIG. 10-4. Section through main magazine showing the escapement, upper assembler entrance 64, and keyboard rods in position to release matrices from the top magazine (four-magazine mixer Models 29 and 30). 65 is the pivoting front guide holder.

Figs. 10-4 and 11-4 are perspective sections through the main magazines of Models 29 and 30, and show not only the escapement mechanism with the subsidiary levers and slides on these models, but also the upper assembler entrance 64 and the pivoting front guide holder 65.

Fig. 12-4 is a section through the auxiliary magazines of a four-magazine Model 30 and illustrates the bail box by which the auxiliary magazines are connected to the Linotype single keyboard which releases matrices from both main and auxiliary magazines at the operator's will.



**FIG. 11-4.** Section through main magazine showing the escapement, upper assembler entrance 64, and keyboard rods in position to release matrices from second magazine (four-magazine mixer Models 29 and 30). The small view at the upper right shows screws 69 in the magazine frame guides for locating magazines.

Fig. 13-4 is a perspective section taken through the main magazines of Models 27 and 28; Fig. 15-4 is a similar section through the main magazines of "Two-in-One" Models 31 and 32; Fig. 18-4 is a section through the main magazines of Models 8 and 14, shown as a "Two-in-One" 72-90 character model.

Other chapters of this book contain more detailed descriptions of the current Linotype models and describe the variations of them for special purposes.

It is well to consider here certain characteristics of all "Two-in-One" models, especially as to their assembler entrances and the parts between the keyboard and the magazine escapements which make possible the escapement and assembling of matrices from both 72- and 90-channel magazines.

The Model 14, 72-90, which is a "non-mixer," is equipped with a revolving assembler entrance, or "front." The Models 29 and 30, which allow mixing of matrices from two adjacent magazines, are equipped with two separate fronts, each equipped with a different layout of assembling guides.

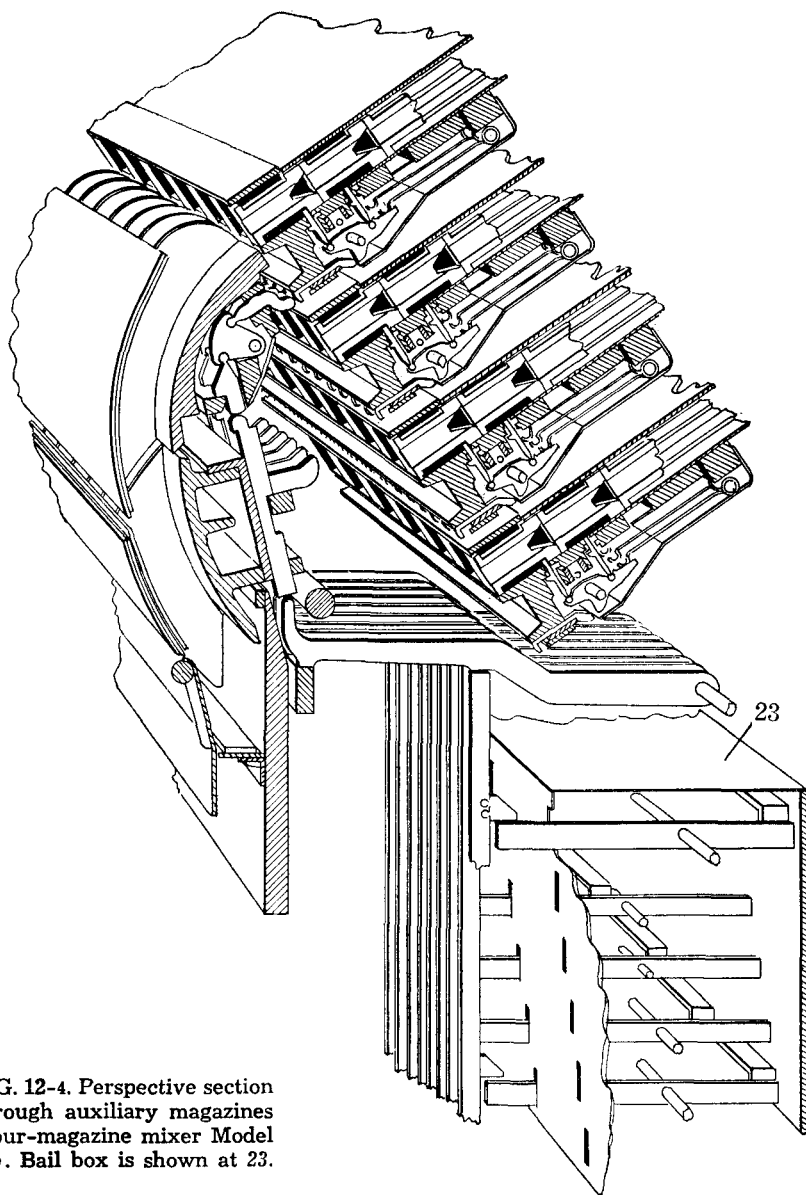


FIG. 12-4. Perspective section through auxiliary magazines (four-magazine mixer Model 30). Bail box is shown at 23.

All of this has already been shown. The parts between the keyboard and whatever form of subsidiary levers are employed above the keyboard key rods will now be considered.

