

CHAPTER 3

The Keyboard

THE LINOTYPE KEYBOARD carries ninety keys, arranged in six rows of fifteen keys each. Each button is attached to the end of a lever. Each row of fifteen key levers is pivoted upon a round rod, which is supported by the sides of the keyboard and two supports inside. The key lever is shown in Fig. 1-3. For the sake of convenience, the keybuttons are arranged in three colors—the black, at the left-hand of the operator, being the characters of the lower case; the blue buttons in the center, the points, figures and special characters; and the white buttons at the right, the caps. These buttons are sometimes made of a larger size than usual, so that they may contain two, and even three, characters. A different style of keybutton is used for some of the many languages set on the Linotype.

The key levers are of six different lengths, but all of them are pivoted upon the round rods at the center of the distance from the keybutton to the end of the lever. The key lever is reduced in size at the opposite end from the keybuttons so that a lug or projection fits into a notch in the keyboard bars. This keyboard bar 3, Fig. 1-3, answers two purposes. By its weight it returns the key lever after the finger is removed from the keybutton. Also, at the upper end of this keyboard bar, there is a notch into which the rounded end of the trigger 4 registers. This is also shown in Figs. 2, 3, 4 and 5-3.

Referring to Fig. 2-3, when the keybutton is touched and the keyboard bar 3 has risen, rocking backward the trigger 4, it allows the keyboard cam 5, carried by the keyboard cam yoke 8, to drop upon the keyboard rubber roll 9. This is shown in Figs. 3, 4 and 5-3. The keyboard cam 5 has teeth in part of its edge, and when these teeth come in contact with the rubber roll 9, the cam 5 is caused to revolve, which carries upward the cam yoke 8 which is pivoted at one end, and the other end of this cam yoke 8, coming up under the reed 6, causes the reed to rise vertically. The first part of this action is shown in Fig. 3-3 and the second part of the action is shown in Fig. 4-3. It will be plain that if the operator has removed his finger from the keybutton, and the keyboard bar 3 has returned the trigger to its place, as shown in Fig. 5-3, when the keyboard cam is lowered, on account of the shape of the cam 5, the keyboard yoke 8 will rest upon the trigger 4 as shown in Fig. 5-3; or in other words, it will be again in normal position. The keyboard cam 5, on account of its momentum, will revolve until the pin 7 in said cam comes against the stop 10. Cam 5 remains motionless until the keybutton is again touched by the operator.

A general view of the Linotype keyboard and a description of the functions of its various parts have already been given in Chapter 1; but it is essential for the purpose of this book that they should be considered in detail so that they may be studied and thoroughly understood.

The release of a matrix from the magazine is the final result of a sequence of operations begun by the touch of a keybutton, which requires very little effort

on the part of the operator. Thereafter, the motive power of the machine itself supplies the energy for the remainder of the operations.

The train of mechanism from the keybutton to the escapement is logically divided into three general divisions:

1. The keyboard itself, a self-contained unit, easily swung out into the open for examination, cleaning, repair or replacement.
2. The keyboard rods or "reeds" which serve as a connecting link between the keyboard and escapement verges.
3. The actual escapement for the matrices.

First let us consider the keyboard itself, one train of working parts being shown in Fig. 1-3.

