Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 1

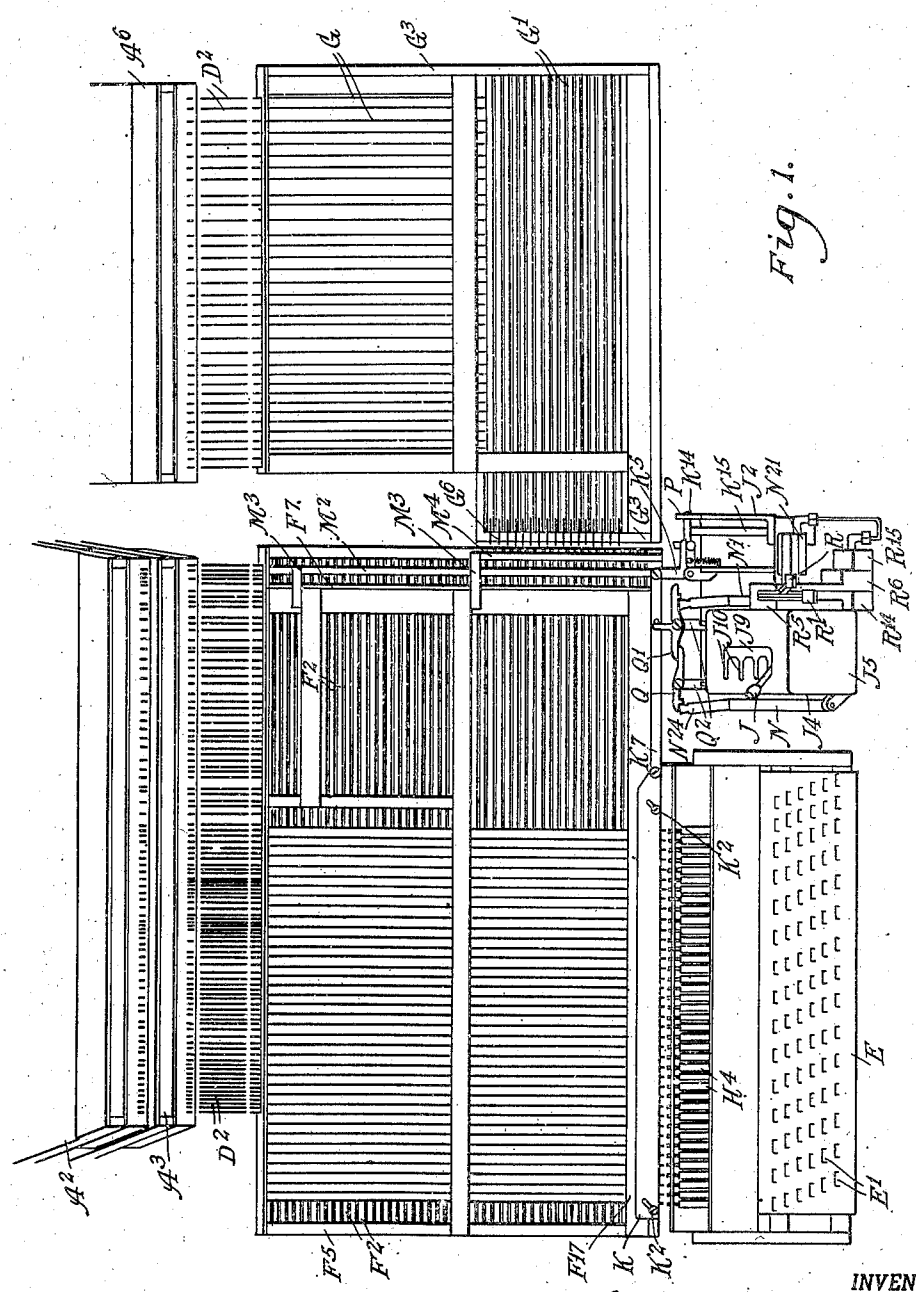


Fig. 1.

INVENTOR

BY James C. Plastaras

Morrison, Kennedy & Campbell

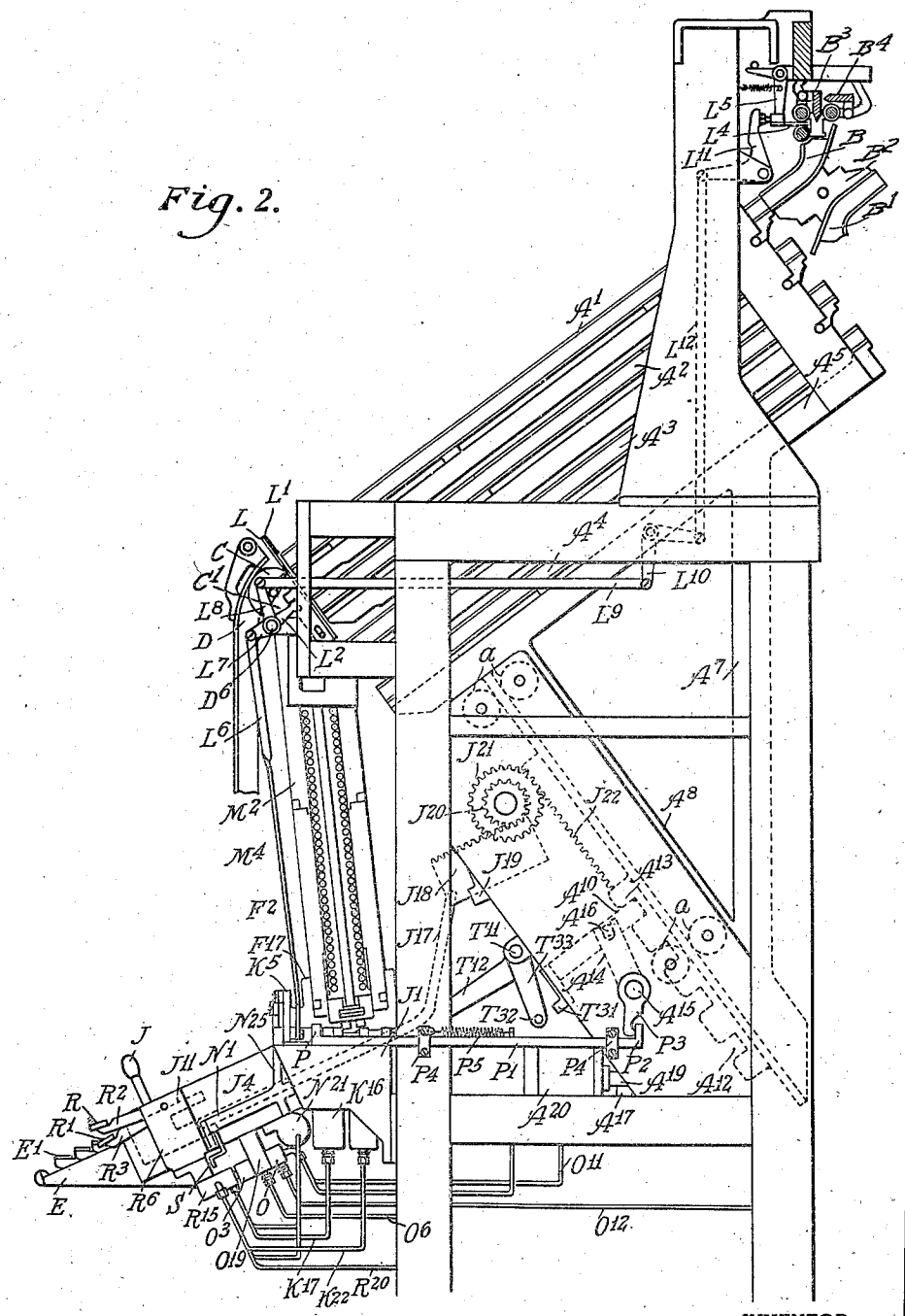
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 2

Fig. 2.



INVENTOR

James C. Plastaras

BY

Morrison, Kennedy & Campbell

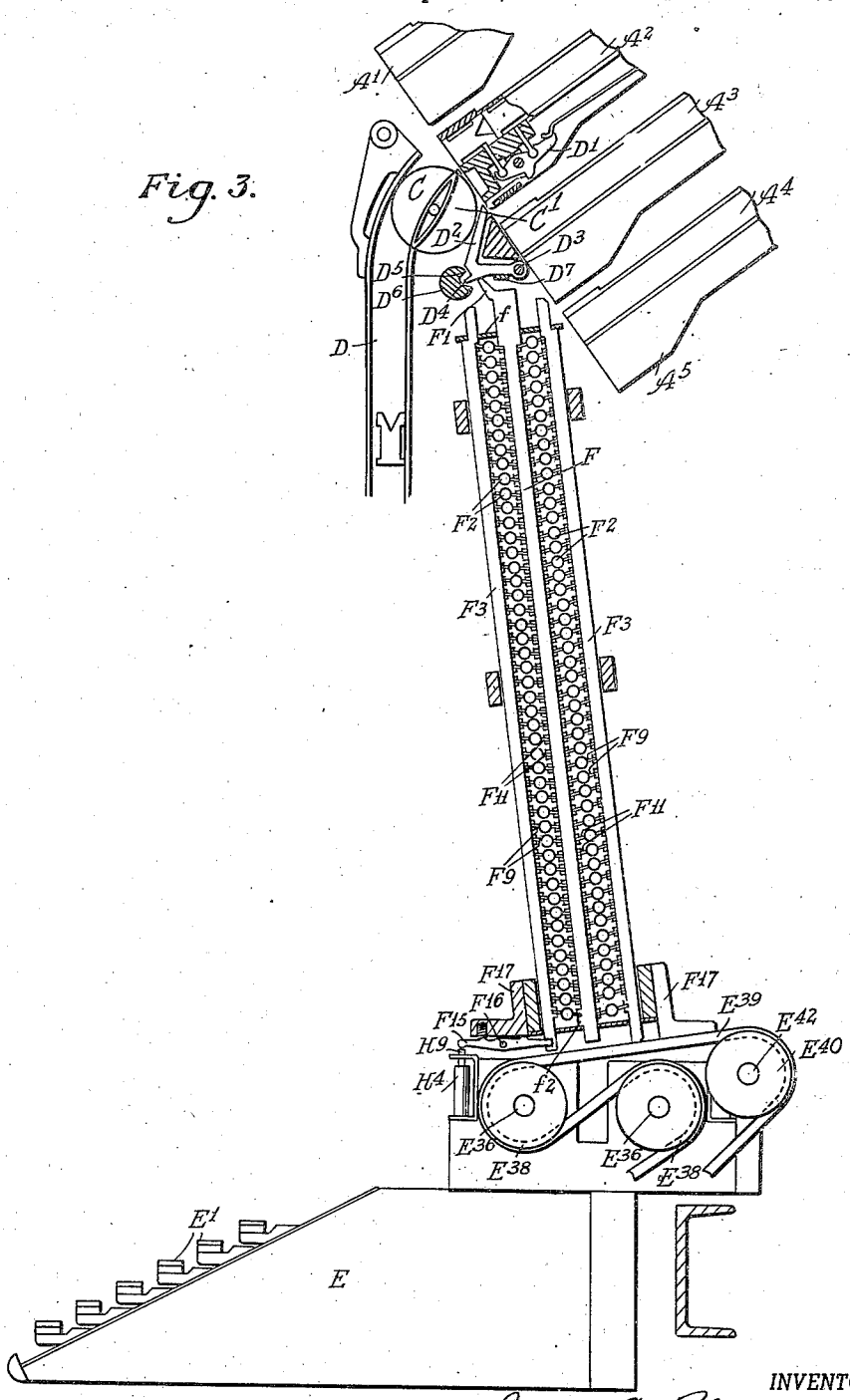
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 3

Fig. 3.



INVENTOR

BY James C. Plastaras

Morriam Kennedy & Campbell

ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 4

Fig. 4.

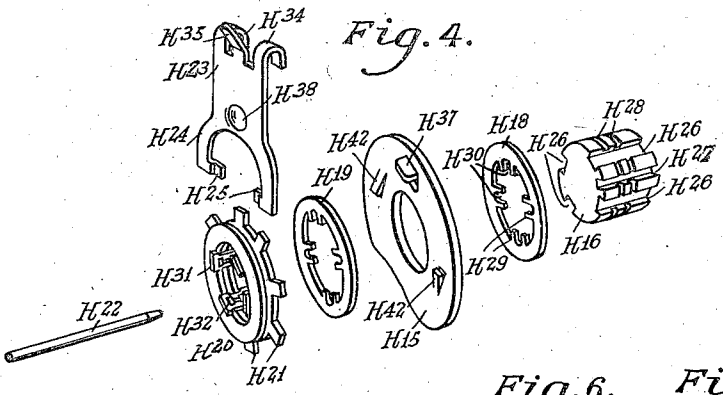


Fig. 5.

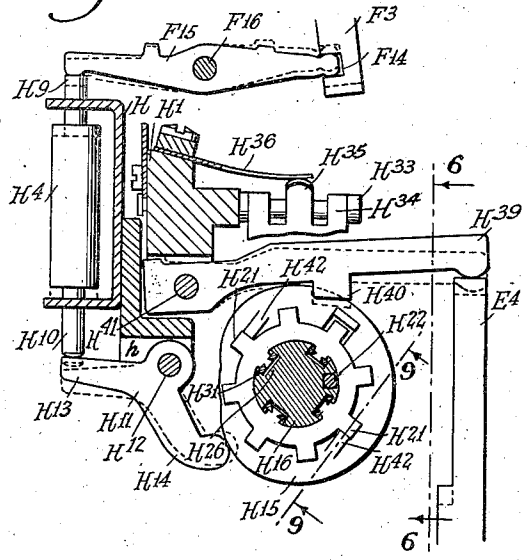


Fig. 6.

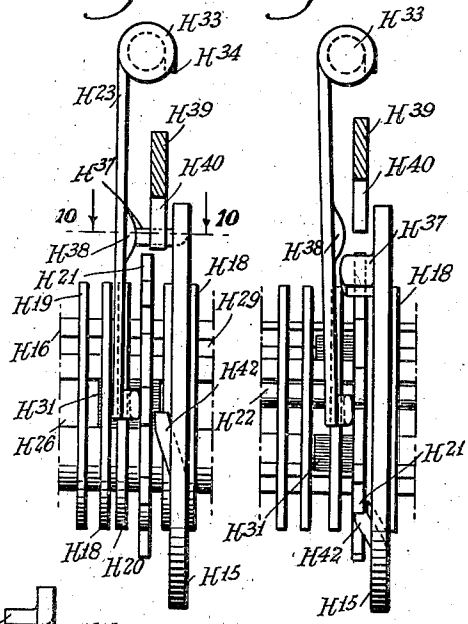


Fig. 7.

Fig. 8.

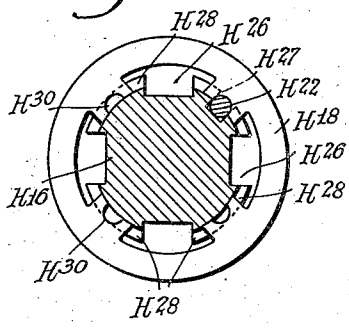


Fig. 9.

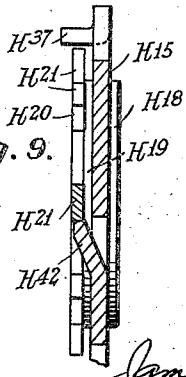
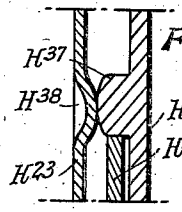


Fig. 10.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 5

Fig. 11.