All 72-90 character models have two banks of keyboard key rods, shown in Fig. 18-4 as 72 and 90. They also have a bank of intermediate levers 15, which are pivoted on a frame 14 which is movable forward and rearward so that the short sections 27 of the rods carried on the keyboard itself can lift keyboard rods either 72 or 90.

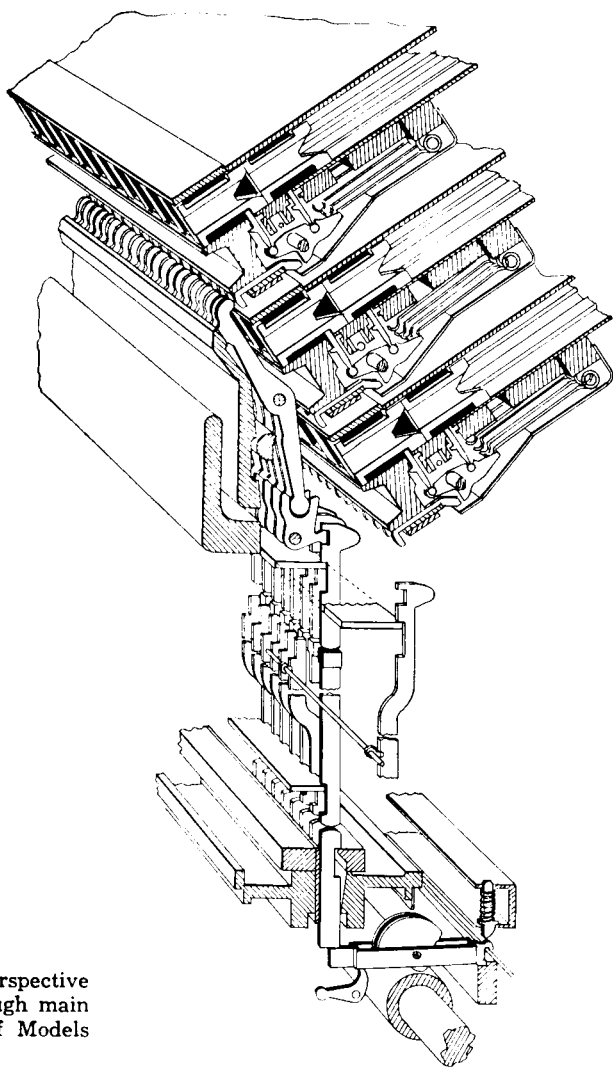


FIG. 13-4. Perspective section through main magazines of Models 27 and 28.

The keyboard rods 72 have their lower ends in line with the lower ends of keyboard rods 90, when viewed from the front; their upper ends are offset sidewise so that any one of the 72 bank will not necessarily operate the same escapement lever 22 that is operated by the one of the 90 bank which is raised by the touch of the same key on the keyboard when the bank of levers 15 is moved rearward to act upon keyboard rods 90. By this means, and by the addition of wider striking surfaces on the front of some of the escapement verge plungers 11, Fig. 7-4, on the escapement frames of the 72-channel magazines, the touch of any character key on the keyboard will start the assembly of a matrix of that character from either the 72-channel or the 90-channel magazine, as desired.

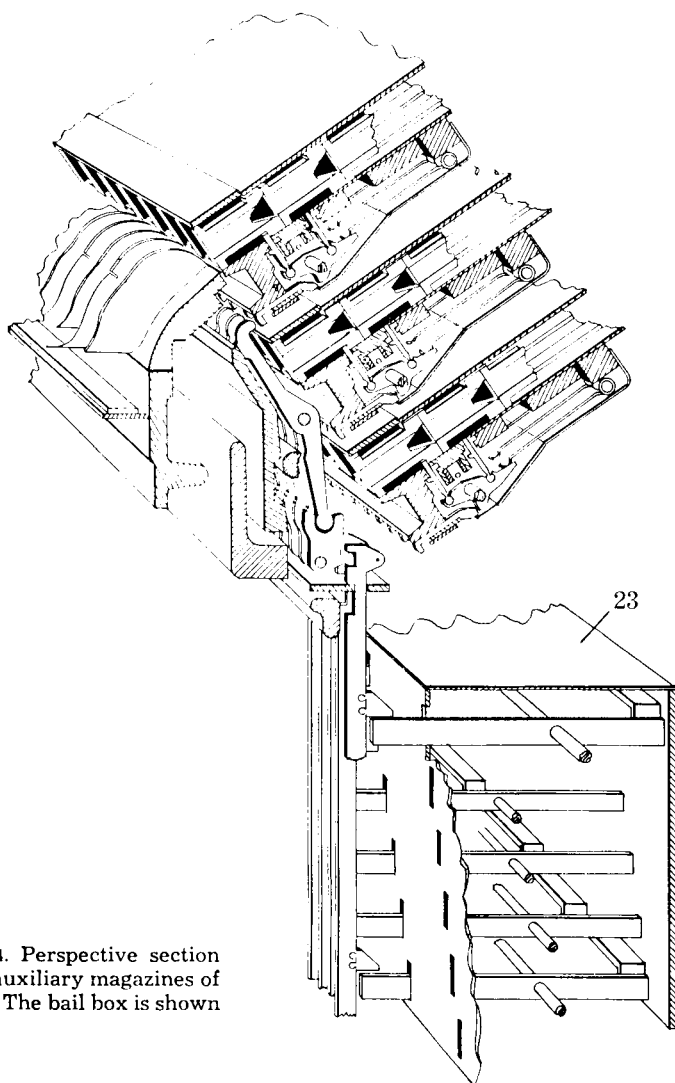


FIG. 14-4. Perspective section through auxiliary magazines of Model 28. The bail box is shown at 23.