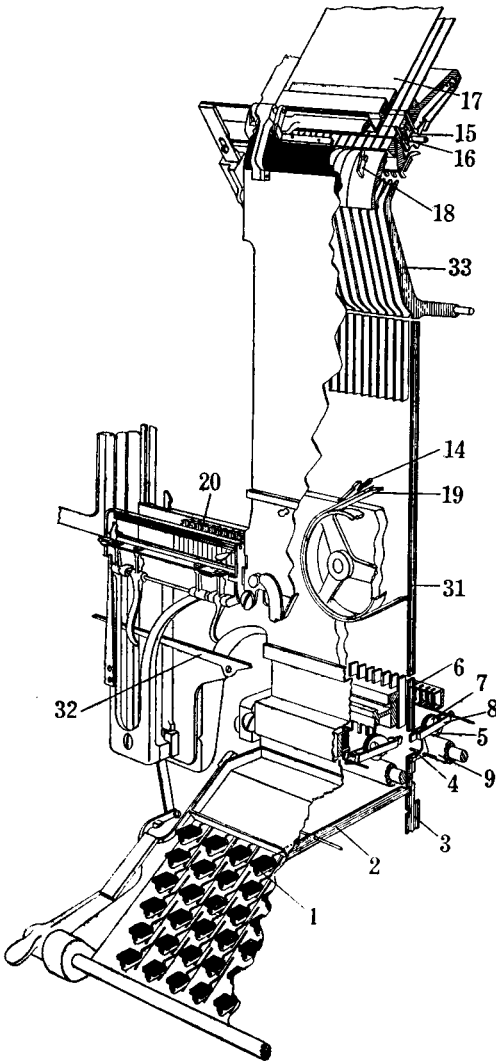


FIG. 1-3. Perspective diagram of the assembling mechanism of the Linotype machine. 1 is the keybutton; 2, key lever; 3, key weight, called the keyboard bar; 4, trigger; 5, keyboard cam; 6, keyboard rod, commonly called the key reed, or the reed; 7, keyboard cam stop pin; 8, keyboard cam yoke; 9, keyboard cam roll; 14, matrix on assembler belt; 15, escapement verge; 16, escapement pawl; 17, magazine; 18, matrix; 19, matrix delivery belt; 20, assembler stick, or the assembling elevator; 31, long key rod; 32, spaceband buffer finger; 33, escapement lever.

When the short lower portion of the key rod 6 is raised, it lifts the key rod 31, which is directly over it; and that, in turn operates the escapement lever 33 which actuates the escapement, releasing the matrix from the magazine.

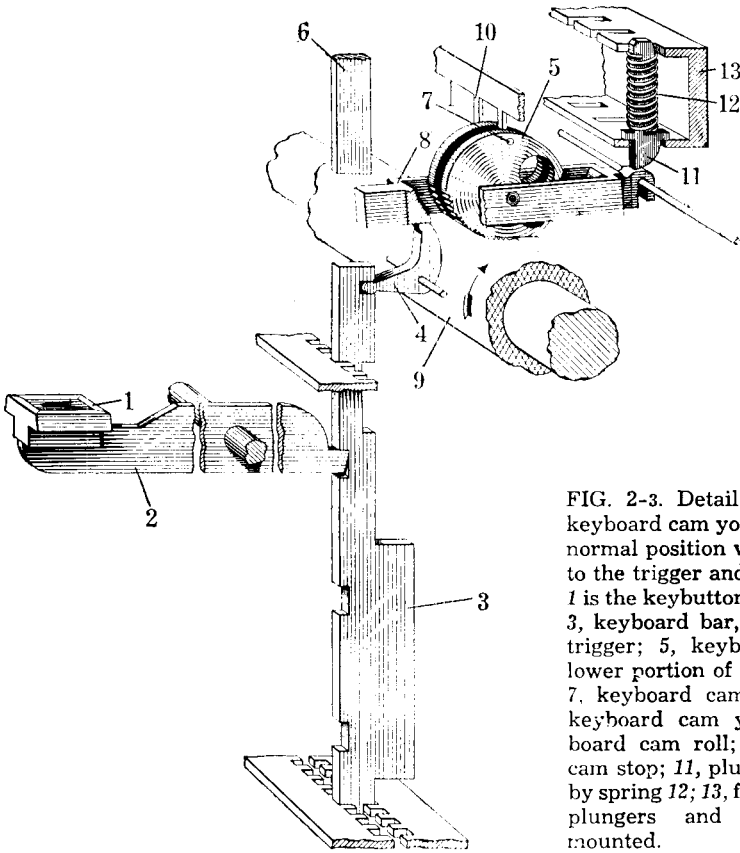


FIG. 2-3. Detail showing the keyboard cam yoke standing in normal position with reference to the trigger and the cam roll. 1 is the key button; 2, key lever; 3, keyboard bar, or weight; 4, trigger; 5, keyboard cam; 6, lower portion of keyboard rod; 7, keyboard cam stop pin; 8, keyboard cam yoke; 9, keyboard cam roll; 10, keyboard cam stop; 11, plunger operated by spring 12; 13, frame in which plungers and springs are mounted.