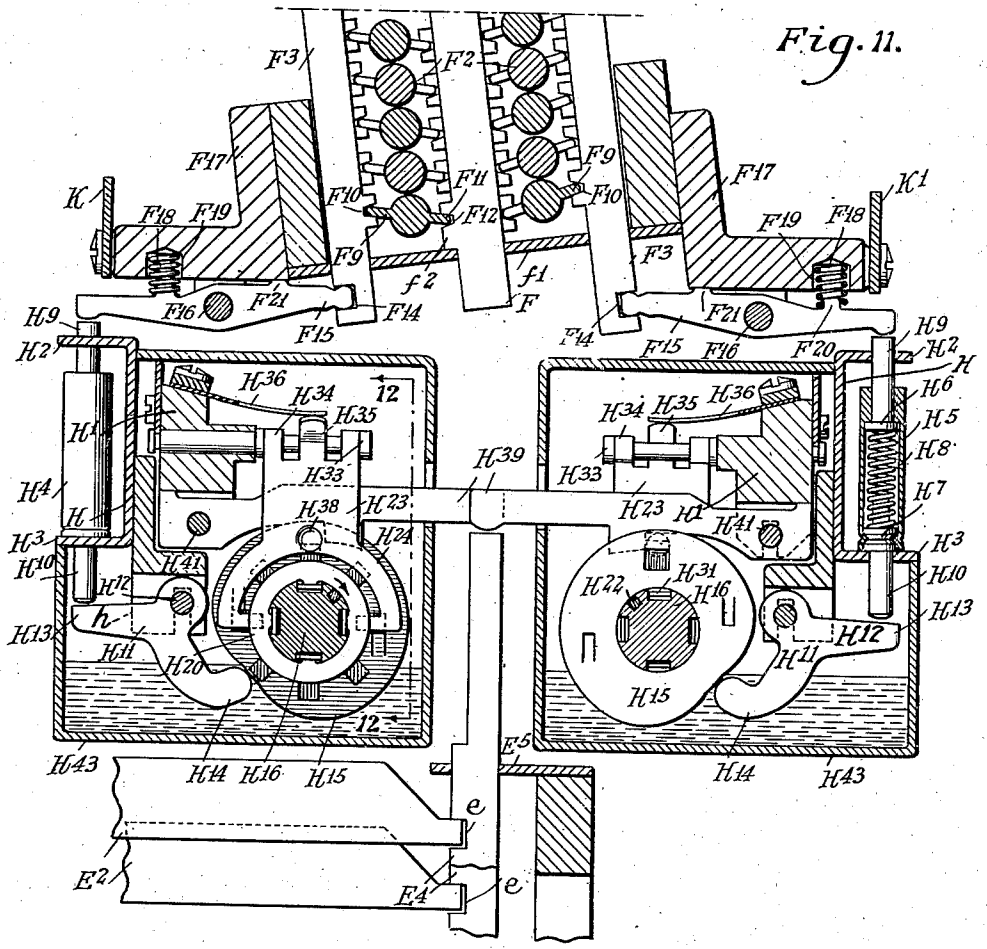
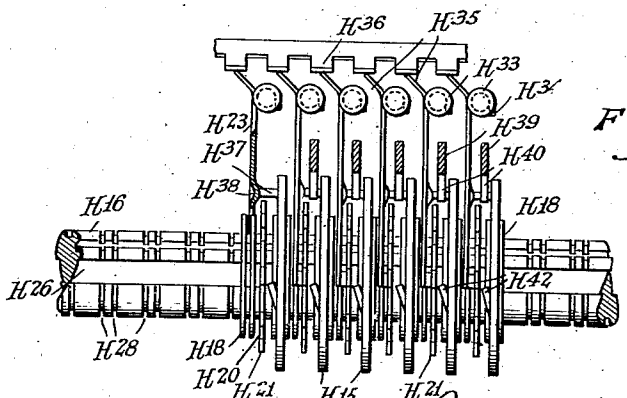


Fig. 12.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 6

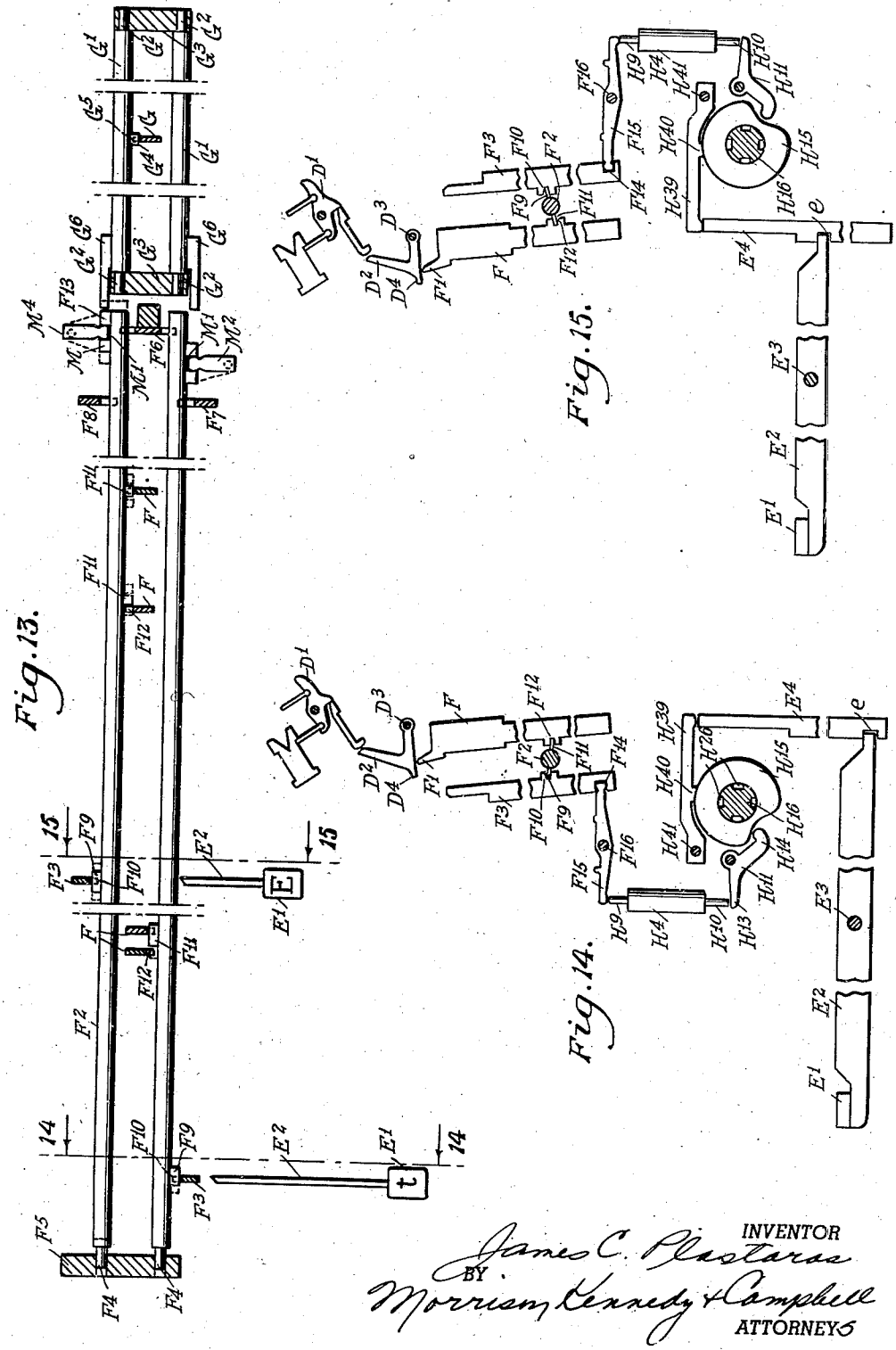


Fig. 13.

Fig. 15.

Fig. 14.

INVENTOR
James C. Plastaras
BY
Morriam Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 7

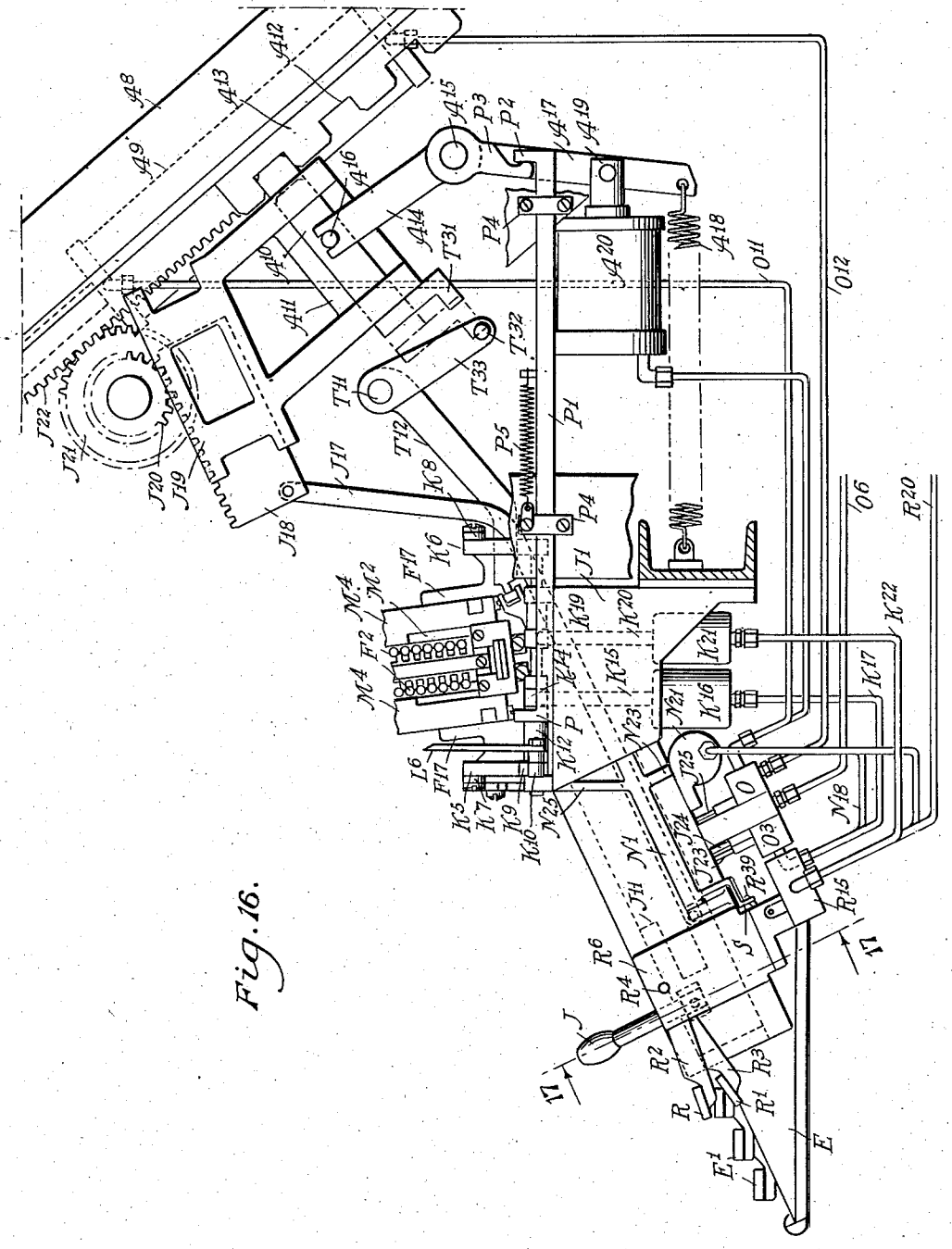


Fig. 16.

INVENTOR
James C. Plastaras
BY
Morrison Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 8

Fig. 17.

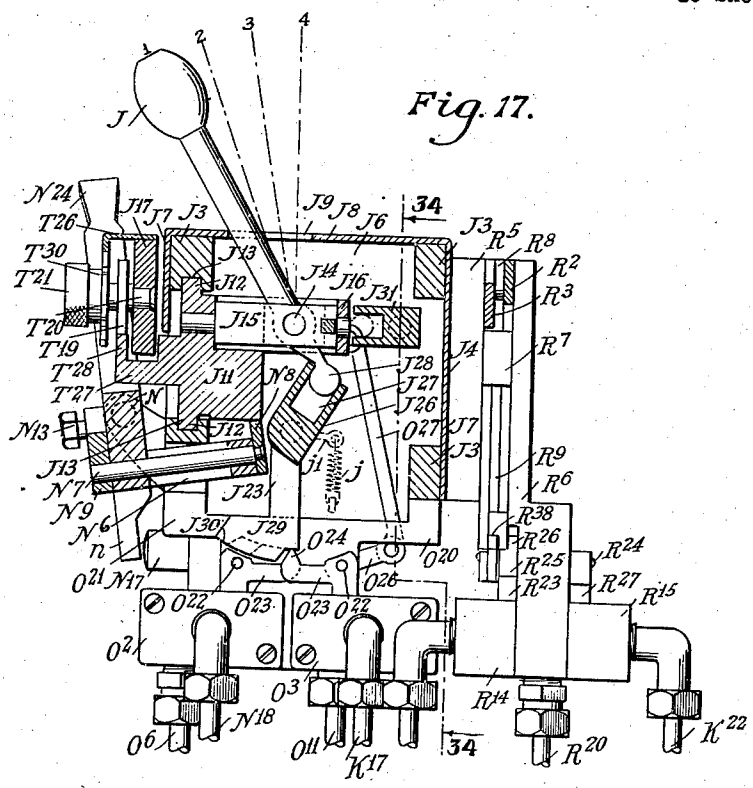


Fig. 18.

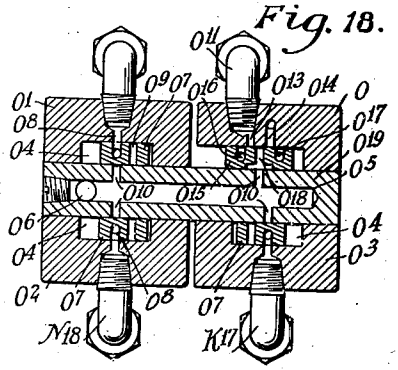
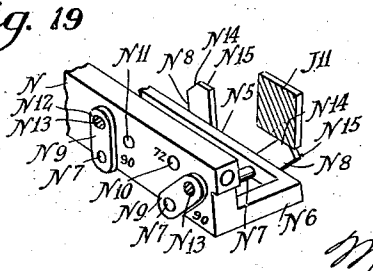


Fig. 19



INVENTOR
James C. Plastaras
BY
Merriam Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 9

Fig. 20.

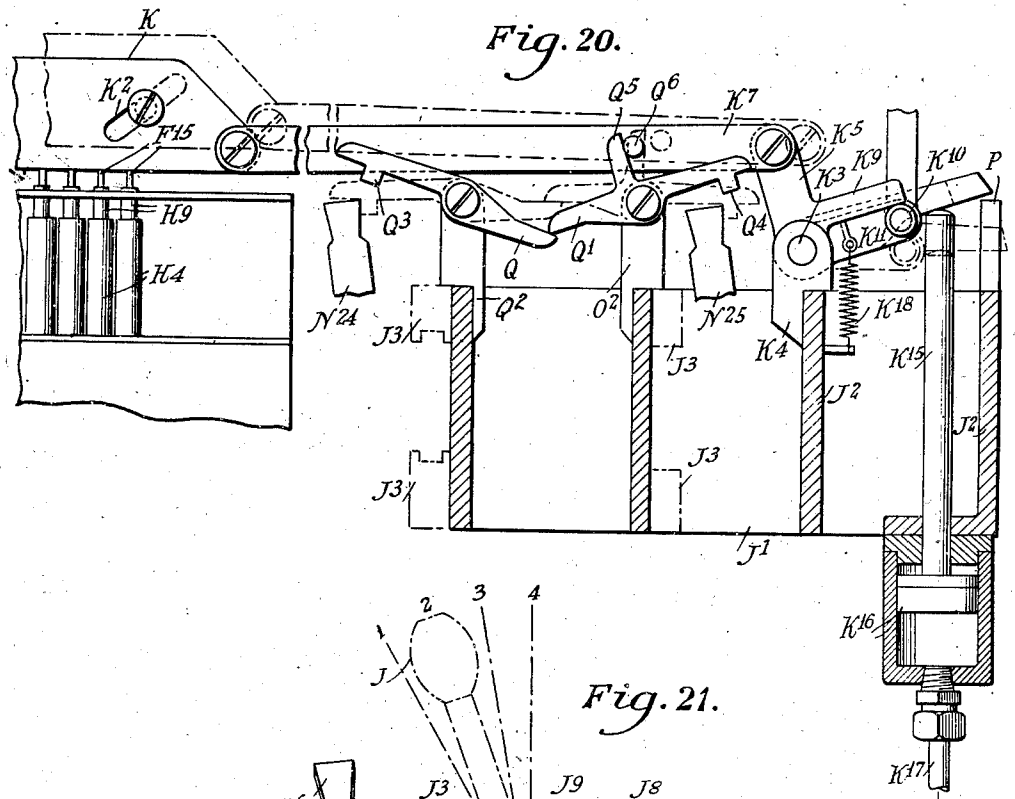


Fig. 21.