The usual position of the magazines on the "72-90" Models 8 and 14 is the 72-channel magazine at the top, and the two 90-channel magazines in the middle and lower positions, but this may be changed to have two 72-channel magazines at the top and a 90-channel magazine at the bottom. In all cases the two magazines with the same number of channels must be adjacent and not separated by the middle magazine. The mechanism by which the "Two-in-One" Models 8 and 14 are changed for operation from the 72- to the 90-channel magazine, is shown in Fig. 18-4 and described in Chapter 26.

By referring to Figs. 11-4 and 6-25 the proper settings of the upper, or oscillating, assembler entrance 64 and of the distance between magazines and the intermediate assembling guide extension holder 67 can be clearly explained.

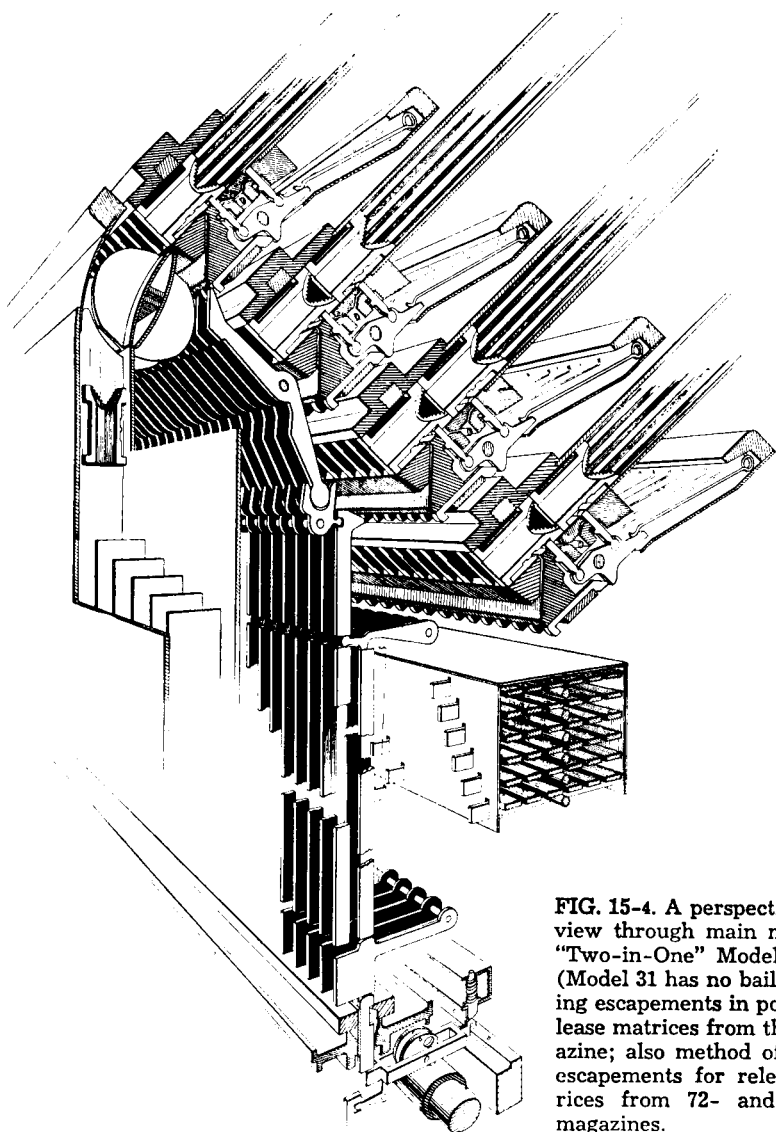


FIG. 15-4. A perspective sectional view through main magazines of "Two-in-One" Models 31 and 32 (Model 31 has no bail box) showing escapements in position to release matrices from the first magazine; also method of alternating escapements for release of matrices from 72- and 90-channel magazines.

When the entrance 64 swings forward for operation of the top magazine, as shown in Fig. 10-4, the push rods 68 must align with the tappets 66 so that the tips of the rods 68 do not strike either side (front or back) of the slots in which the tappets ride. In Fig. 6-25, the set screw located above lever 49 acts upon that lever to limit its upward travel and, thereby, the forward oscillation of entrance 64. Screwing down of the set screw stops the forward swing of 64 earlier, while backing-off the screw permits the entrance 64 to swing forward farther. Before the set screw is adjusted, its lock nut must be loosened; after the adjustment the lock nut must be tightened securely.