It will be noted that all moving parts are guided sidewise and the projecting portion of the keyboard bar 3 rests at the bottom upon a guide to limit its downward motion. The vertical motion of the keyboard bars is about $\frac{1}{8}$ ". The weight is light, so that the work required of the operator in depressing the key button with his finger will be as easy as possible.

The sequence of actions thus far described is: the touch of the key button with the finger; the raising of the keyboard bar 3; the tripping of the trigger 4; the fall of the keyboard cam yoke 8, bringing the cam 5 upon the revolving rubber roll; the revolution of the cam, causing the yoke 8 to rise, lifting the key rod which operates the escapement, which will be described in detail in Chapter 4.

When the key button is depressed, the bar 3 is raised and the trigger 4 is moved out from under the lip of cam yoke 8 and allows it to drop, bringing the cam 5 in contact with the revolving rubber roll 9, which in turn raises the key rod 6 to operate the escapement mechanism.

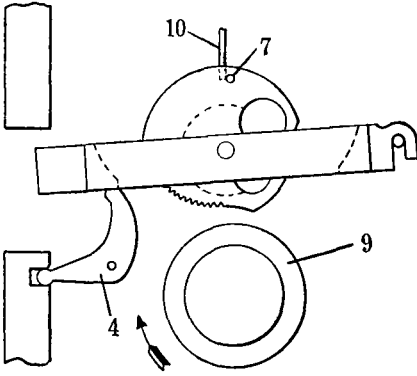


FIG. 3-3. Diagram of keyboard parts in normal or non-operating position; keyboard cam stop pin 7 held against the stop 10, because the cam is overbalanced on the side toward the trigger 4.

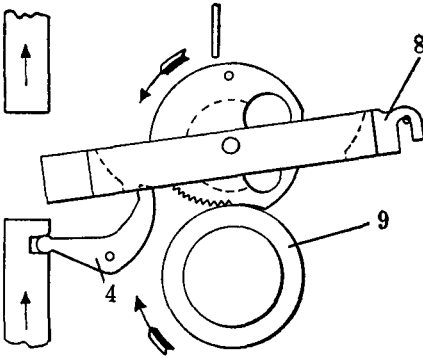


FIG. 4-3. Further detail of keyboard parts, showing the keyboard cam yoke 8 released by the trigger 4 and fallen down toward the keyboard cam roll 9. The revolution of the keyboard cam roll shown by the arrow, carrying upward the keyboard cam yoke 8.

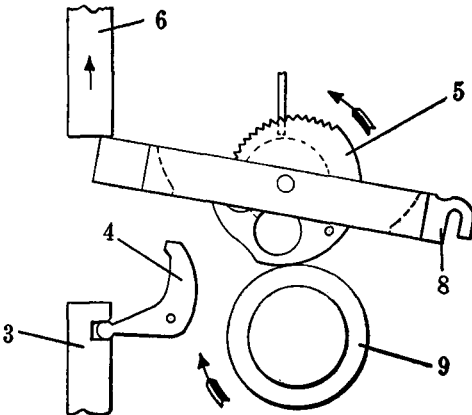


FIG. 5-3. Diagram of the keyboard parts showing the cam 5 revolved by the keyboard cam roll 9, so as to raise the keyboard cam yoke 8 to its highest position, thereby raising the keyboard rod 6 to its highest position. This figure also shows the trigger 4 returned to its normal position by the gravity of the keyboard bar 3.