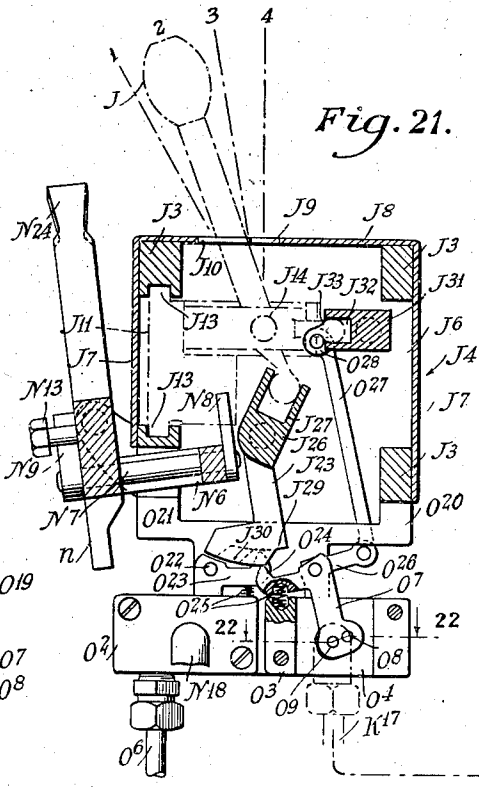
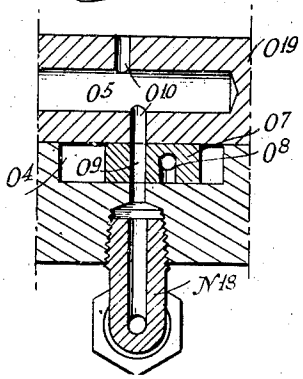


Fig. 22.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 10

Fig. 23.

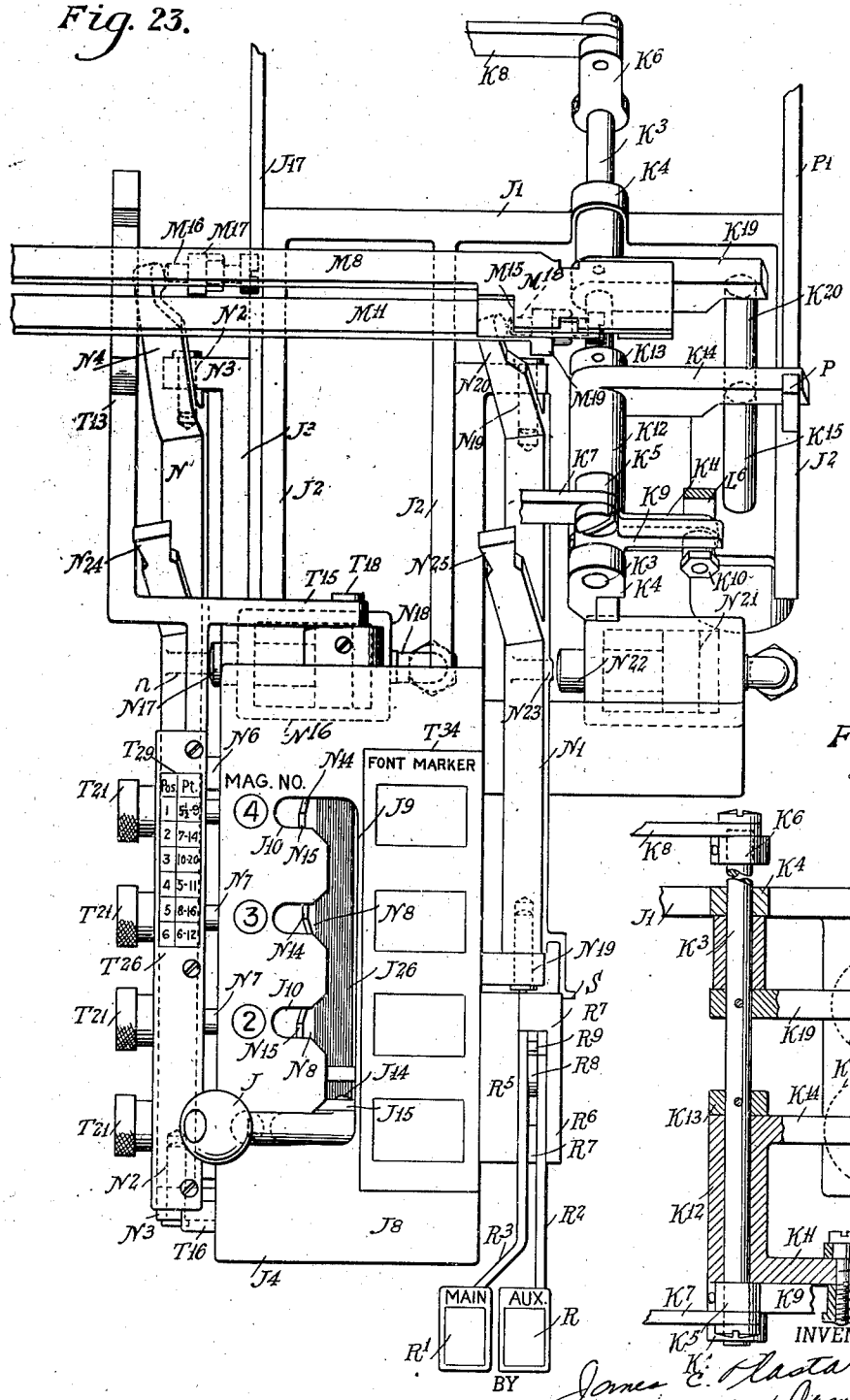


Fig. 24.

INVENTOR
James C. Plastaras
BY
Morrison Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 11

Fig. 25.

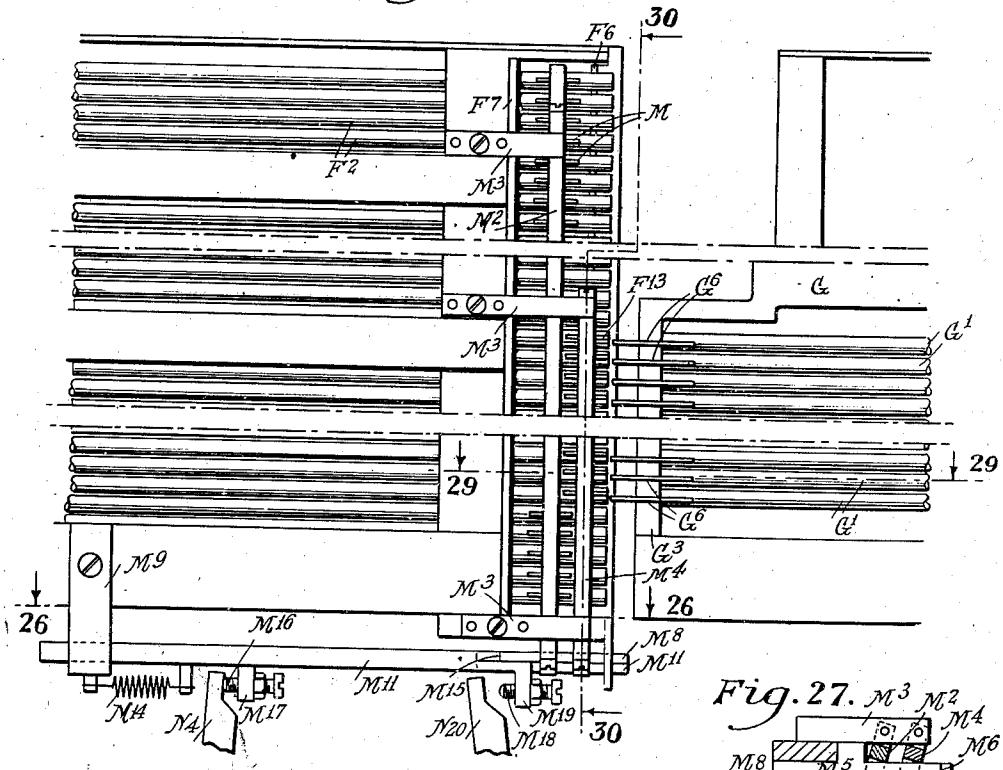


Fig. 27.

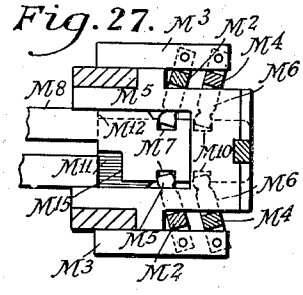


Fig. 26.

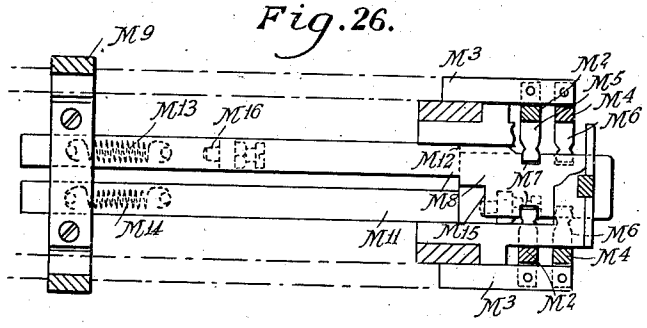


Fig. 28.

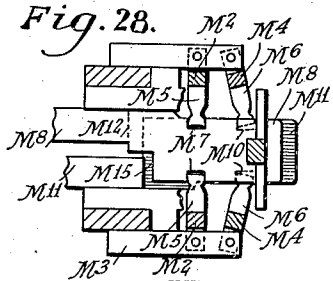
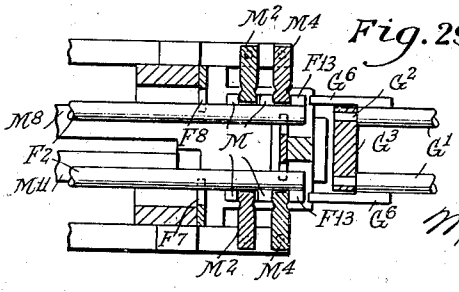


Fig. 29.



INVENTOR

James C. Plastaras

BY

Morriam Kennedy & Campbell

ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 12

Fig. 30.

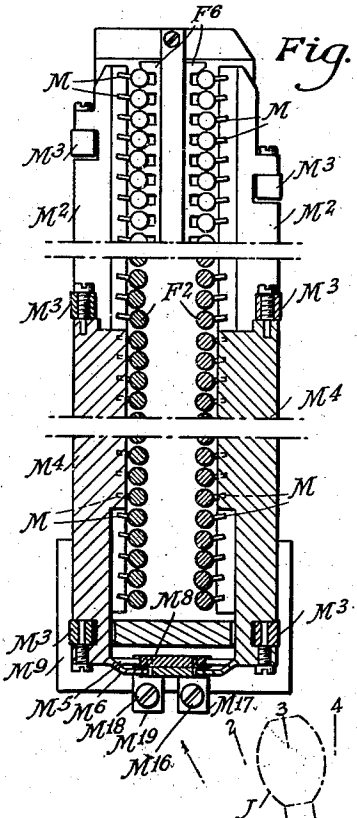


Fig. 32.

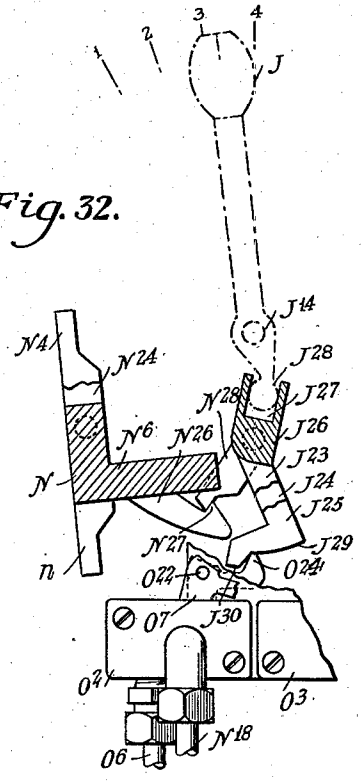


Fig. 31.

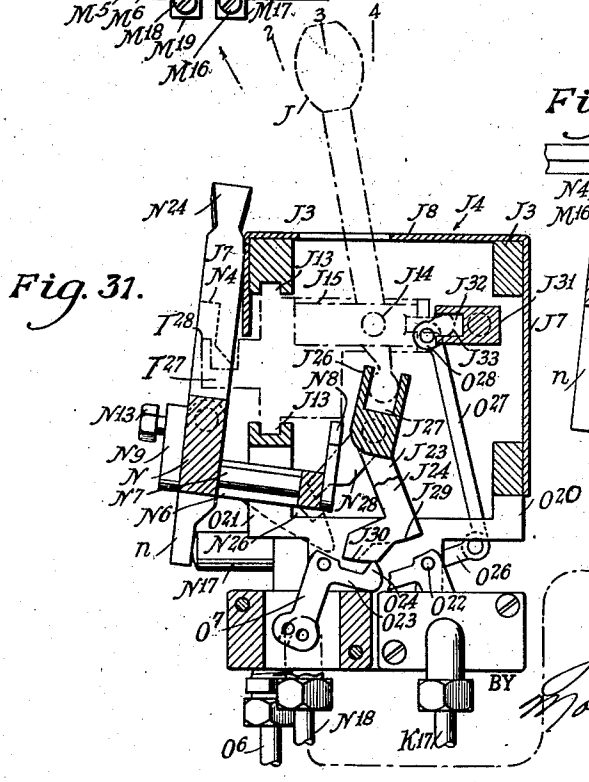
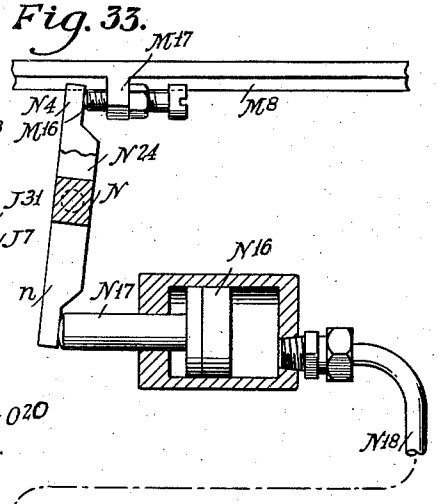


Fig. 33.



INVENTOR
James C Plastaras
Morsman, Kenady & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 13

Fig. 34.

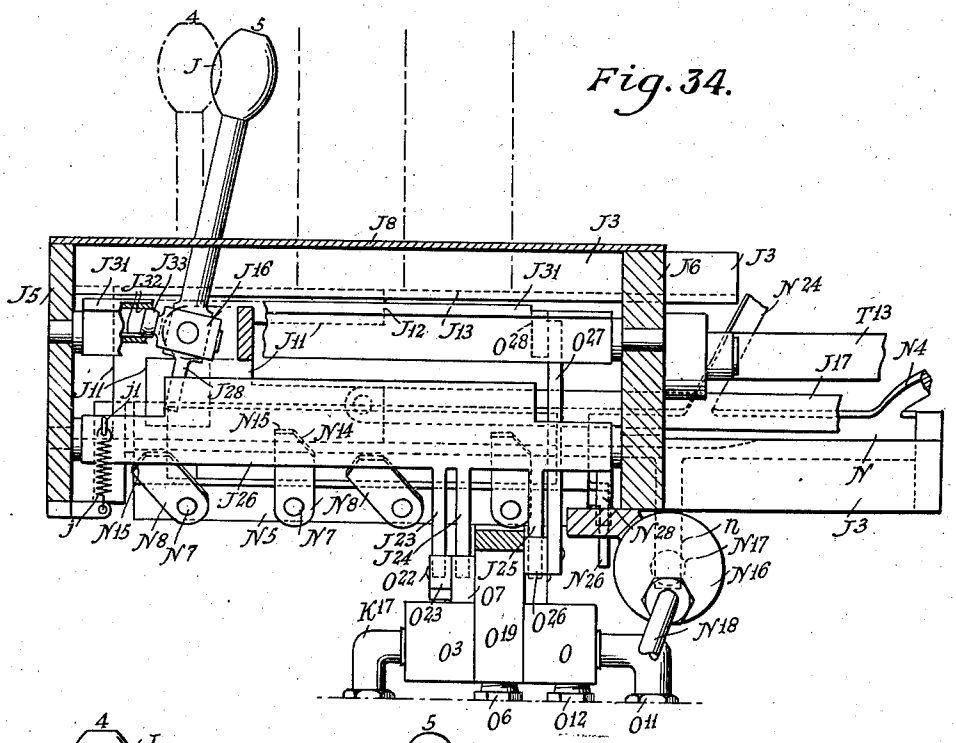


Fig. 35

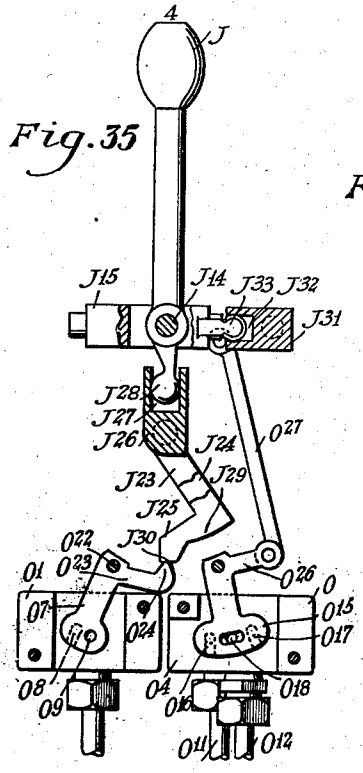


Fig. 36

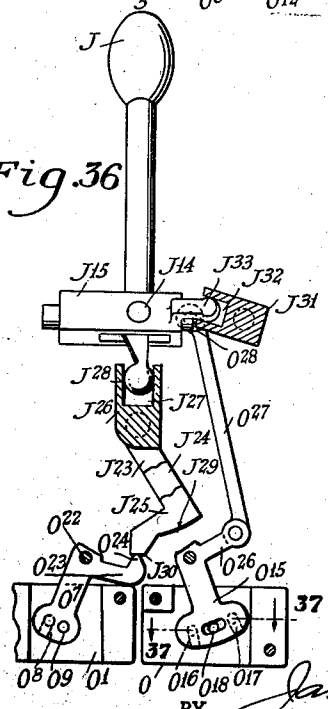
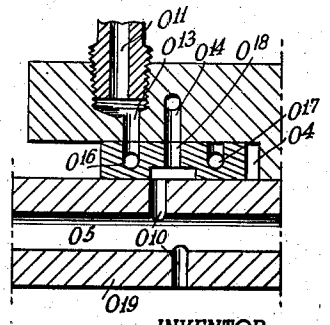


Fig. 37.