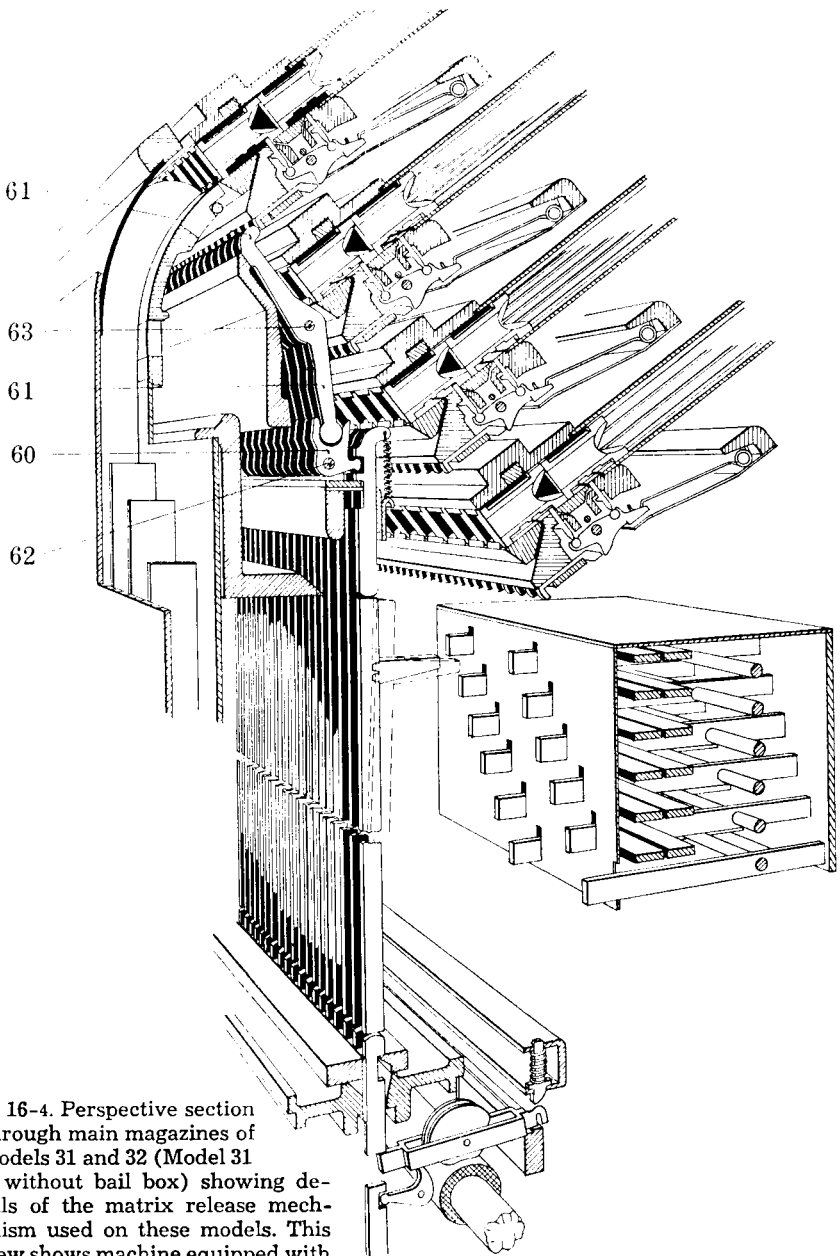


FIG. 16-4. Perspective section through main magazines of Models 31 and 32 (Model 31 is without bail box) showing details of the matrix release mechanism used on these models. This view shows machine equipped with four 90-channel magazines.

As shown, the lengths of the lever arms of the operating lever 60 and the escapement lever 61 are proportioned to maintain a ratio of one-to-one, and the fulcrum centers 62 and 63 are located so that the operating action of each lever arm is divided to move an equal distance each side of its fulcrum center line. This assures easy action and minimum friction on working surfaces and reduces wear on rubber roll.