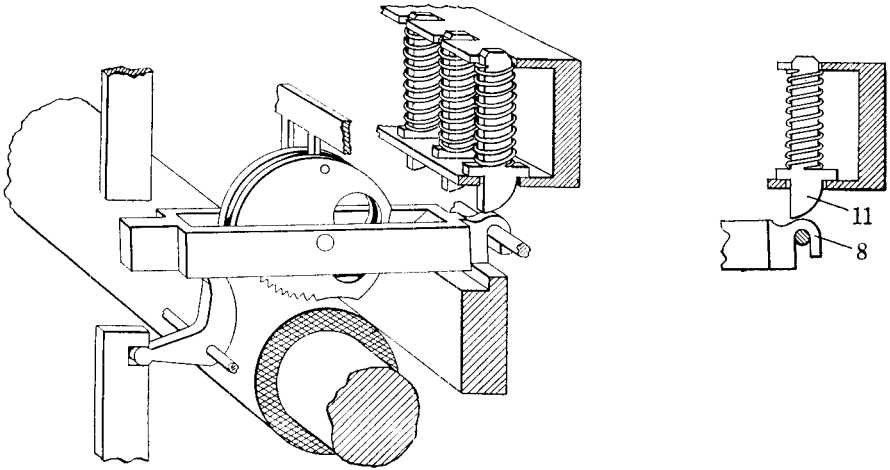


FIG. 6-3. Detail showing the keyboard cam yoke in normal position with reference to the trigger and the cam roll.

A small view shown at right indicates clearance between the plunger 11 and the cam yoke 8. This clearance should be about $.010''$. If the plunger 11 rests upon the cam yoke 8, the fall of the cam yoke when released by the trigger will be retarded, causing transpositions.

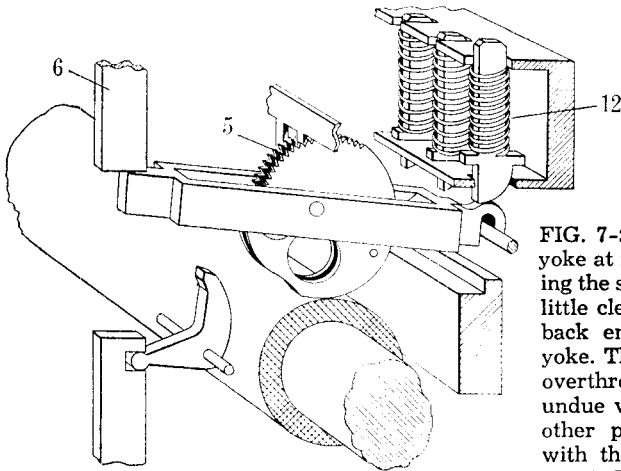


FIG. 7-3. View of keyboard cam yoke at its highest position, showing the spring 12 compressed and a little clearance in the hook at the back end of the keyboard cam yoke. This clearance is called the overthrow and provides against undue wear of the rubber roll or other parts, or for interference with the action of the keyboard cam 5. In case of serious interference with the action of the escapement which would prevent the normal rise of the key rod 6, the spring 12 is further compressed and thus acts as a safeguard to prevent damage to parts.