INVENTOR
James C. Plastaras
BY
Morsman, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 14

Fig. 38.

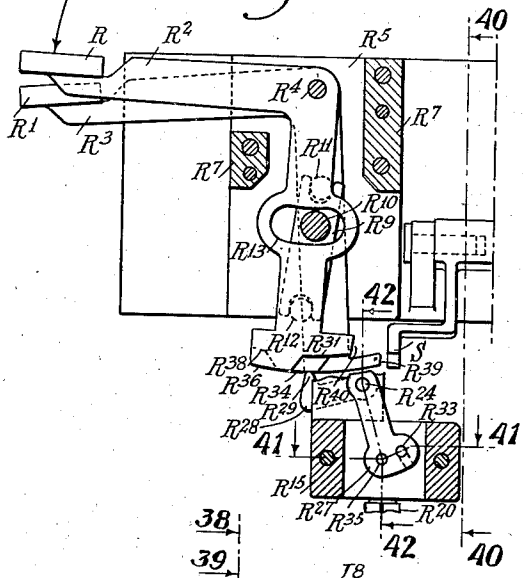


Fig. 39.

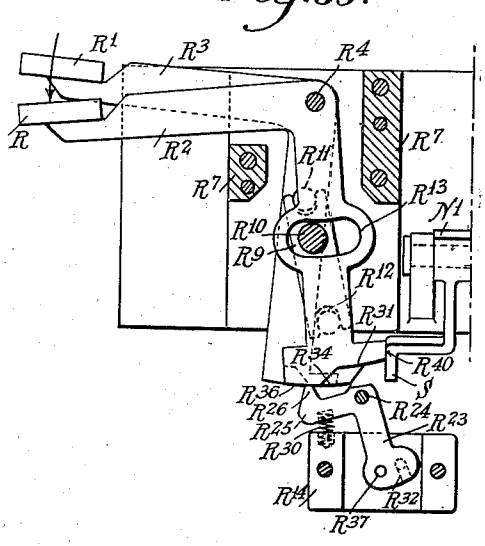
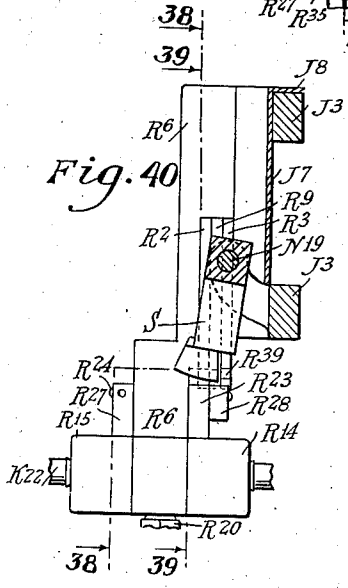


Fig. 40



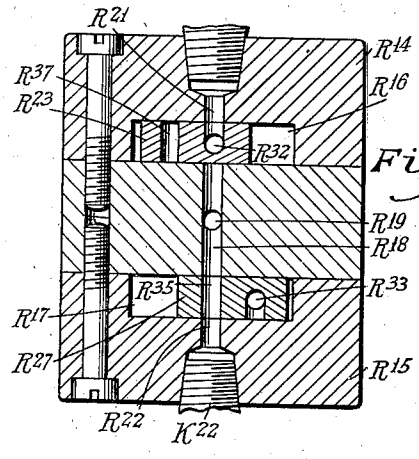
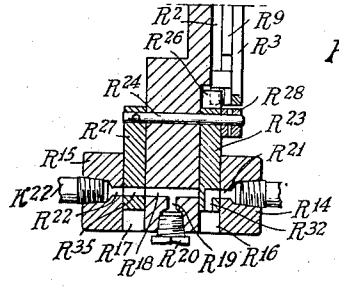


Fig. 41.

Fig. 42.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 15

Fig. 43.

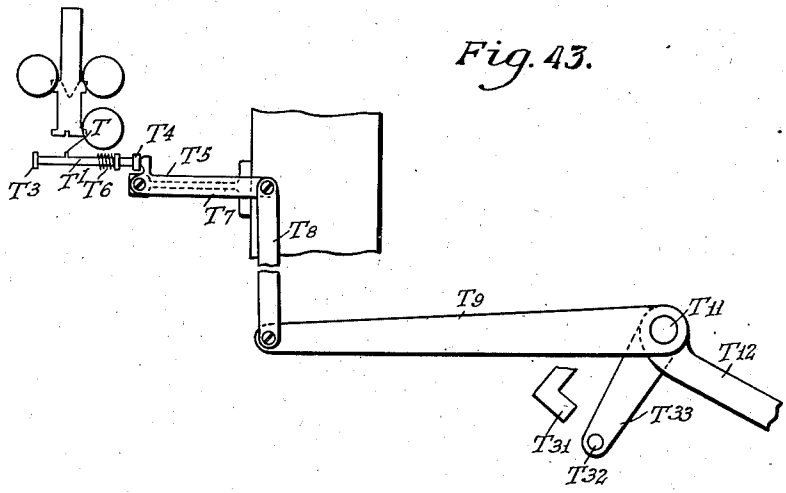
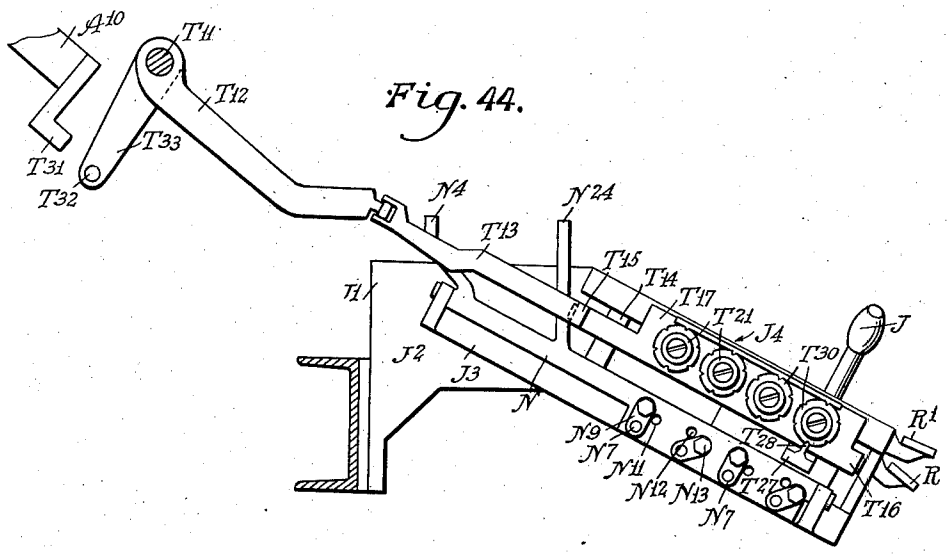


Fig. 44.



INVENTOR
James C. Plastaras
BY
Morrison Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 16

Fig. 45.

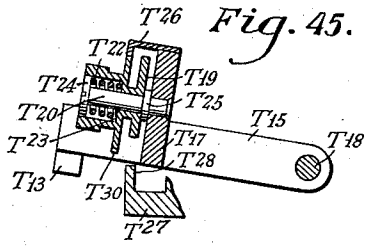


Fig. 46.

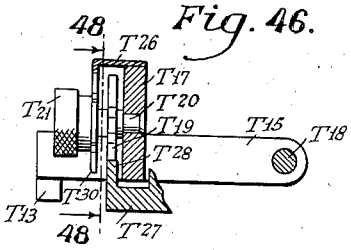


Fig. 47.

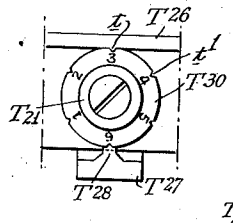


Fig. 48.

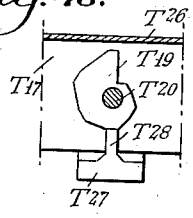


Fig. 49.

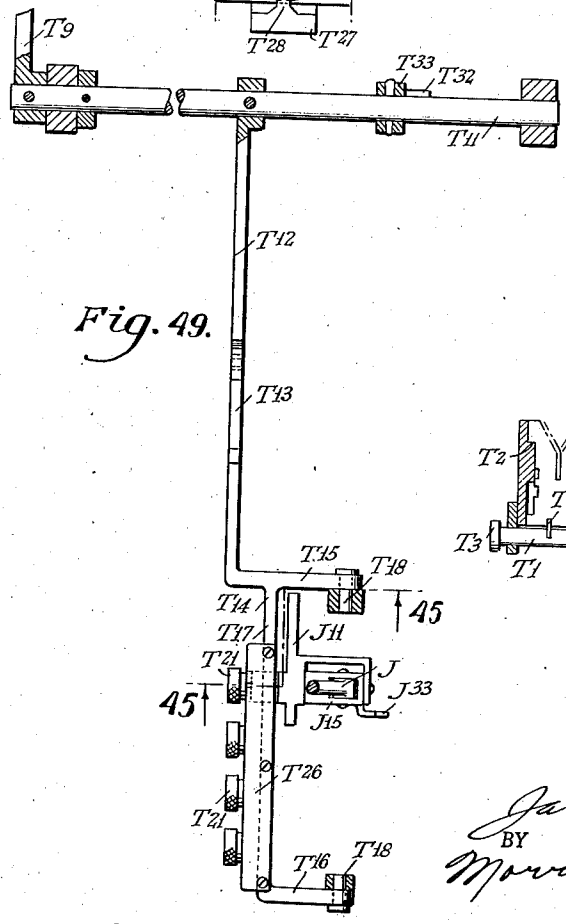
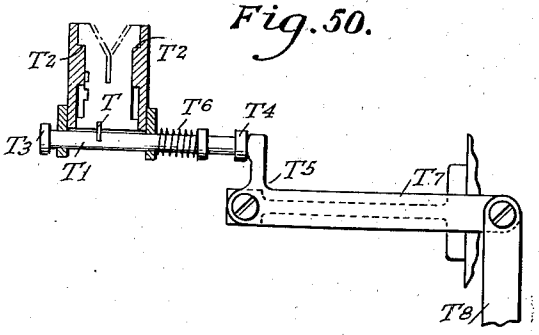


Fig. 50.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 17

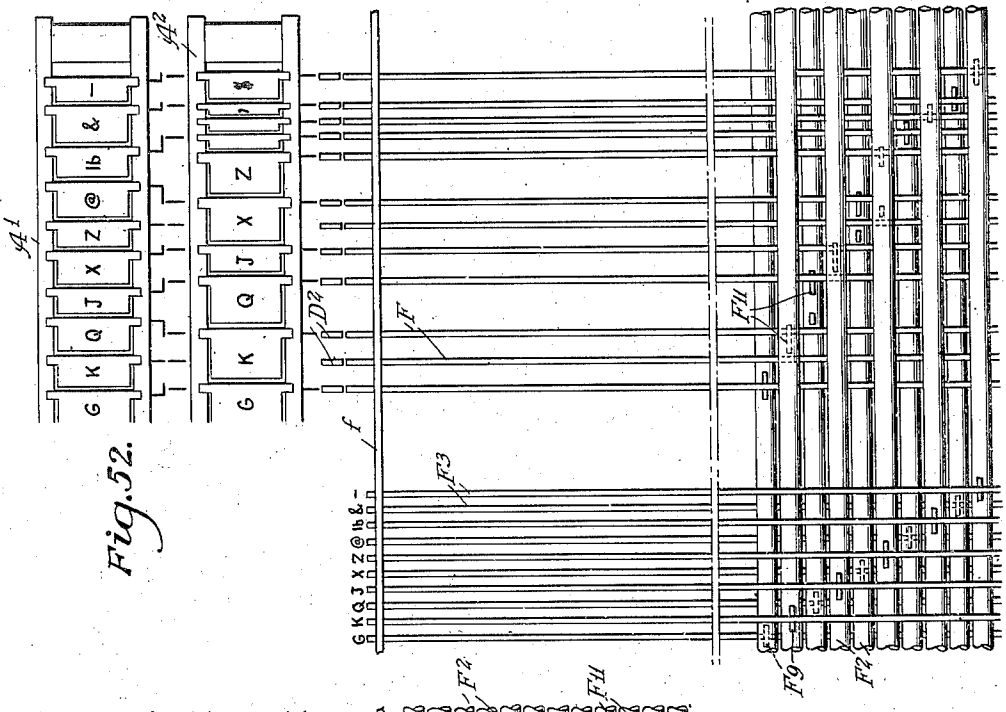


Fig. 52.

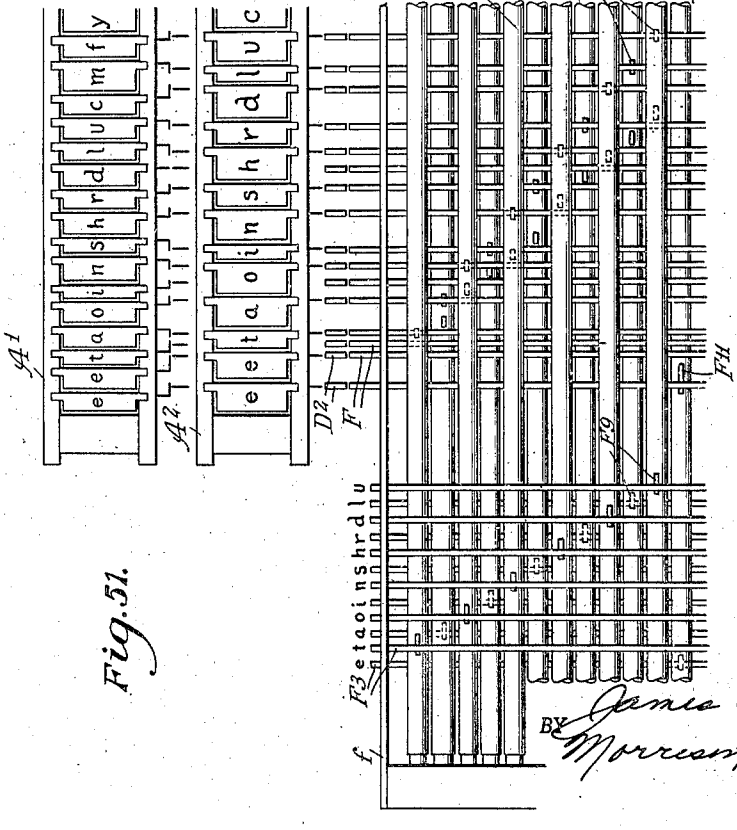


Fig. 51.