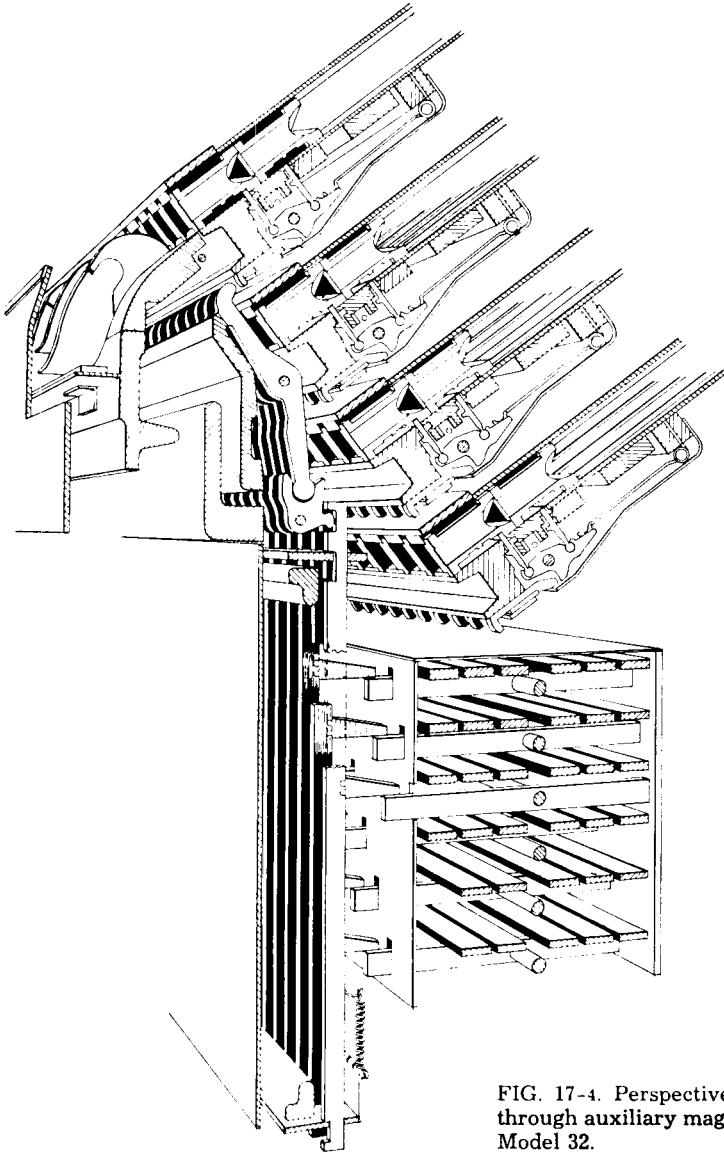


FIG. 17-4. Perspective section through auxiliary magazines of Model 32.

On its inward motion to the position for operating the lower magazine of the pair being used, as shown in Fig. 11-4, the frame which carries entrance 64 banks against rubber blocks mounted in steel holders. The rubber blocks are adjustable up and down to limit the inward motion of the entrance 64 so that it will come to rest at the point where the top of its curved top surface, over which matrices slide, is just a trifle below the top surface of the holder 67. Then there is no overhanging edge on which matrices can stick or be delayed. A distance of about .020" is generally considered as the proper "drop-off" at this point.



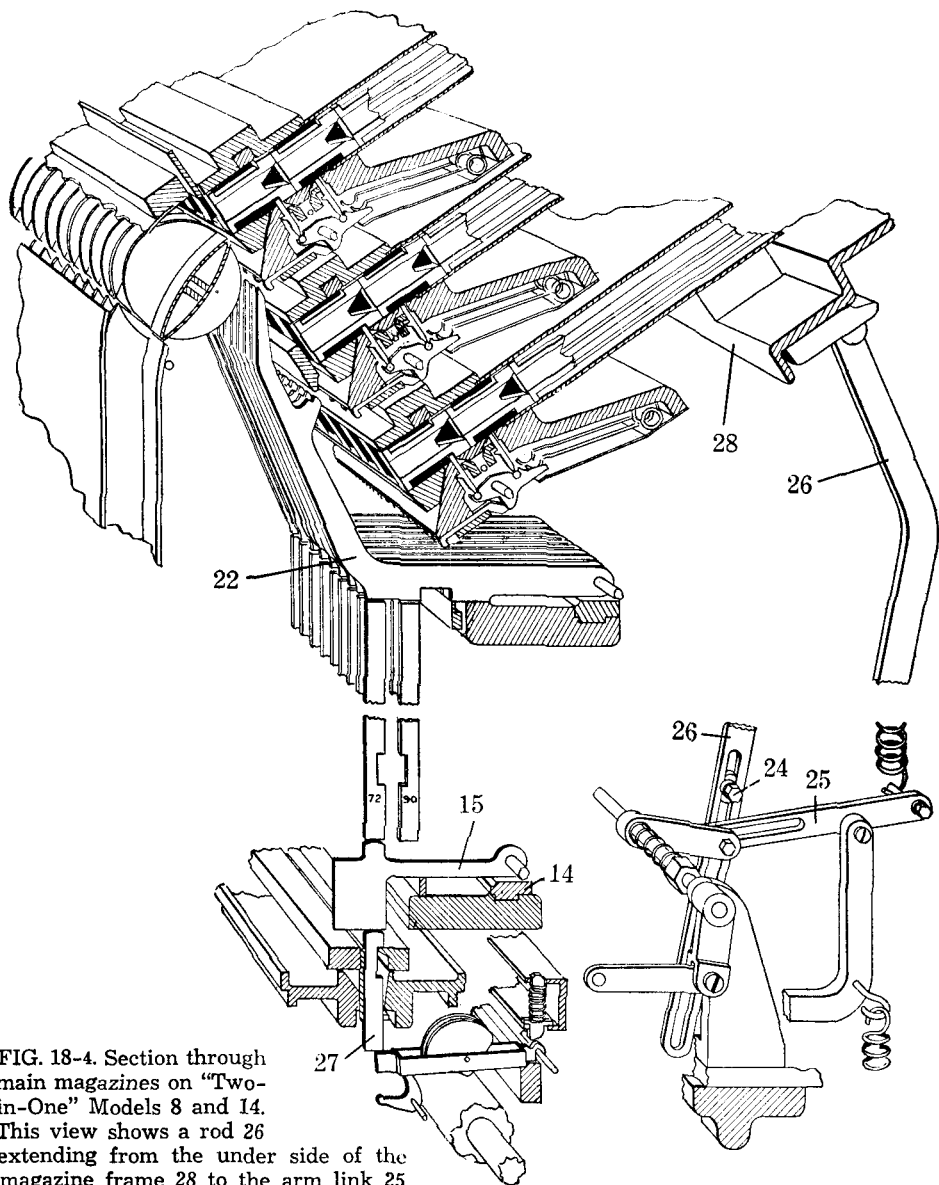


FIG. 18-4. Section through main magazines on "Two-in-One" Models 8 and 14. This view shows a rod 26 extending from the under side of the magazine frame 28 to the arm link 25. The filler piece 24 is set in position to hold the bank of levers 15 forward under the 72-channel upper key rod. When the pressure is released at link 25, the bank of levers 15 is moved back to be underneath the 90-channel key rod. This action is entirely automatic after the filler piece 24 is permanently set to correspond to positions of the magazines.