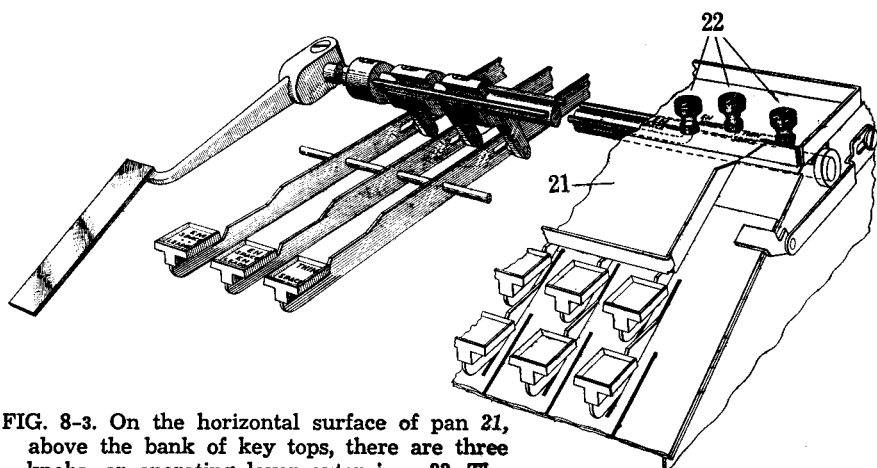


FIG. 8-3. On the horizontal surface of pan 21, above the bank of key tops, there are three knobs, or operating lever extensions 22. The slides which are operated from these knobs cause the operation of the spaceband key to release a spaceband and any one or any combination of the em, en, or thin space at the same time. When these knobs are all moved to the right as shown above, the spaceband lever operates normally. The combination of a fixed space or spaces with the justifying space, is advantageous in many kinds of composition, such as centered lines, etc.

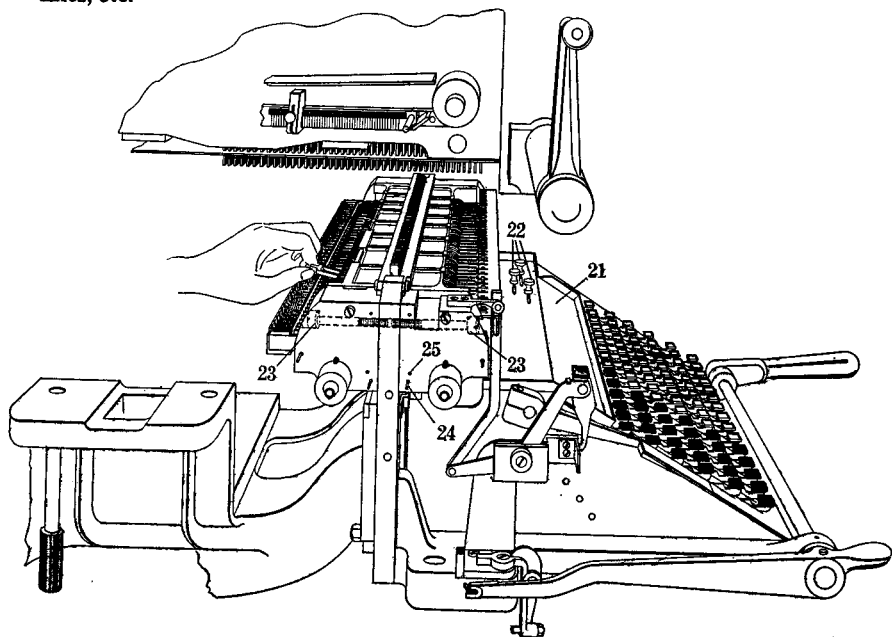


FIG. 9-3. Showing a standard 90-character keyboard. This keyboard as a whole may easily be swung out into the open for accessibility, as shown. Only six steps are required in swinging the keyboard, as follows: (1.) Remove keyboard roller driving belt. (2.) Shut off switch. (3.) Lock keyboard. (4.) Disconnect the assembling elevator link. (5.) Release the lock bolt on the left-hand side of the keyboard. (6.) Swing open the keyboard.

MAINTENANCE

The general operation of the keyboard has been described in this chapter, and for best results in operation, periodical attention should be given to the various parts to keep them in condition.