INVENTOR
James C. Plastaras
BY Morrison Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 18

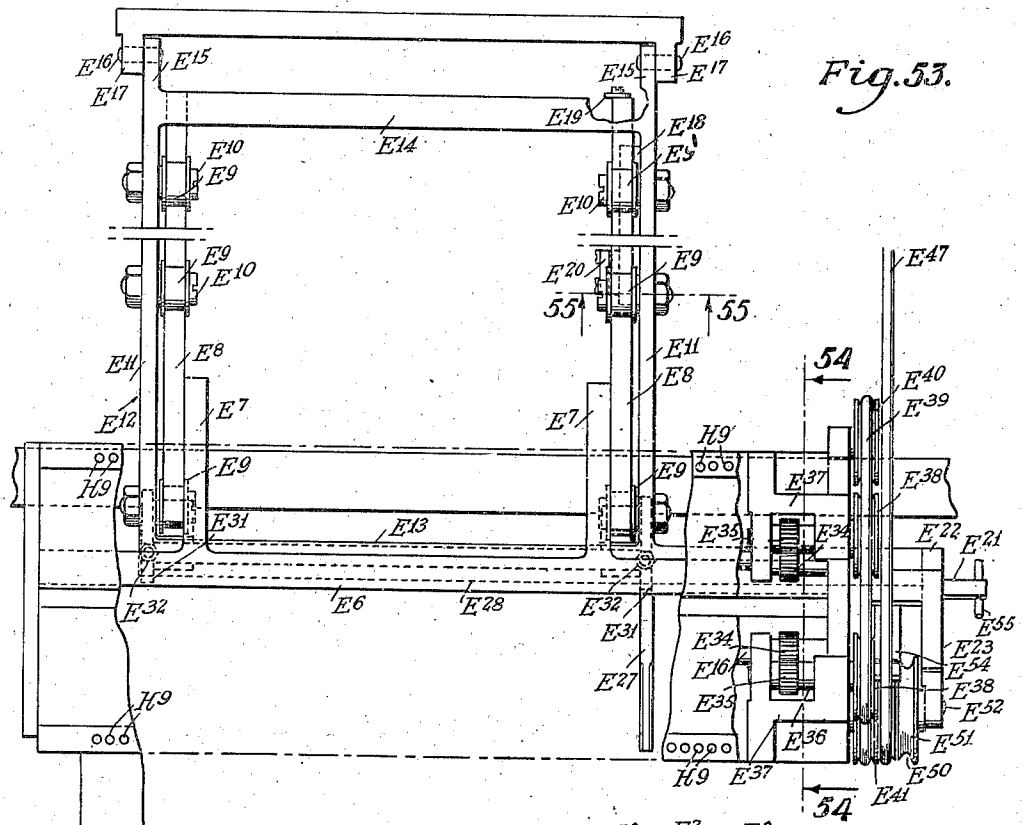


Fig. 53.

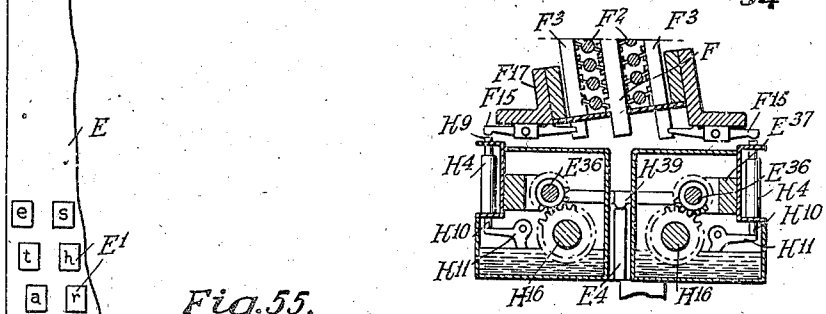


Fig. 54.

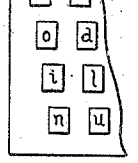
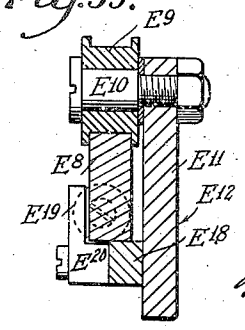


Fig. 55.



INVENTOR
James C. Plastaras
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Aug. 21, 1945. J. C. PLASTARAS 2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

Filed Sept. 24, 1941 19 Sheets-Sheet 19

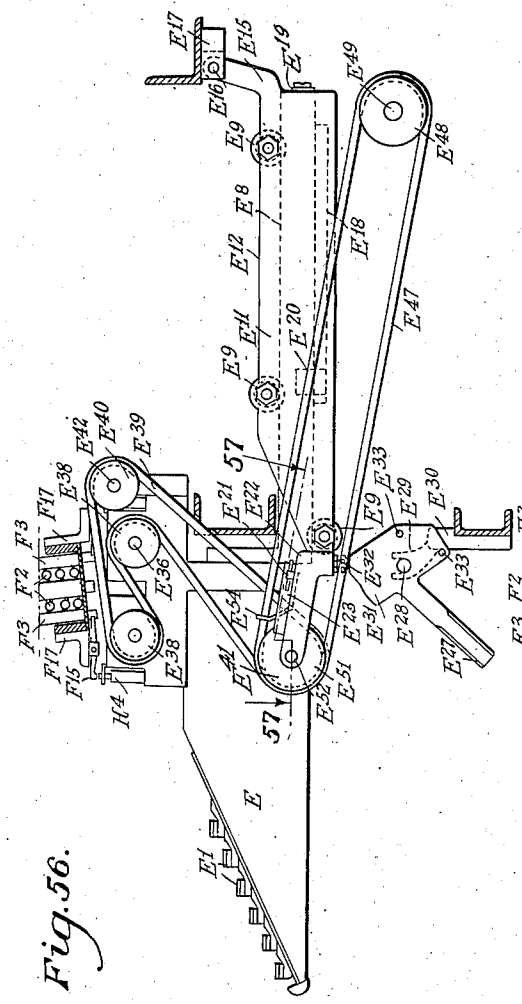


Fig. 56.

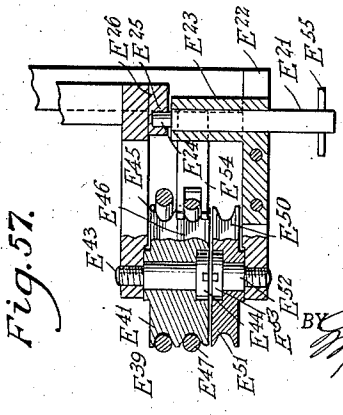


Fig. 57.

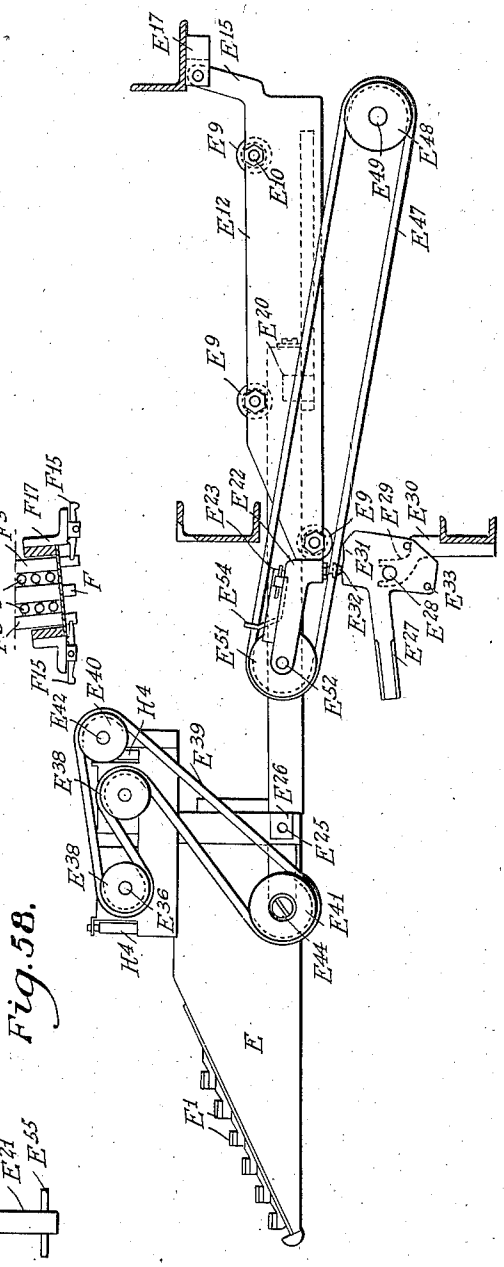


Fig. 58.

INVENTOR
James C. Plastaras
BY Morrison, Kennedy & Campbell
ATTORNEYS

Patented Aug. 21, 1945

2,383,158

UNITED STATES PATENT OFFICE

2,383,158

TYPOGRAPHICAL COMPOSING AND DISTRIBUTING MACHINE

James C. Plastaras, Laurelton, N. Y., assignor to Mergenthaler Linotype Company, a corporation of New York

Application September 24, 1941, Serial No. 412,144

141 Claims. (Cl. 199—20)

This invention relates to typographical composing and distributing machines such as "Linotype" machines of the general organization represented in Letters Patent of the United States No. 436,532 to O. Mergenthaler, wherein circulating matrices are released from a magazine in the order in which their characters are to appear in print and then assembled in line, the composed line transferred to the face of a mold, the mold filled with molten metal to form a slug or linotype against the matrices which produce the type characters thereon, and the matrices thereafter elevated and returned through distributing mechanism to the magazine from which they started.

The present improvements in part are directed to a machine capable of being equipped with matrix fonts comprising ninety different characters suitable for the more usual composition or "straight" matter and with matrix fonts comprising only seventy-two characters for head letter and display work, etc., as well as with auxiliary fonts comprising a lesser number of characters likewise used for display work. In such machines, the ninety and the seventy-two character fonts are contained in superposed main magazines shiftable as a unit to bring any selected one into operative position, and a common keyboard is employed for the release of matrices from the magazine in operative position. Since the matrices of the two different kinds of fonts occupy differently located magazine channels because of the difference in the size of the characters, it is customary to employ different intermediate connections for operating the escapements of the different magazines in order that corresponding characters may be released by the same finger keys.

In accordance with the present invention, the intermediate connections just alluded to include a single bank of escapement reeds, some of which constitute a group for actuating the escapements of a magazine containing a ninety character font, and some a group for actuating the escapements of a magazine containing a seventy-two character font. The escapement reeds in turn are operated by rock bars allocated permanently to and operated in turn by the finger keys of the keyboard mechanism, and said bars are shiftable endwise into connection with one group of escapement reeds or the other according to the font contained in the magazine in operative position. The selection of the proper group of escapement reeds is carried out automatically as the magazines are shifted to bring different selected ones into operative position. For this purpose, control mechanism is provided which is set initially to accord with the magazine arrangement decided upon, and thereafter, so long as the magazine arrangement remains unchanged, the proper group of escapement reeds is brought into use as any selected magazine is moved into operative position and this without any further thought on the operator's part.

The improvements have been herein illustrated in connection with the magazine power shift disclosed in the copending Plastaras application Serial No. 311,091, filed December 27, 1939, comprising a reversible pneumatically operated device for shifting the magazines upwardly or downwardly, and a pneumatically operated locking device for locating and securing the selected magazine in operative position, both said pneumatic devices being operated from a control box at the front of the machine adjacent the keyboard. The shifting of the rock bars in the instant case is also effected pneumatically and is governed from the same control box, as is also a pneumatically operated keyboard lock which is rendered active automatically prior to a magazine shifting operation and the adjustment of the rock bars and which is later rendered inactive automatically upon the arrival of the selected magazine in operative position and after the rock bars have been adjusted to connect the keyboard with the appropriate group of escapement reeds for the newly selected magazine.

Also in accordance with the present invention, the escapement devices associated with the auxiliary magazine are actuated by escapement reeds operated from a group of rock bars located in endwise alignment with a corresponding group of rock bars associated with the main magazines. When it is desired to use an auxiliary magazine, pneumatic devices under the control of a finger key at the front of the machine operate to shift the group of main rock bars into endwise connection with the auxiliary rock bars so that matrices can be released from the auxiliary magazine by the operation of the appropriate finger keys of the keyboard mechanism. A second finger key enables the main group of rock bars which act in the release of matrices from the auxiliary magazine to be reconnected for the release of matrices from the main magazine. The two keys are appropriately marked "Main" and "Aux.," signifying, respectively, main magazine and auxiliary magazine, and they will by their position indicate whether or not the auxiliary magazine is connected for use. One of the features of the present arrangement resides in the fact that the

auxiliary magazine can be used regardless of whether the main magazine in operative position contains a ninety or a seventy-two character font, and also that different selected main magazines can be brought into operative position while the auxiliary magazine remains in service. In other words, while the auxiliary magazine is in use, the operative main magazine may be changed from one containing a ninety character font to one containing a seventy-two character font and vice versa; and, when the auxiliary magazine is rendered inoperative, the main rock bars which were utilized for the release of the matrices therefrom will be reconnected to the appropriate escapement reeds of the group allocated to the main magazine then in operative position.

During the rock-bar shifting operations to render the auxiliary magazine active and inactive, the keyboard lock is rendered operative and inoperative automatically prior to and at the conclusion of each shifting operation.

A number of safety devices are employed to prevent certain operations from being carried out when prior operations have failed of completion. These safety devices are more specifically enumerated and described in later portions of the application.

The improved machine is also equipped with a font distinguisher which is initially set by devices located at the front of the machine in accordance with the font arrangement in the main magazine shift frame. Thereafter, as different selected magazines are moved into operative position, the font distinguisher is automatically set to permit the passage of matrices through the distributor box belonging to the font in operative position and, of course, to reject those matrices which are not of the proper font.

Substantial improvements have also been made in the keyboard mechanism itself. The usual arrangement which included, for each key, a cam disposed in a pivotally mounted yoke adapted upon the operation of the key to be dropped into engagement with an underlying constantly rotating rubber-covered roll, and which was driven by the roll for one rotation to operate the associated escapement device, has been dispensed with, and instead the cams are freely mounted on a constantly driven metal shaft and normally held against rotation with the shaft by trip mechanism under the control of the finger keys. Upon the operation of a finger key, the corresponding trip mechanism acts to release its cam, whereupon mechanism automatically operates to couple the cam positively and directly to the constantly rotating drive shaft. The cam assemblies operate in oil which, incidentally, has a specific force transmitting function in the cam operation in addition to maintaining the parts quiet and free from wear. In addition to improving the life of the mechanism and eliminating the inconvenience occasioned by the rather frequent changing of rubber-covered rolls when such are used, the positive drive eliminates the transposition of matrices in the composed line which was occasionally brought about due to slippage that took place between the cams and the rubber-covered rolls during their driving engagement, especially when wear had occurred or in the presence of oil which frequently finds its way onto such rolls.

The keyboard unit is arranged for bodily movement forward from its normal position, enabling it to clear the reed assembly when access to the parts is necessary for servicing. The keyboard is belt driven from a continuously operating countershaft through mechanism which includes a driven pulley mounted on a stub shaft carried by the keyboard unit. When the keyboard unit is moved forward from its normal position, however, a normally active locking device, which locates it therein, is moved to an inactive position, and such movement of the locking device acts automatically to shift the belt from the driven pulley on the keyboard unit to an idler pulley located adjacent thereto but which is mounted in a relatively fixed device which supports the keyboard mechanism, thus enabling the keyboard unit to be moved bodily forward without arresting the rotation of the driving shaft or removing the belt from the driving pulley located thereon. The driving connection is automatically reestablished when the locking device is again rendered active upon the restoration of the keyboard unit to normal position.