The speed of both the inward and outward motions of the entrance 64 is controlled by an air cushion, shown in Fig. 6-25, so that shock and vibration are eliminated.

The small view in Fig. 11-4 shows the screws 69 by which the proper distances between the magazines and the intermediate assembling guide extension holder 67 on Models 29 and 30, or the distances between the magazines and the front guide holder on Models 31 and 32, are adjusted.

This setting, as regards the bottom magazine, is carefully made in the factory with the help of necessary gauges and tools by the proper application of the Blue Streak Shift mechanism and related parts. Upper magazines may be adjusted for a clearance of about .020" between the front of the magazines and the holder 67 or the front guide holder—depending on the model of the Linotype—by regulation of the screws 69 in the magazine frame guides on either side of the magazine.

### Bail Box

Every model Linotype which is equipped with auxiliary magazines has an appliance which is known as the bail box (see 23, Fig. 14-4). The use of this device

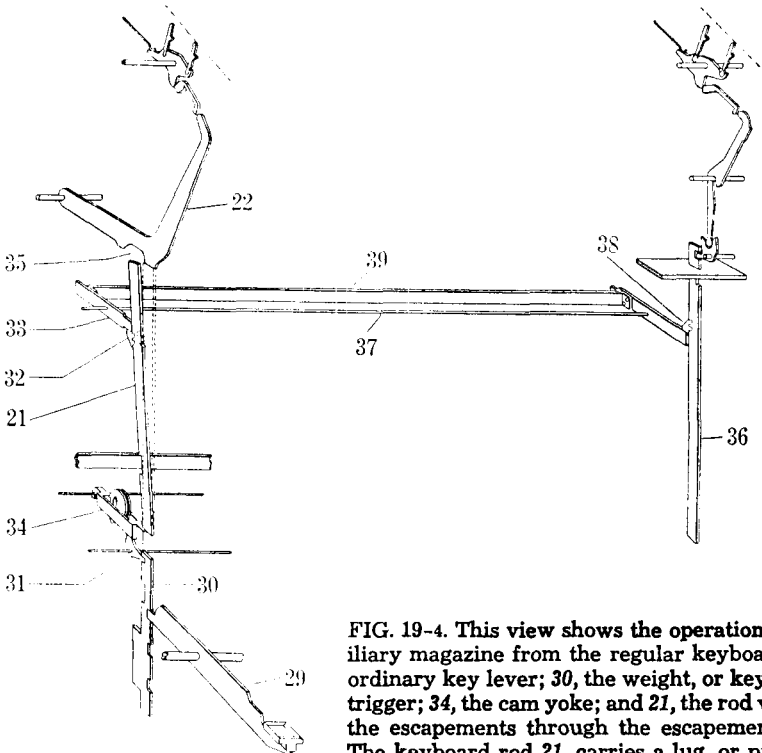


FIG. 19-4. This view shows the operation of the auxiliary magazine from the regular keyboard. 29 is the ordinary key lever; 30, the weight, or key bar; 31, the trigger; 34, the cam yoke; and 21, the rod which works the escapements through the escapement levers 22. The keyboard rod 21, carries a lug, or projection 32. The regular position of the keyboard rod 21 is indicated by the dotted lines. When in this position the operation of the keyboard rod escapement lever and the escapement is exactly the same as used in ordinary operation.

makes it possible to operate the auxiliary magazines from the regular keyboard.

When it is desired to operate the auxiliary escapement, the rods 21, Fig. 19-4, are moved toward the rear of the machine by means of a shift key at the left of the keyboard near the spaceband key. When in this position, the lug 32 will be under the lever 33 which is mounted on a rod 37, and this lever is connected on its rear side by a piece 39, which runs to the auxiliary side of the machine.

This device, consisting of the lever 33, and the connecting bar 39, forms a frame adapted to fulcrum on the rod 37. This movable frame is called a bail. It is evident that when the rod 21 rises under the action of the cam yoke it will lift the bail, causing the lever 38 to raise the rod 36, which will operate the escapement for the auxiliary magazine. At this time, the rod 21 does not operate the lever 22, as there is a notch 35 made in the lever into which the rod passes at the time the auxiliary is being operated. A touch of the shift key will bring all parts back to normal position to operate main magazine only.

## MAINTENANCE

**Bail Box**—If it should become necessary to detach the bail box from the machine, it may be done by removing the two screws at each end of the box, moving it away from the dowels and sliding it out from the end. On some models it will be necessary to remove the distributor driving pulley and possibly the grease cup, so as to make the necessary clearance.

When replacing the box, the levers must be locked to hold them down in place so as not to interfere with the auxiliary escapements. Use  $\frac{1}{8}$ " locking rods supplied for this purpose and have them long enough to cover all the levers.