Removing the Cam Yoke Frames—The keyboard cams should be cleaned and oiled twice a year. To do this, it is necessary to remove both front and back cam yoke frames from the keyboard. The method of swinging the keyboard has been explained previously. When the keyboard is in the open position, the cam yoke frames can easily be removed. Fig. 9-3 shows the keyboard swung out and a single cam being removed, but to take off the entire back frame, remove the screws 23, at each end and pull back on frame to release the dowels. To remove the front frame, the small knobs 22 must be taken off. These are held in place by small set screws in the side. Remove front pan 21 and take out screws 23. After these parts have been removed, the cams may be removed from the cam yoke frame. As they are removed they should be kept in rotation so that when they are re-assembled they may be put back in their original position. The reason for this is that each cam is apt to be worn in such a manner as to operate more satisfactorily in the position in which it has always been used. The spaceband cam is slightly larger than the others.

Cleaning the Yokes and Cams—There are three ways to clean the yokes and cams, each depending on the equipment available for doing this work.

The first way is to wash the cams with high test gasoline, after which they should be allowed to dry thoroughly before oiling; also wash slots where the front end of the cam yoke extends through the cam yoke frame under key reeds.

The second method may be followed if the plant is equipped with the matrix-cleaning apparatus described in Chapter 2, using the rotary wire brush which can be fastened on the end of a saw arbor. Clean both sides of the cam yoke at each end, and the spot that rests on the trigger; then turn the edge of the cam against the brush and revolve slowly so that the brush will clean the teeth and edges of the cam. Also clean the slot as before mentioned.

The third way is to dry clean, provided there is no oil on the cam yokes. Use a very fine file or one that is partly worn (a Barrette file, X-619, is best) and rub both sides of the cam yoke in such a manner as to remove any accumulation of gum; then scrape clean the outer edge of the cam where it comes in contact with the rubber roll. After the machine has had considerable use, the teeth on the cams are apt to be worn smooth, and to remedy this, hold the cam in the exact position shown in Fig. 10-3 and draw the edge of the file over the teeth in the direction indicated by the illustration, using some pressure on the file. This treatment will make a slight burr on the teeth in the right direction to cause the cam to engage on the rubber roll. To file each tooth would be a tedious operation and it would be difficult to get the teeth even, but by scraping them the work can be done in a short time without damaging the cams. The sides of the slots over the triggers where the cam yokes operate should be scraped. If these slots are gummy the cam might hesitate to drop on the rubber roll. It is good practice to scrape the teeth on the cams no matter what method of cleaning is used.

Before the cams are put back in their frames they should be oiled, using the Linotype Keyboard Cam Oil (X-101). The oil should be applied with a thin wire, flattened at the end, using one drop on the pin on which the cam turns, and spinning the cam to be sure it works freely. All surplus oil should be wiped off before the cam is again placed in the frame.

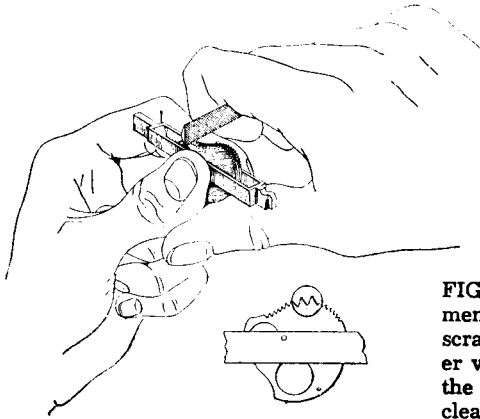


FIG. 10-3. Showing treatment of worn cam teeth by scraping with a file. The lower view is a cam with two of the teeth magnified to more clearly show the result obtained by scraping. The burred teeth enable the cam to have a more positive grip on the rubber roll and will help to avoid transpositions from that source.

Replacing the Keyboard Cam Rubber Roll—After the cams have been assembled in their frames, examine the rubber rolls, and if in good condition, wash them with alcohol. If worn or lifeless, they should be replaced.

On the new machines there is a knurled collar at the end of the shaft which requires about a $\frac{1}{4}$ turn to loosen. This must be removed in order to take off the rubber roll. The older machines have a different collar at the end, and to remove it drive the oil ring off and take out the pin which holds the collar to the shaft. If the rubber roll sticks to the shaft, it may then be necessary to cut it through lengthwise.