For a better understanding of the invention, reference may be had to the drawings of which

Fig. 1 is a front elevation of a portion of a machine equipped with the present improvements;

Fig. 2 is a side elevation of a section of the machine containing the main magazines and the keyboard mechanism;

Fig. 3 is a side elevation of the keyboard and the escapement mechanism;

Fig. 4 is an exploded perspective view of one of the individual keyboard cam assemblies;

Fig. 5 is a sectional view through one of the keyboard drive shafts and showing an assembly of one of the cam devices;

Fig. 6 is a sectional view on line 6—6 of Fig. 5, the parts being shown in their normal positions;

Fig. 7 is a sectional view similar to Fig. 6, the parts being shown, however, after a driving connection has been established between a cam and the drive shaft;

Fig. 8 is a cross section through one of the keyboard drive shafts showing certain details of construction of the cam assembly;

Fig. 9 is a sectional view taken on line 9—9 of Fig. 5;

Fig. 10 is a sectional view taken on line 10—10 of Fig. 6;

Fig. 11 is a sectional view on a fore-and-aft vertical plane through the keyboard mechanism;

Fig. 12 is a partial sectional view on line 12—12 of Fig. 11, only one of the individual cam assemblies, however, being shown;

Fig. 13 is a horizontal sectional view through the frame supporting the escapement reeds and the rock bars by which said reeds are actuated;

Fig. 14 is a vertical sectional view on line 14—14 of Fig. 13;

Fig. 15 is a vertical sectional view on line 15—15 of Fig. 13;

Fig. 16 is an enlarged right side elevation of the keyboard and the control box, together with portions of the mechanisms operated from the control box;

Fig. 17 is a vertical transverse section through the control box on line 17—17 of Fig. 16, the parts being shown in their normal positions;

Fig. 18 is a horizontal sectional view through the valve mechanism assembly for controlling the pneumatic devices which are active in shifting the magazine unit;

Fig. 19 is a perspective view of a portion of the mechanism for presetting the control mechanism according to the font arrangement in the main magazine unit;

Fig. 20 is a front elevation of the keyboard locking device;

Fig. 21 is a vertical transverse section through the control box, the parts being shown in a second position of adjustment;

Fig. 22 is a horizontal sectional view on line 22—22 of Fig. 21;

Fig. 23 is a plan view of the control box and of certain of the mechanism which is controlled thereby;

Fig. 24 is a plan view of a portion of the mechanism shown in Fig. 23, part of which is shown in section to illustrate details of construction;

Fig. 25 is a front elevation of a portion of the rock bar assembly and its supporting frame;

Fig. 26 is a horizontal sectional view on line 26—26 of Fig. 25, the parts being shown in their normal positions of adjustment;

Fig. 27 is a view of part of the mechanism shown in Fig. 26, the view being taken at the same section plane but the parts being shown in a different position of adjustment;

Fig. 28 is a sectional view similar to Fig. 27, but with the parts shown in still another position of adjustment;

Fig. 29 is a horizontal sectional view on line 29—29 of Fig. 25;

Fig. 30 is a vertical sectional view on line 30—30 of Fig. 25;

Fig. 31 is a vertical sectional view through the control box and similar to Fig. 21 but with the parts shown in a third position of adjustment;

Fig. 32 is a sectional view similar to Fig. 31 but with a portion only of the mechanism shown therein and with the parts in still a different position of adjustment;

Fig. 33 is a fragmentary view partially in section of a portion of the mechanism for shifting the rock bars during an interchange of the main magazines;

Fig. 34 is a vertical sectional view on line 34—34 of Fig. 17, the control lever and associated parts being shown in a position of adjustment which will effect the raising of the magazine unit;

Fig. 35 is a transverse vertical section through a portion of the control box mechanism, the position of the parts corresponding to the dotted line position shown in Fig. 34;

Fig. 36 is a transverse vertical section through a portion of the control box mechanism, the position of the parts corresponding to the solid line position shown in Fig. 34;

Fig. 37 is a horizontal sectional view on line 37—37 of Fig. 36;

Fig. 38 is a vertical sectional view on line 38—38 of Fig. 40;

Fig. 39 is a vertical sectional view on line 39—39 of Fig. 40;

Fig. 40 is a vertical sectional view on line 40—40 of Fig. 38;

Fig. 41 is a horizontal sectional view on line 41—41 of Fig. 38;

Fig. 42 is a vertical sectional view on line 42—42 of Fig. 38;

Fig. 43 is a side elevation of a portion of the mechanism for adjusting the font distinguisher;

Fig. 44 is a side elevation of a portion of the mechanism for controlling the adjustment of the font distinguisher;

Fig. 45 is a vertical sectional view on line 45—45 of Fig. 49;

Fig. 46 is a vertical sectional view similar to Fig. 45 but with the parts shown in a different position of adjustment;

Fig. 47 is a face view of one of the settable devices for controlling the adjustment of the font distinguisher;

Fig. 48 is a vertical sectional view on line 48—48 of Fig. 46;

Fig. 49 is a plan view of a portion of the mechanism for controlling the adjustment of the font distinguisher;

Fig. 50 is a view of a portion of the mechanism shown in Fig. 43, but somewhat enlarged to indicate details of construction;

Figs. 51 and 52 are diagrammatic illustrations of the rock bar and escapement connections for the main magazines;

Fig. 53 is a plan view of the keyboard mechanism and the supporting frame therefor, a portion of the keyboard mechanism being broken away to show the construction of the parts;

Fig. 54 is a vertical sectional view on line 54—54 of Fig. 53;

Fig. 55 is a vertical sectional view on line 55—55 of Fig. 53;

Fig. 56 is a side elevation of the keyboard mechanism and its supporting frame, the parts being shown in their normal positions;

Fig. 57 is a sectional view on line 57—57 of Fig. 56; and

Fig. 58 is a side elevation similar to Fig. 56, the parts being shown after the keyboard mechanism has been moved forwardly to an inactive position.

Magazine arrangement

The invention has been illustrated in connection with a machine equipped with four main superposed magazines A^1, A^2, A^3 and A^4, two of which, say, the first or top one and the third from the top (A^1 and A^3) are of standard form, being provided each with ninety-one grooves or channels spaced apart in the usual way so as to contain a regular ninety character font, and the other two of which, say the second and fourth magazines (A^2 and A^4), although of the same width as the others, are provided each with only seventy-three grooves or channels spaced apart in a different manner so as to contain a seventy-two character display font (Fig. 2). The magazines are mounted on separate base frames constituting part of a shift frame A^5 which is arranged to be raised and lowered to bring any selected one of the magazines into operative position. The machine is also equipped with a series of superposed auxiliary magazines A^6 likewise mounted on separate base frames constituting part of an auxiliary shift frame similar to but separate and distinct from that which supports the main magazines (Fig. 1). The auxiliary magazines are arranged at the right of the main magazines and are provided each with thirty-four grooves or channels spaced apart to contain the larger matrices which go to make up the usual auxiliary fonts. Insofar as the auxiliary magazines are concerned, only one is necessary for an adequate understanding of the invention and, for that reason, only one such magazine has been illustrated.

When either main magazine containing a ninety character font is in operative position, the regular magazine entrance B is employed to deliver matrices thereto from the distributing mechanism; whereas when either main magazine containing a seventy-two character font occupies such operative position, the special magazine entrance B^1 is so employed (Fig. 2). The two entrances differ in the number and spacing of their partition plates, the entrance B presenting nine-

ty-one channels to cooperate with the magazines A^1 and A^3, and the entrance B^1 presenting seventy-three channels to cooperate with the two remaining magazines A^2 and A^4. The entrances, arranged in inverted relation to each other, are rotatably mounted so that either may be brought into the operative position as desired. Their individual supporting frames are fastened together and constitute a reversible holder or support B^2 which may be given successive half rotations to bring first one entrance and then the other into use. The substitution of one entrance for the other is accompanied by a corresponding substitution of one distributor bar B^3 or B^4 for the other, so that the proper distributor bar for the magazine in operative position will be employed. The mechanism for effecting the interchange of the entrances and the corresponding interchange of the distributor bars is not shown in detail, being well known (see for instance the Burt Patent No. 1,928,716). It will be understood, of course, that the magazine entrances and the distributor bars continue on across the machine to cooperate with the auxiliary magazines in the usual way.

When a magazine is in operative position, it registers at its front end with a throat C through which the matrices are conveyed in the usual manner to an assembler entrance D from which the matrices pass to an assembler (not shown) wherein they are composed in line (Fig. 2). Since the throat for a magazine containing a ninety character font differs from that for a magazine containing a seventy-two character font, an additional throat C^1 is provided arranged back to back with the throat C, the two throats being mounted on a suitable frame which is rotatable to bring one or the other into operative position depending upon the magazine in use (see again the Burt Patent No. 1,928,716). As to the auxiliary magazines, only one throat is required since all such magazines are equipped with the same number of channels. The auxiliary magazine in operative position registers with the fixed throat and the matrices, as they are released from the magazine, pass through it and are deposited upon a traveling belt which conveys them toward the left and down through the assembler entrance D for composition in line with the matrices released from the main magazines, all in the usual way.

Magazine shift frame and its operation

The construction and operation of the magazine shift frame are, in most respects, the same as disclosed in the Plastaras application Serial No. 390,558 filed April 16, 1941. Thus, there is formed integral with the inclined base frame supporting the lowermost magazine, a rear frame member having lateral side elements A^7 extending vertically downward from the base frame near the rear and joining at their lower ends with an inclined front frame member having lateral side elements A^8 joined at their upper ends with the base frame near the front (Fig. 2). The side elements A^8 are perpendicular to the base frame and present laterally extending flanges disposed between antifriction rollers *a*, which act to guide the shift frame as it is raised and lowered to locate the different magazines in operative position. As set forth in the Plastaras application, the magazine shift frame is raised and lowered by pneumatically operated mechanism comprising a cylinder and piston device A^9 connected between the shift frame and the fixed machine frame (Fig. 16). Through the manipulation of a control lever J located at the front of the machine, air can be supplied to the cylinder at its lower end to raise the shift frame and also at its upper end to lower the shift frame.

The different operative positions of the shift frame are determined by a pair of locking bolts A^{10} slidably arranged in fixed guides A^{11} at opposite sides of the machine frame and which are adapted to be moved in a fore-and-aft direction, rearwardly to engage in one or another of a series of notches A^{12} presented by a pair of bars A^{13} secured one to each of the lateral frame members A^8 and which determine the different operative positions of the shift frame, and forwardly to clear the notches when it is desired to move the shift frame in substituting one magazine for another (Fig. 16).

The bolts A^{10} are withdrawn from their operative positions pneumatically by means which include a pair of arms A^{14} fixed at the opposite ends of a transverse rock shaft A^{15}, the arms being bifurcated at their upper ends to engage pins A^{16} extending laterally from the bolts (Fig. 16). An arm A^{17}, fixed to and depending from the rock shaft, is pulled forwardly by a spring A^{18}, connected to the arm at its lower end and having a fixed anchorage forward in the machine frame, to urge the rock shaft in a clockwise direction, looking at the machine from the right. Just above its lower end, the arm A^{17} is pivotally connected to the rear end of a piston rod A^{19} movable in a fore-and-aft direction and constituting one element of a pneumatically operated cylinder and piston device, the cylinder A^{20} of which is mounted on the fixed machine frame. As in said Plastaras application, the locking bolts A^{10} are operated by the manipulation of the control lever J during a magazine shifting operation, air being supplied to the cylinder A^{20} at its front end to push the piston rearwardly and turn the rock shaft A^{15} against the tension of the spring A^{18} in a direction to withdraw the bolts out of the notches A^{12} and free the shift frame for movement. Later, as the selected magazine approaches operative position, the cylinder A^{20} is vented, permitting the spring A^{18} to turn the rock shaft A^{15} in a direction to force the bolts A^{10} rearwardly against the front edges of their respective notched bars A^{13}, causing them to snap into the notches corresponding to the selected magazine as the latter is brought into operative position.

The control lever J forms part of a control mechanism which is supported at the front of the machine upon a fixed bracket J^1 having four forwardly extending flanges or ribs J^2 upon which various elements of the control mechanism are mounted as will later appear (Figs. 2, 16, 20 and 23). At the top and at the bottom of each of the two flanges at the left, there is mounted a bar J^3, i. e., there are four bars in all, extending forwardly and serving as fore-and-aft frame elements of a housing J^4 in which the control lever J is mounted, the housing consisting of front and rear end plates J^5 and J^6, side plates J^7 and a top plate J^8 (shown best in Figs. 17, 23 and 34). The top plate J^8 is formed with a fore-and-aft slot J^9 having a series of notches J^{10} branching from it laterally to the left. There is one such notch for each magazine, the notches being numbered from 1 to 4, starting from the front, and corresponding respectively to the magazines in order, starting from the top. The arrangement is such that when the control lever is placed in any given notch, the corresponding magazine will be brought into operative position.

In order to substitute one main magazine for

another, the control lever is moved out of the notch J^{10} in which it is located and then along the slot J^9, in one direction or another, depending upon the location of the notch corresponding to the selected magazine with respect to the notch in which the control lever was originally located. To this end, the control lever J is mounted on a slide J^{11} presenting tongues J^{12} at the top and bottom which fit into opposed grooves J^{13} formed in the bars J^3 constituting the fore-and-aft frame elements at the left of the housing (Fig. 17). The slide J^{11} is movable in a fore-and-aft direction, the grooves J^{13} serving as guides for that purpose, being sufficiently long to accommodate the full range of movement of the control lever as it travels from one end of the fore-and-aft slot J^9 to the other, or from position No. 1 to position No. 4 and vice versa. The control lever is mounted upon the slide J^{11} by what in effect is a universal joint, that is to say, the lever itself is mounted on a pivot pin J^{14} extending in a fore-and-aft direction across a slot formed in a block J^{15} trunnioned at one end in the slide proper and at the other end in an outboard bracket J^{16} projecting rightward from the slide. The trunnion axis extends transversely of the machine and, since the axis of the pivot pin J^{14} on which the control lever is mounted is perpendicular to the trunnion axis, it is obvious that the control lever can be rocked laterally out of and into the notches J^{10} as well as in a fore-and-aft direction when located in the slot J^9. As will later appear, the lateral movements of the control lever are utilized, among other things, to effect the charging and venting of the pneumatic device A^{20} for operating the locking bolts A^{10}, whereas the fore-and-aft rocking movements are utilized for selectively charging and venting the pneumatic device A^9 for raising and lowering the shift frame. In other words, when the control lever is tilted rearwardly, the cylinder A^9 is charged at the bottom and vented at the top to raise the shift frame, whereas when tilted forwardly, the cylinder will be charged at the top and vented at the bottom to lower the shift frame.

In order to insure that the control lever J will be located at all times in a position corresponding to the position of the shift frame, the fore-and-aft movements of the slide J^{11} are synchronized with the down and up movements of the shift frame. Thus, as shown in Fig. 16, the slide J^{11} at its rear end, is connected to a link J^{17} which extends rearwardly and upwardly and is connected at the front end of a slide block J^{18} guided for movement in a fore-and-aft direction in a bracket J^{19} secured to the fixed frame of the machine. The slide block J^{18} presents in its upper edge a series of gear teeth meshing with a pinion J^{20} integrally secured to a larger pinion J^{21} which meshes with a rack bar J^{22} secured to the movable shift frame. According to this arrangement, when the shift frame is raised, the slide J^{11}, through the gear and rack train just mentioned, will move rearwardly a distance proportionate to the shift frame movement; whereas, when the shift frame is lowered, the slide will move forwardly through a corresponding proportionate distance. Synchronizing the movement of the slide J^{11} with the shift frame movement, as thus described, not only enables the control lever, by its setting, to indicate which of the magazines is in operative position, but also serves to determine the extent the control lever will have to be moved to insure the arrival of a newly selected magazine in operative position.

Escapement devices

The main magazines as well as the auxiliary magazines are equipped each with an individual bank of escapement devices D^1, the selective operation of which releases the matrices from the corresponding magazine channels. The escapement devices are of standard form, and need not be described in detail. When a magazine is brought into operative position, the escapement devices are located in position to be actuated by a series of pivoted escapement operating levers D^2 mounted upon a cross bar D^3 fixed at its opposite ends in the machine frame (Fig. 3), one series of levers being provided for the main magazines, and one for the auxiliary magazines. Numerically, the escapement levers associated with the auxiliary magazines are equal to the magazine channels, i. e., there are thirty-four escapement levers, one for each channel in an auxiliary magazine. As to the escapement levers associated with the main magazines, however, their number has been increased to ninety-seven of which ninety-one are employed for releasing matrices from the channels of those magazines containing the ninety character fonts, and seventy-three of which are employed for releasing matrices from the channels of those magazines containing the seventy-two character fonts. Obviously, some of the escapement levers will be employed in connection with magazines of both categories.

Because of the difference in channel spacing as regards the different magazines, the only escapement levers that release the same characters from both fonts are those associated with the channels containing the lower case "e" and the large caps "B," "V" and "G." In all other instances, corresponding characters from the seventy-two and the ninety character fonts are released by different escapement levers, and this notwithstanding the fact that all of the characters in a seventy-two character font are duplicated in a ninety character font, the latter, of course, having eighteen additional characters.

The matrices are released from the magazines under the control of a standard keyboard E equipped with ninety finger keys E^1 and, in accordance with standard practice, the same key is employed to release the corresponding character from both the seventy-two and the ninety character fonts. From what has been said, it follows that when a ninety character font is in use, the finger keys of the keyboard must be connected to control the operation of one group of escapement levers, whereas when a seventy-two character font is in use, such keys will be connected to control the operation of a different group of escapement levers. In each case, of course, the groups will contain some levers that are common to both character fonts and some that are not.

The individual escapement levers D^2 are generally of V form, being pivotally mounted at the end of one leg and having their active or escapement engaging surface located at the end of the other leg (Fig. 3). Where their legs meet, the escapement levers present lugs D^4 extending forwardly into a notch D^5 running longitudinally of a horizontal transverse rock shaft D^6 supported at its opposite ends in the machine frame and having a length sufficient to accommodate all of

the escapement levers in the main bank as well as all of the escapement levers in the auxiliary bank. When the rock shaft D^6 is in its normal position, the escapement levers D^2 are free to function, the notch D^5 having sufficient width or clearance for that purpose. However, when the rock shaft is turned in a clockwise direction from the position shown in Fig. 3, the upper face of its notch will engage the lugs D^4 on the escapement levers and lock them against operation. The devices for operating the rock shaft D^6 are described later on.