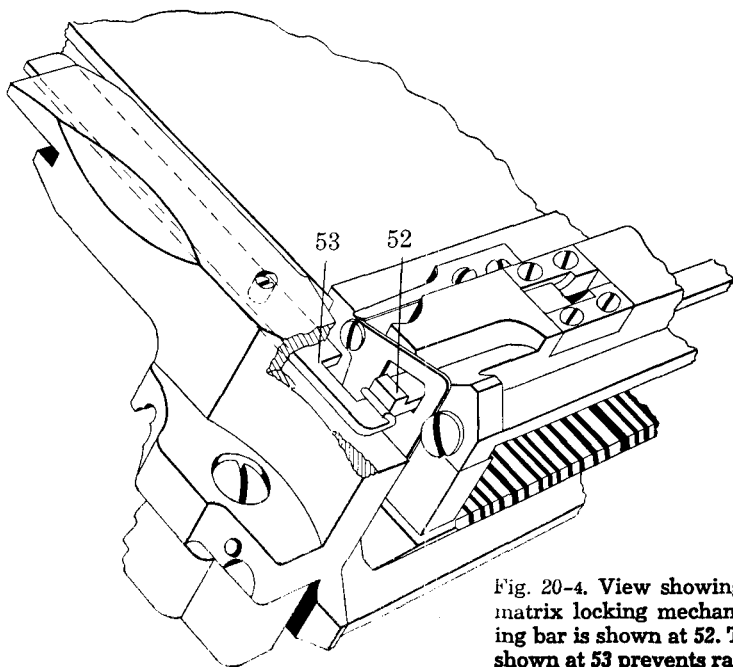


Fig. 20-4. View showing the magazine matrix locking mechanism. The locking bar is shown at 52. The safety latch shown at 53 prevents raising the magazines unless they are locked.

**Magazines**—When desiring to remove a main magazine from Model 8 or 14, the top magazine may be taken off while in operating position, after the locking bar 52, Fig. 20-4, has been pushed to the left to lock the matrices and release the safety latch 53. Apply magazine support arms 57 to the shaft 58, Fig. 21-4, and pull forward on the support arms, then lift magazine slightly and slide it forward.

To change a middle magazine, turn the crank handle 17, Fig. 6-4, to bring the magazine to the operating position, then pull forward on the elevating handle 56, Fig. 21-4, to raise the upper magazine out of the way. After the magazine is locked it may be removed by attaching the support arms and sliding out the same way as the top magazine.

When removing the bottom magazine, turn the crank handle 17 to bring it to operating position, then turn in the elevating links 54 to engage the pins 55 and pull forward on the elevating handle 56 to raise the upper magazines so that the lower one can be lifted. Lock the magazine and lift with the support arms and remove in the manner described above.

On the latest four-magazine-model Linotypes, the magazine support arms are designed as a part of the machine and are permanently attached. To provide for the removal of the fourth magazine, additional elevating links and pins as shown at 54 and 55 in Fig. 21-4, have been added so that this magazine is removed by following the same procedure as described above for the removal of the bottom magazine from the three-magazine models, 8 and 14.

When putting a magazine back on the frame, care should be used not to slam it too hard as the matrices may be jarred and fall through the opening in the magazine, thus preventing the magazine from seating properly on the escapement. Before the magazine is lowered to the escapement, see that the lugs of the matrices are in the right position.

While the machine and matrices are new it will be found necessary to brush the magazines quite often, using the regular magazine brush (I-158), until all oil and grit have been removed. The cleaning will then have to be done less frequently, as by continual use, the magazine channels and matrices will polish themselves unless an excessive amount of oil is used on the machine where it might come in contact with the matrices.

If oil should get in the magazine, wash with alcohol and brush thoroughly, and allow to dry before running the matrices in; but do not wash unless absolutely necessary. Do not use graphite in the magazine or on the matrices, for if they are kept clean it will not be necessary.

**Escapement**—Fig. 7-4 shows the details of the escapement. The principal points of wear are: first, the top of the verge pawls 9 where the matrices come in contact with them. After considerable use it will be noticed that a small indentation will be made at this point and if worn too much it will interfere with the free travel of the matrices. This is especially true of thin matrices such as the commas, thin spaces, and periods, as these characters are used frequently.

If there is trouble at this point, replace the pawls, and examine the matrices to see that the lugs are not too narrow. If the lugs are too thin, they are apt to get alongside the matrix that is following and wedge fast.

Another source of trouble may be due to friction at the point where plunger 11 comes in contact with the verge 8. If a notch is worn in the verge, the plunger may bind when pushed back, and the spring 10 will not return the pawls to their normal position, or there might be too much friction to allow the pawl to be forced low enough to release the matrix. Also examine the pawl spring 10 to see that the end where it comes in contact with the verge 8 is not worn too flat to slide freely in the groove.