Before applying the new roll, clean the shaft with emery cloth, start the roll on the shaft and with an assembling tool (H-2897), furnished by the Linotype Company, place over the roll and stand in a vertical position. With a firm pressure, force the roll over the shaft and stretch the roll so it will be against the collar at each end and uniformly spread over the shaft's length.

If no special tool is available, the roll may be put on easily by starting one end on the shaft and filling the roll with water. Hold the hand over the top and press down, allowing the water to escape as the roll goes into place.

To replace the rubber rolls into the frames after the cams have been assembled, turn the cam yoke frame upside down, and slide the roll into place, then turn the frame right side up, and revolve the roll to bring the cams against the stop pins and tighten the set screws that hold the bushings in place.

See that the front end of triggers are down in place ready to be locked before the frames are fastened to the keyboard. To lock them, insert a $\frac{1}{8}$ " wire through the hole 25 as shown in Fig. 9-3, and have it long enough to pass through all the triggers, being careful not to let the end opposite the gear wheel extend too far through as it might get bent when fastening the cam frames to the machine, and would be difficult to pull out. The wire shown at 24, Fig. 9-3, is permanently in that position. After the triggers are locked, polish the ends that extend into the keyboard key bars or weights.

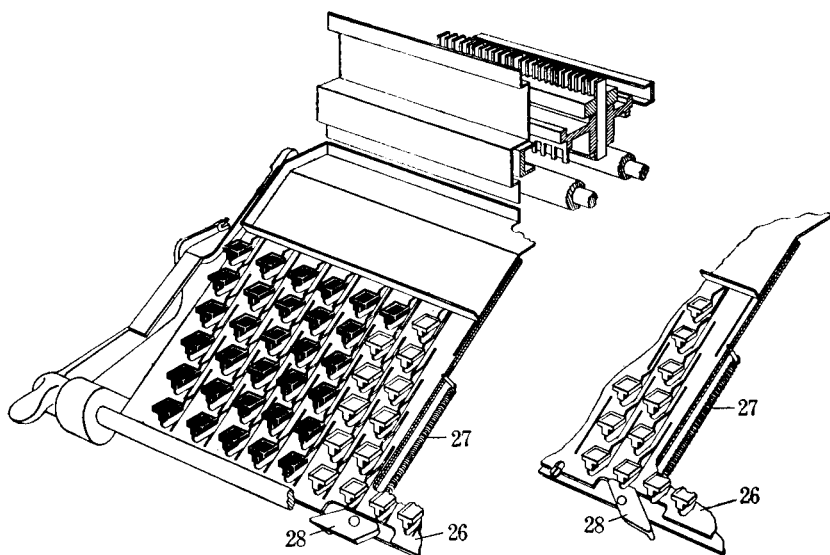


FIG. 11-3. Showing the keyboard locking plate 26, which is normally held down by the coil spring 27 so that the key levers will have room to move downward in their slots; but when slid upward by the cam 28, blocks any movement of the key levers.

When the keyboard is not being operated it should be locked to guard against accidental pressing of the keys and assembling of matrices, if the rubber rolls should be revolving. If a number of keys should be pressed and therefore a number of keyboard cams dropped on the rubber rollers while they are stationary, the rollers may not revolve at all when the machine is started; or if they are revolved by machine power or by hand, the rubber rollers are very likely to be ruined.

Replacing the Cam Stop Strips—The strip of cam stop pins 10, shown in Fig. 2-3, is made in two sections. There are two of these strips, front and back, and the sections are marked for position as R. H. and L. H. Front, and R. H. and L. H. Back. Each of these sections is secured to the cam yoke frame by three small screws and each section is removable separately. If it is found that some of these pins are worn, it is only necessary to remove the small screws which hold the worn section and replace it with a new one.