The escapement reed assembly

The escapement levers D^2 (and this is true of those in the auxiliary bank as well as in the main bank) are actuated by long substantially upright escapement reeds F and G arranged across the machine in banks corresponding to the banks of escapement levers (Figs. 1, 2 and 3). The reeds are guided at their upper and lower ends for limited vertical movement in a pair of slotted crossplates f and f^1 secured at their opposite ends on fixed frame members of the machine. The escapement reeds, which equal the escapement levers in number, directly underlie the latter and are formed at their upper ends with fingers F^1 arranged to engage the lower edges of the levers D^2 somewhat in advance of the cross rod D^3 on which they are mounted, the arrangement being such that as the reeds are raised, the levers will be rocked clockwise (viewed from the right of the machine) to actuate the corresponding escapement devices of the magazine in operative position; whereas, when the reeds are lowered, restoration of the levers to normal position will follow under the influence of gravity. In their normal or lower positions, the escapement levers rest on a flat underlying crossbar D^7 (Fig. 3). The normal or lowermost positions of the escapement reeds F and G, on the other hand, are determined by lugs f^2 projecting from the front edges of the reeds in a position to engage the top face of the comb plate f^1.

The escapement reeds associated with the main magazines are raised and lowered through the medium of two groups of transverse horizontally disposed rock bars F^2 arranged, one group in front of the escapement reeds, and the other group at the rear thereof (Figs. 1 and 3). Each group of rock bars in turn is actuated by a group of power-operated actuating reeds F^3, those actuating the front group of rock bars being located at the front thereof, and those actuating the rear group of rock bars being located at the rear thereof.

The rock bars in the respective groups are located one above the other in superposed relation and are formed at their left ends with rounded reduced portions F^4 which engage in holes drilled in a vertical member F^5 of the machine frame, the arrangement providing journal supports for the rock bars at that end (Fig. 13). At their right ends, the rock bars are supported in notches presented by vertically disposed bars F^6, F^7 and F^8 which also are fixed in the machine frame. The notched bar F^6 is located between the banks of rock bars F^2 and is formed with two series of notches, one series facing forwardly to provide half journal supports for the rock bars in the front bank, and the other series facing rearwardly to provide half journal supports for the rock bars in the rear bank. The notched bar F^7 is located in advance of the front bank of rock bars and has its notches facing rearward to complete the journal support for those rock bars, whereas the notched bar F^8 is located in back of the rear bank of rock bars and has its notches facing forward to complete the journal support for those rock bars.

The rock bars are connected for operation by the actuating reeds F^3 by means of small rectangular lugs F^9, extending forwardly in the case of the front rock bars to engage in notches F^{10} presented in the rear edges of their associated actuating reeds, and extending rearwardly in the case of the rear rock bars to engage in similar notches presented in the front edges of their associated actuating reeds (Figs. 14 and 15). To be more specific, there is one actuating reed for each rock bar and, in order that they will be properly connected, the lugs F^9 on the different rock bars are located at different positions along their lengths according to the positions of the actuating reeds allocated respectively to them and, for the same reason, the notches F^{10} in the actuating reeds are located at different levels according to the level of their associated rock bars (Figs. 51 and 52).

The rock bars F^2 are also formed with similar lugs F^{11} for connection with the escapement reeds F, the lugs on the front bank of rock bars extending rearwardly to engage notches F^{12} formed in the front edges of certain of the escapement reeds, and those on the rock bars in the rear bank extending forwardly to engage similar notches formed in the rear edges of the remainder of the escapement reeds (Figs. 14 and 15). It will be recalled now that, while there is but a single bank of escapement reeds F, actually they go to make up two groups, one group for releasing matrices from the magazines containing the ninety character fonts and the other group for releasing matrices from the magazine containing the seventy-two character fonts.

In order that the rock bars may be connected selectively to either group according to whether a magazine containing a ninety or a seventy-two character font is in operative position, they are arranged to be shifted from a normal position, endwise to the left for a limited distance, their end bearing supports being so constructed as to permit this. When the rock bars are in their normal positions, their lugs F^{11} will be connected to the escapement reeds in the group for releasing matrices from a magazine containing a seventy-two character font, whereas when the rock bars are in their leftmost position, their lugs will be connected to the escapement reeds in the group for releasing matrices from a magazine containing a ninety character font, it being understood of course that, in either position of adjustment, a rock bar will be connected to only one main reed. Thus, when the rock bars are in their normal position, there will be one rock bar connected to each escapement reed in the group allocated to the seventy-two character fonts and, specifically, to the escapement reed whose associated magazine channel contains the character corresponding to the finger key which controls the operation of the actuating reed F^3 connected to that rock bar. On the other hand, when the rock bars are in their leftmost position, they will be connected to the group of escapement reeds F that are active in releasing the matrices from a ninety character font. And here, too, a given rock bar will be connected to that escapement reed whose associated magazine channel

contains the character corresponding to the finger key which controls the operation of the actuating reed connected to that rock bar. During a shift of the rock bars from their normal to their leftmost positions, the lugs F^{11} on the rock bars corresponding to the lower case "e" and the large caps "B," "V" and "G" will remain connected to their respective escapement reeds, since these reeds release the same characters regardless of which group of escapement reeds is operative. Here the lugs F^{11} are made long enough to accommodate the endwise movement of the rock bars. In other instances, as where the channel containing a given character in a seventy-two font magazine is relatively close to the channel containing the same character in a ninety font magazine, the shift will involve merely disconnecting the corresponding rock bar from one escapement reed and connecting it to the adjacent escapement reed. The lower case "t" is an example of that condition (Fig. 51). When that condition is present, the length of the lug F^9 is such that when the rock bar is in its rightmost or normal position, its lug will be connected to the appropriate escapement reed of the seventy-two font group and will stand clear of the corresponding reed of the ninety font group (see particularly the solid line position of the lug associated with the front rock bar in Fig. 13); whereas, when the rock bar is in its leftmost position, the conditions will be reversed, i. e., its lug will be connected to the appropriate reed of the ninety font group and will stand clear of its corresponding reed of the seventy-two font group (see the dotted line position of the lug referred to parenthetically above).

In still other instances, the escapement reeds to which a given rock bar will be connected in its different positions are spaced at a substantial distance one from the other. In other words, there may be one or more reeds intervening between the escapement reed in the ninety font group that releases a given character and the escapement reed in the seventy-two font group that releases the corresponding character. Under such conditions, the corresponding rock bar will be provided with two lugs F^9, the spacing and lengths of which are such that when the rock bar is in its rightmost position one lug will be connected to the appropriate escapement reed in the seventy-two font group, while the other lug will stand just clear and to the right of the corresponding escapement reed in the ninety font group. When the rock bars are shifted to the left, both lugs will be displaced operatively to connect the rock bar to the appropriate reed in the ninety font group and disconnect it from the corresponding reed in the seventy-two font group (Figs. 51 and 52). In those instances where the escapement reeds are common to both the ninety and the seventy-two font groups, they will be actuated by different rock bars in the different positions of adjustment of the latter except in the case of the escapement reeds associated with the lower case "e" and the large caps "B," "V" and "G," as previously mentioned. This is clear, since in all cases a given rock bar is controlled at all times from the same key on the keyboard, whereas the escapement reeds common to the two groups will, for the most part, be connected for the release of different characters according to the font contained in the magazine in operative position.

As to those escapement reeds not common to both groups, they may have a rock bar connection only when their rock bars are adjusted for connection with the group of which they form part or their rock bars may have a fixed position of adjustment and remain permanently connected to the appropriate escapement reeds.

The escapement levers D^2 for the auxiliary magazines are actuated by mechanism similar in many respects to that for actuating the escapement levers associated with the main magazines (Fig. 1). Thus, there is provided the series of auxiliary escapement reeds G, previously mentioned, and two banks of horizontally disposed rock bars G^1 located, one in front of the auxiliary escapement reeds, and the other at the rear thereof. The rock bars are arranged one above the other and are provided at their opposite ends, with reduced rounded portions G^2 whereby they are pivotally mounted in fixed frame members G^3 of the machine (Fig. 13). The rock bars of the rear group are formed with lugs G^4 projecting forwardly to engage in notches G^5 formed in the rear edges of one-half of the auxiliary escapement reeds, i. e., every alternate reed; whereas the rock bars in the front group are formed with similar lugs projecting rearwardly to engage in notches formed in the front edges of the remainder of the auxiliary escapement reeds. There is one auxiliary escapement reed G for each of the rock bars G^1 and, here, the connections are permanent since there is no necessity for any endwise shifting of said rock bars G^1.

Like those associated with the main magazines, the rock bars G^1 in the front bank are rocked in a clockwise direction and those in the rear bank in a counterclockwise direction (viewing the machine from the right) to raise the escapement reeds and release the matrices from the auxiliary magazine in operative position. The rock bars G^1 are operated under the control of the main keyboard E and, to this end, a group of rock shafts F^2 in the main banks, and which are connected for operation by those keys of the keyboard that usually control the release of matrices from the auxiliary magazine, are arranged to be moved beyond their normal positions, endwise to the right and into endwise connection with the auxiliary rock bars G^1. As shown in Figs. 13, 25 and 29, the auxiliary rock bars G^1 in the front end rear banks are formed at their left ends, respectively at the front and at the rear, with fingers G^6 extending toward the left somewhat beyond the supporting frame member G^3 at the left. Normally, the fingers G^6 stand clear of the main rock bars F^2 by which they are actuated and which are in axial alignment therewith, but when the main rock bars in question are moved toward the right beyond their normal positions, a lug F^{13} with which each of said main rock bars is provided at its right end is moved into overlying engagement with the finger G^6 on the corresponding auxiliary rock bar, or into a position such that the auxiliary rock bar will be turned to raise its associated escapement reed upon the operation of the main rock bar to which it has been connected.

At this point, it should be mentioned that the lugs F^9 which connect the main rock bars F^2 with the actuating reeds F^3 are long enough to maintain the connection regardless of the longitudinal position of the rock bars. Thus, as shown in Fig. 13, the lug F^9 on the rock bar corresponding to the lower case "n" may be moved from the solid line position to the dotted line position without destroying the connection as the rock bar is ad-

justed leftward from its normal position. The lug F^9 on the rock bar corresponding to the large cap "E," and which is one of those used to release a character from the auxiliary magazine, may be moved from the solid line position to either of the dotted line positions without destroying the connection as the rock bar is moved either leftward from its normal position during a substitution of main magazines or rightward from its normal position during a shift to the auxiliary magazine.

Mention should also be made of the fact that the lugs F^{11} on the main rock bars F^2 which are shiftable rightward to connect with the auxiliary rock bars G^1 will clear their associated main escapement reeds when the auxiliary magazine is in use.

Power actuated keyboard

The keyboard proper is of standard form, consisting of ninety keys E^1 appropriately labeled and presented at the front ends of key levers E^2 centrally fulcrumed on cross-shafts E^3 supported at their opposite ends in the keyboard frame (Figs. 3, 14 and 15). Broadly speaking, the operation is similar to that of the standard machine, i. e., upon the depression of a finger key, intermediate power mechanism, operating through a single cycle upon the appropriate actuating reed F^3, serves to raise the corresponding escapement reed F and release the matrix. The intermediate power mechanism, however, is substantially different from standard and will be described in detail.

As shown in Figs. 3 and 11, the actuating reeds F^3 in the front bank are formed at their lower ends with notches F^{14} to receive the rear ends of a series of rocker levers F^{15} disposed in a fore-and-aft direction and centrally fulcrumed upon a cross-rod F^{16} fixed at its opposite ends in lugs depending from a transverse angle member F^{17} constituting part of the fixed reed frame, there being one such rocker lever for each actuating reed in the bank. The rocker levers are held in their normal positions by compression springs F^{18} reacting downwardly against the upper edges of the rocker levers just in advance of their fulcrums. The springs seat in recesses F^{19} formed in the overlying angle member F^{17} and encircle small protrusions F^{20} presented on the upper edges of the rocker levers and which serve to hold the springs in place. The springs tend to turn the rocker levers in a counterclockwise direction looking at the machine from the right, their normal positions being determined by upper bearing surfaces F^{21} which react against the bottom surface of the angle member support F^{17}. When the rocker levers are in their normal positions, the associated actuating reeds F^3 are held in their raised positions. As shown, the connections between the reeds F^3 and the rocker levers F^{15} are of a swivel type insuring positive action at all times.

The actuating reeds F^3 in the rear bank are operated by a series of rocker levers F^{15} identical in all respects with those operating the reeds of the front bank insofar as their construction, mounting and operation are concerned, but there is a front to rear reversal in their positions, the notches F^{14} in the rear actuating reeds facing rearwardly to receive the front ends of the rocker levers which normally are urged in a clockwise direction by their associated springs F^{18}. In other words, in releasing matrices, the rocker levers in the front bank are turned in a clockwise direction and those in the rear bank in a counterclockwise direction, against the reaction of their associated springs, to pull the corresponding actuating reeds downwardly and raise the escapement reeds F through the rock bars F^2. After each operation, the rocker levers are restored to their normal positions by their associated springs F^{18}, the levers in turn restoring the actuating reeds to their normal positions as well as the escapement reeds F through the rock bar connections just mentioned.

There is a power mechanism assembly for operating each series of rocker levers, which assemblies, except for a front to rear reversal, are identical. Each assembly includes, in part, a channel H mounted upon a transverse frame member H^1 located, one beneath each bank of rocker levers. The channels present, each, an upper and a lower flange H^2 and H^3, extending forwardly in the case of the front assembly, and rearwardly in the case of the rear assembly. The channel members H serve each to support a series of vertical thrust transmitting elements H^4, there being one such element for each rocker lever F^{15}, located in the case of the front series directly beneath the front ends of the rocker levers in the front bank, and in the case of the rear series directly beneath the rear ends of the rocker levers in the rear bank (Figs. 11, 14 and 15).

Each thrust transmitting element H^4 consists of a vertically disposed cylinder H^5 supported at its lower end, when in normal position, on the lower channel flange H^3. The cylinder is closed at its lower end by a member H^7 having an enlarged cylindrical portion fitting within the cylinder and formed with an annular groove into which the cylinder wall is pinched to produce a permanent connection when the thrust transmitting element is assembled. The element H^7 is formed at the bottom with a reduced portion H^{10} extending through the lower channel flange H^3 on which the cylinders are supported and, at the top, with an upper reduced portion serving to center, in the cylinder, a coil spring H^8 arranged to react between the enlarged portion of the member H^7 and an enlarged portion H^6 of a slidable plunger which is pressed by the spring against the upper end wall of the cylinder. The upper end wall of the cylinder is drilled to accommodate a reduced plunger stem H^9 which extends upwardly beyond the cylinder and through the upper channel flange H^2. The overlying and underlying flanges H^2 and H^3 serve to guide the thrust transmitting elements for limited vertical movement, there being sufficient clearance between the upper flange H^2 and the upper end of the cylinder H^5 when the latter is resting in its normal position on the flange H^3 to permit a degree of upward movement sufficient to rock the overlying lever F^{15} the extent required for releasing a matrix. The spring H^8 which reacts between the plunger and the member H^7 is strong enough to overcome the force exerted by the rocker lever spring F^{18} and also strong enough to overcome whatever friction and resistance is presented to the operation of the parts, so that normally the thrust transmitting element acts as if it were rigid and of constant length. However, in those cases where some obstruction is presented to the operation of the parts, and particularly when the rocker levers are locked against operation in a manner described hereinafter, an attempted raising of the thrust transmitting element will result merely in the compression of the spring H^8 without injury to the parts.

Beneath each bank of the thrust transmitting elements H^4, there is located a corresponding bank of levers H^{11} fulcrumed centrally on a fixed rod H^{12} extending from one side of the keyboard to the other and equally spaced along the rod by a comb plate *h*, there being one rod for each series of levers, and one lever in a series for each thrust transmitting element. Each lever is provided with one arm H^{13}, extending forwardly or rearwardly according as it forms part of the assembly operating the front or rear series of rocker levers F^{15}, to a position underlying its associated thrust transmitting element H^4, and a second arm H^{14} extending in the opposite direction and also downwardly to engage the periphery of an edge cam H^{15}, the end of the arm H^{14} being rounded off to present a suitable bearing surface. In number, the edge cams H^{15} equal the levers H^{11} and are arranged in two banks, one behind the other.