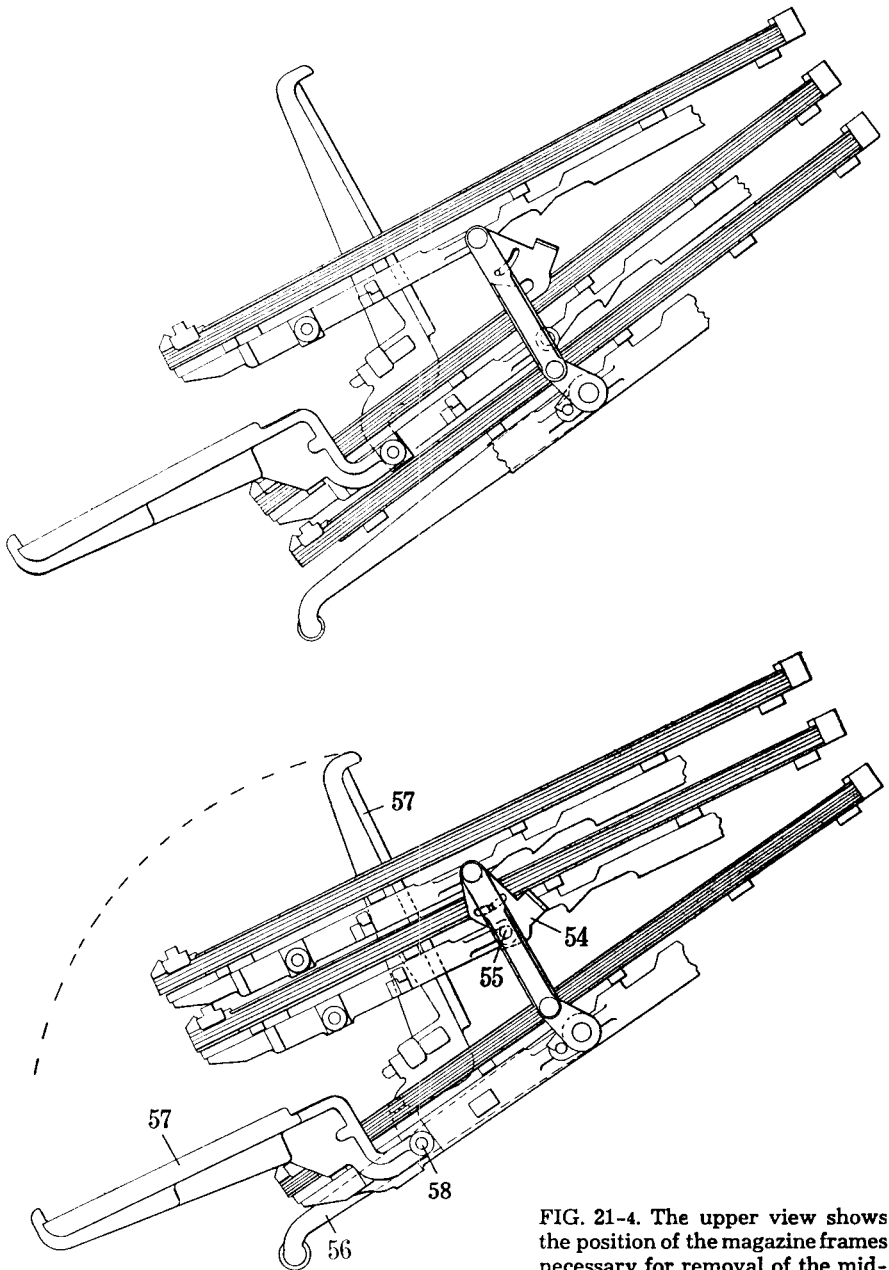


FIG. 21-4. The upper view shows the position of the magazine frames necessary for removal of the middle magazine from Models 8 and 14.

The lower view shows the position of the magazine frames necessary for the removal of the bottom magazine

A simple way to temporarily overcome this friction if the wear is not too great, is to take the point of a soft lead pencil and rub it over the front edge of the verge 8 where it comes in contact with the rear end of the plunger 11. This will give it a coating of graphite in its best form and will sometimes last for a long while. The front end of the plunger, where it comes in contact with the escapement lever, may be treated in the same way, especially if rust spots show.

When the escapement levers come in contact with the plungers, there is a slight sliding motion, and to reduce the friction, place some graphite on the finger tip and rub over the points of the levers when the lower magazine has been raised to the operating position. Do not use oil on the ends of the plungers as it will eventually work back into the verge rack and cause the plungers to bind.

The escapement rack is fastened to the magazine frame by a screw at each end, and is located with dowels. About once a year it should be removed from the machine in order to clean the plunger slots. The plungers are held in place by a brass strip screwed to the escapement rack. After this strip has been taken off, remove the plungers, being careful to keep them in order so that when they are replaced they will be in their original positions.

The rotary wire brush described in Chapter 2 may be used to good advantage for cleaning the plunger slots, and it may also be used for cleaning the grooves on the reverse side of the escapement rack, through which the matrices pass over the escapement pawls. After the plungers have been reassembled, polish the ends that come in contact with the escapement levers.

When necessary to replace an escapement verge, have at hand a rod the exact size of the fulcrum rod 12, Fig. 7-4, and when the fulcrum rod is withdrawn to release the verge, follow up with the other rod, which will hold the verges in place until the fulcrum rod is in position. Before the new verge is put in place, see that it fits freely on the fulcrum rod, and try the verge pawls in their openings to see that they do not bind.

When putting in a new verge, the spring 10 should also be replaced, as the end may be worn flat and cause it to bind in the verge groove.