Cleaning the Keyboard Key Bar—Before the cam yoke frames are attached to the machine, the keyboard key bars or weights should be thoroughly washed with high test gasoline. They may be taken off as a unit by removing the two screws 29, Fig. 12-3, the heads of which may be seen from the front of the keyboard. When replacing the key bar unit it is necessary to lock the key levers in the manner illustrated in Fig. 11-3.

Cleaning the Key Levers—On the right-hand end of the keyboard there is a narrow steel strip about $4\frac{1}{4}$ " long which is fastened with a small screw at each end. Remove this piece and the rods will be free for removal. Polish the sides of the levers at each end where they pass through the keyboard frame. Do not use emery cloth or other abrasive material. If equipped with a wire brush such as has been described, use that, or some other polishing agent which will not scratch.

While the key levers are out, clean the slots in the keyboard frame where the

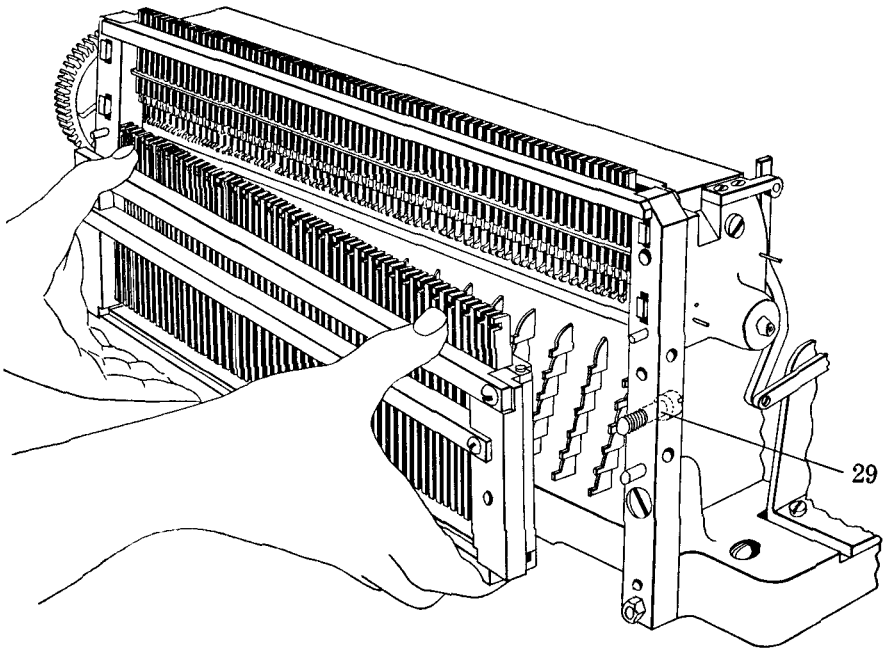


FIG. 12-3. Showing key bars being removed from keyboard as a unit. Also key bar frame end-piece screws 29, which hold the unit in place.

key levers pass through, both front and back. If there is any gum on the sides of these slots, the action of the key levers will be sluggish and possibly cause "doublets," as well as affecting the "touch" of the keyboard.

Re-assembling the Keyboard—To re-assemble the various parts of the keyboard, begin with the key levers, and it will be easier to do this before the key bar unit is attached. Start with the lower row of keys and work upward.

After the key levers are assembled, lock them in place, and then replace the key bar unit, and fasten the cam yoke frames to the keyboard, doing the back one first. See that the dowel pins enter the brackets and that all of the trigger ends are in place in the key bar slots before tightening the screws that hold the end brackets in place. After the cam yoke frames are tightened, try the rubber roll shaft and see that it spins freely, as it sometimes happens that if the set screws in the bushings are too tight, the shaft will bind. Pull out the locking wire 25, Fig. 9-3, which is the upper one, but be careful not to remove the lower one, 24, which is the permanent wire on which the triggers fulcrum.