There is a transverse driving shaft H^{16} for each bank of cams extending from one side of the keyboard to the other, and on which the cams are loosely or freely mounted (Figs. 3 and 11). The shafts H^{16} are disposed in parallel relation and are driven in opposite directions from a continuously operating source of power. Although the shafts H^{16} rotate continuously, the cams H^{15} are normally held stationary until the finger key E^1 is depressed (there being a corresponding finger key for each cam), whereupon means are rendered operative to effect a driving connection between the selected cam and the shaft on which it is mounted. The cam remains connected to the shaft until it completes one cycle of rotation, when the driving connection is broken and the cam brought to rest. The cam configuration is such that, during a cycle of rotation, the associated levers H^{11} will be rocked to raise the overlying thrust transmitting element H^4 and operate the overlying rocker lever F^{15}. The active rocker lever F^{15}, through the actuating reed connected thereto, will turn the corresponding rock bar F^2 to actuate the escapement reed which happens to be connected to the rock bar at the time.

In order to effect the driving connection between the cams H^{15} and the drive shafts H^{16}, there is provided, in association with each cam, an individual clutch unit which is rendered active upon the depression of the corresponding finger key and which positively connects the cam for rotation by the shaft. At the completion of the cam cycle, the clutch is rendered inactive and the cam positively brought to rest in its normal position. The details of the cam and clutch mechanism are best shown in Figs. 4 to 10. Referring to Fig. 4, which shows an exploded view of the elements composing a cam and clutch assembly, it will be observed that in addition to the cam H^{15} proper, the assembly includes two washers H^{18} and H^{19} adapted to be located one on each side of the cam, a third element H^{20} comprising two spaced annular members, one of which is formed with teeth H^{21} in its outer periphery, a spline H^{22}, and a yoke member H^{23} formed with spaced legs H^{24} presenting at their lower ends, inwardly projecting opposed portions H^{25} adapted to enter radially between the spaced members of the element H^{20}. The shaft H^{16} is formed with four longitudinal grooves H^{26}, equally spaced around its otherwise cylindrical surface, with an additional smaller longitudinal groove H^{27} located midway between two of the other grooves. At regular intervals along the shaft, i. e., at each position corresponding to the location of a cam (Fig. 12), there are provided two parallel circular grooves H^{28} located in planes perpendicular to the shaft axis. Were it not for the interruptions in the cylindrical surface of the shaft resulting from the longitudinal grooves therein, these circular grooves would be continuous. The washers H^{18} are formed with four protrusions H^{29} equally spaced about their internal periphery so as to correspond with the spacing of the grooves H^{26} in the shaft. In addition, the internal protrusions on the washers are formed with recesses, one only of which is active, as will presently appear.

During assembly, one washer H^{18}, with its protrusions H^{29} entering the grooves H^{26} in the shaft, is slid along the shaft until it registers with the desired one of the circular grooves H^{28}, whereupon it is turned about the shaft through an angle of 45° or until the recess H^{30} in one of the protrusions registers with the smaller longitudinal groove H^{27} in the shaft. After the washer, the cam H^{15} is slid along the shaft, and after the cam, the second washer H^{19} is assembled on the shaft in the same manner as the first. Next comes the toothed element H^{20} which, as previously stated, consists of two spaced circular elements. These elements are held in proper spaced relation by four internal yoke members H^{31} equally spaced apart about the internal periphery and formed each with axially spaced apertures to accommodate correspondingly spaced lugs H^{32} on the internal edges of the spaced members. The lugs are press fitted into the spaced apertures to hold the yoke member in place. When the element H^{20} is in place on the shaft, the yoke members H^{31} fit into the longitudinal grooves H^{26} thereof and their lateral edges are machined to provide a sliding fit with the walls of said grooves. The element H^{20} and the washers H^{18} and H^{19} are constrained to rotate with the shaft, the former by reason of the engagement of the yoke members H^{31} in the groove H^{26} thereof, and the latter (the washers) because they are interlocked with the shaft by the spline H^{22}, which, when the cam assembly is complete, seats in the small longitudinal groove H^{27} in the shaft and also in the recesses in those protrusions of the washers that register with the shaft groove H^{27} (Fig. 9). The washers are held against movement along the shaft H^{16} by reason of the engagement of their protrusions H^{29} in the circular recesses H^{28}, and since the cam is located between the washers, it too will be held against movement along the shaft. Relative movement between the shaft and the cam is permitted, however, since the cam is bored to fit upon the cylindrical portions of the shaft between the grooves. The toothed element H^{20} does have a limited movement along the shaft, although normally it is held in spaced relation with the cam by the yoke member H^{23}, which is supported by an overlying rod H^{33} extending in a fore-and-aft direction and which is mounted at one end in the transverse member H^1 of the keyboard frame (Figs. 6, 11 and 12). The yoke H^{23} is formed at the top with two spaced hook portions H^{34} which seat upon the supporting rod and permit the yoke to pivot with respect thereto.

As shown in Fig. 12, each yoke H^{23} is also formed in its upper edge and between its hook portions with a small flange or tongue H^{35} extending upwardly at an angle away from the associated cam. The flanges H^{35} of all the yokes

in each bank are engaged at the top by the teeth of a leaf spring H^{36} in the form of a comb plate secured to the fixed frame member H^1. The leaf spring tends to rotate the yoke member H^{23} in a direction to move its toothed element H^{20} along the shaft toward its associated cam, but normally, such movement is prevented by a lug H^{37} which projects from one face of the cam into engagement with a protrusion or blister H^{38} formed in the adjacent face of said yoke member (see Figs. 6 and 10).

It will now be seen that the only element of each individual cam assembly which normally does not rotate with the shaft is the cam itself, and that such conditions will be maintained so long as the cam is held in its normal position with its lug H^{37} in registry with the blister H^{38} on the yoke. The cam is maintained in its normal position by an overlying fore-and-aft lever H^{39} formed in its lower edge with a lug H^{40} which stands in the path of the lug H^{37} on the cam, the lug serving as an arresting abutment to locate the cam in its normal position. There is, of course, one such lever H^{39} for each cam, and those which are associated with the front cam assembly are pivotally mounted adjacent their front ends on a cross rod H^{41} supported at its opposite ends in lugs depending from the front frame member H^1, the latter member having a comb formation at the bottom properly to space the levers along the rod H^{41}. The levers H^{39} associated with the rear cam assembly are in all respects the same except for being reversed in position, i. e., they are pivotally mounted at their rear ends, in spaced relation, on a cross rod H^{41} supported at its opposite ends in lugs depending from the rear frame member H^1. The normal positions of the levers H^{39} are determined by banking surfaces h^1 presented by their upper edges and which engage the bottom surfaces of the frame members respectively supporting them (Fig. 11).

The levers H^{39} at their free ends (i. e., the rear ends as regards the levers in the front cam assembly and the front ends as regards the levers in the rear cam assembly) overlie a bank of vertically disposed key rods E^4 which are guided for limited vertical movement, at the top, in slots formed in an upper comb plate E^5 fixed to a keyboard frame member and, at the bottom, in a lower comb plate (not shown). There are ninety-one key rods (one for the space-bands) in this bank, every other one being arranged to cooperate with the levers H^{39} of the front cam assembly, and the remaining ones with the levers H^{39} in the rear cam assembly. Each key rod is provided with a notch e to receive the reduced rear end portion of one of the key levers, it being recalled, that the invention contemplates the use of the standard "Linotype" keyboard which is provided with ninety keys.

The operation is as follows: When the operator depresses a finger key, the corresponding key rod E^4 is raised, causing the overlying lever H^{39} to turn from the dotted to the solid line position shown in Fig. 5, it being understood that this figure represents the front cam assembly, although the same operation would occur as regards the rear cam assembly if the finger key depressed happened to be associated with one of the cams of that group. As the lever H^{39} is tilted upwardly, the stop lug H^{40} thereon lifts clear of the lug H^{37} projecting from the associated cam H^{15}, thus freeing the cam for rotation. As will be made clear presently, there is sufficient drag between the washers H^{18} and H^{19} (which rotate with the shaft) and the cam itself (which is otherwise freely mounted on the shaft) to turn the cam until the lug H^{37} thereon moves clear of the blister H^{38} with which the associated yoke H^{23} is provided. Thereupon, the reaction of the overlying leaf spring H^{36} turns the yoke in a direction to move the associated toothed clutch member H^{20} shaftwise toward the cam, that is, from its inactive position shown in Fig. 6 to its active position shown in Fig. 7. It should be noted that the spacing of the elements comprising the clutch member H^{20} in effect constitutes a groove or track to receive the inwardly projecting portions H^{25} of the yoke member H^{23}, enabling the latter to shift the clutch member shaftwise without interfering with its rotation by the shaft H^{16}. Furthermore, since the portions H^{25} are diametrically opposed, there will be no tendency for the clutch member to cant out of its proper position or bind upon the shaft during its shifting movement. In its active position, the teeth H^{21} of the clutch member are located in a plane permitting two of them to engage a pair of diametrically opposed protrusions H^{42} struck up or offset from the adjacent face of the cam H^{15} and, as the shaft H^{16} continues to rotate, the clutch member which is keyed thereto will positively drive the cam through one rotation or until the lug H^{37} on the cam again arrives adjacent the blister H^{38} on the yoke member H^{23} to restore the latter to its normal position. The restoration of the yoke member shifts the clutch member shaftwise away from the cam to destroy the driving connection. In the meantime, the overlying lever H^{39}, having dropped back to its normal position as the operator released the finger key, will have located its depending lug H^{40} in the path of the lug H^{37} to arrest the cam in its normal position. Here again, the drag between the washers H^{18} and H^{19} and the cam H^{15} will be sufficient to continue the cam's rotation, after the clutch has been released, to insure that it will be restored to its normal position as determined by the lug H^{40} on the lever H^{39}. During the rotation of the cam, the lever H^{11}, which tracks along the edge thereof, will be rocked from the dotted to the solid line position shown in Fig. 5 to raise the overlying thrust transmitting element H^4 and, through the related rocker lever F^{15} and the associated actuating reed and rock bar, operate the escapement reed connected at the time to the rock bar, thus releasing from the appropriate magazine the matrix corresponding to the key depressed.

At this point, it may be appropriate to mention the cause of the drag between the washers H^{18} and H^{19} and the cam H^{15} which results first in displacing the cam sufficiently to render the clutch active and which, later on, at the end of the cycle, restores the cam to its normal position after the clutch has been rendered inactive. Referring to Fig. 11, it will be observed that the cam assemblies are encased in housings H^{43} which contain oil in which the cam assemblies operate at all times. Not only does this reduce the wear upon the parts, but in addition keeps them free from dust and dirt since, should dust accumulate in the housings H^{43}, it will merely drop to the bottom thereof where it can be removed when the oil is replaced. The arrangement insures a film of oil at all times between the cams and the adjacent washers, thereby creating the drag which will have a rather definite value suitable for the purpose intended, assuming an oil of a given viscosity and the design of the parts with that viscosity as a consideration. In other words, by

selecting an oil of the proper viscosity, the drag developed by it, or what is the same thing, the force capable of being transmitted by it, is so definitely ascertainable that the operation is substantially as positive as if the connections were mechanical in the narrower sense.

The keyboard unit E is mounted for bodily movement in a fore-and-aft direction from its normal position, in which the thrust transmitting elements H^4 directly underlie the levers F^{15} operated thereby (Fig. 56), to a forward position, in which the rear bank of thrust transmitting elements stands clear of the front bank of levers F^{15}, the entire keyboard mechanism then being accessible for servicing or repair (Fig. 58). To facilitate this bodily movement of the keyboard unit (see Fig. 53), a main rear frame member E^6 thereof is formed with two laterally spaced rearwardly projecting arms E^7, to each of which is secured a rearwardly extending bar E^8 supported and guided for fore-and-aft movement by anti-friction rollers E^9 rotatably mounted on studs E^{10} presented by two laterally spaced elements E^{11} of a supporting frame member E^{12}. In addition to the side elements E^{11}, which are located adjacent and exteriorly of the bars E^8, the frame member includes front and rear cross members E^{13} and E^{14}, integral with the side members to lend strength and rigidity, and also a pair of upwardly extending arms E^{15} located at the rear of the frame and pivotally supported at their upper ends on hinge pins E^{16} mounted in lugs formed on a fixed frame member E^{17} of the machine.

The anti-friction rollers E^9 have both their faces flanged to engage the lateral faces of the bars E^8 in order to prevent sidewise displacement of the keyboard unit in an endwise direction. Three rollers E^9 are used in conjunction with each bar E^8, one being located near the front of the supporting frame E^{11} beneath the bar, and the other two above the bar, the spacing of the latter two being such that when the keyboard unit is in its normal position, the rear roller will engage the top of the bar near its rear end, whereas when the unit is in its forward position, the front roller will engage the top of the bar near its rear end (Figs. 56 and 58). A rail member E^{18}, secured to the right side member E^{11} adjacent its inner face and beneath the bar E^8 at that side, suffices to prevent the keyboard unit from being tilted upwardly inadvertently (Figs. 53 and 55). With the arrangement just described, the overhanging weight of the keyboard mechanism will be adequately supported regardless of its position.

The keyboard unit is limited in its forward movement by a washer E^{19} attached to the right-hand bar E^8 at its rear end and having a portion which projects beyond the left face of said bar so as to engage a lug E^{20} fastened to the rail member E^{18} when the unit is moved forward. Such is the location of the lug E^{20} that when it is engaged by the washer E^{19}, the keyboard unit will be in its full forward position clear of the levers F^{15}. At this point, it might be stated that if it is desired to remove the keyboard unit completely from the machine, the removal of the washer E^{19} will permit the bars E^8 to be drawn forward clear of the anti-friction rollers without interference.

The keyboard unit E is located in its normal position and held against movement in a fore-and-aft direction by a locking bolt E^{21} slidably arranged in an outboard extension E^{22} of the supporting frame E^{12} at the right (Figs. 53, 55 and 57). The bolt is approximately square in cross section and is guided for limited movement in a direction transversely of the machine by an L-shaped plate E^{23}, one leg being secured to the outboard extension E^{22} at the top, and the other recessed at the bottom to receive the bolt member. The bolt, at its inner end, is formed with a reduced rounded end portion E^{24} to engage in a hole E^{25} presented by a small lug E^{26} fastened to the rear frame member of the keyboard mechanism near the bottom. Normally the rounded end portion of the bolt engages in the hole and locates the keyboard unit in its proper position in a fore-and-aft direction with reference to the supporting frame E^{12}, but when it is desired to move the keyboard unit forwardly, the bolt is pulled outwardly toward the right until its end clears the hole, whereupon the keyboard unit is free to be moved.

Before the keyboard unit E is moved forwardly, however, it is lowered slightly to allow ample clearance between the thrust transmitting elements H^4 and the levers F^{15} which are operated thereby, regardless of their positions. For this purpose, there is provided, below the keyboard supporting frame E^{12} and adjacent the front end thereof, a handle E^{27} which is integrally secured to a transverse rock shaft E^{28} horizontally located below the keyboard and journalled near its ends in open-top bearings E^{29} presented by brackets E^{30} mounted upon the fixed frame of the machine. There are two cams E^{31} fixed upon the rock shaft E^{28}, one adjacent each end thereof, the one at the right being formed as an integral part of the handle E^{27}. The cams are arranged to cooperate each with an overlying banking screw E^{32} threaded upwardly into the supporting frame E^{12} near its front end and which is adjustable to insure the proper location of the parts. Such is the configuration of the cams E^{31} that when the handle E^{27} is located in the position shown in Fig. 56, the supporting frame will be adjusted to locate the thrust transmitting elements H^4 in proper operative relation with the levers F^{15}, whereas when the handle is turned upwardly to the position shown in Fig. 58, the pivotally mounted supporting frame will be allowed to swing or drop downwardly a distance sufficient to permit the thrust transmitting elements to clear the levers as the keyboard unit is moved forwardly.

The cam E^{31} at the right, i. e., the one formed integrally with the handle E^{27}, is provided with two laterally projecting pins E^{33} adapted one, to engage the adjacent supporting bracket E^{30} at the top, and the other to engage the said bracket at the front, thus to determine the different terminal positions of the handle. It will also be observed that the pins E^{33} on the cam are so located with reference to the rock shaft E^{28} that the weight of the keyboard unit tends always to maintain the handle E^{27} in the terminal position to which it is adjusted by the operator.

As previously stated, the keyboard mechanism is power driven and, as part of the present invention, the power drive is automatically disconnected from the keyboard as the latter is unlocked to permit its forward movement and automatically reconnected to the keyboard when the latter is moved rearwardly and located in its normal position. It will be recalled that the reed actuating cam devices H^{15} are arranged to be coupled for rotation by a pair of continuously operating shafts H^{16}. As shown in Figs. 53 and 54, these shafts, at their right ends, are provided with gears E^{34} which mesh with a pair of overlying pinions E^{35} fixed on stub shafts E^{36} jour-

nalled in brackets E^{37}, secured to the keyboard frame. At their right ends, beyond the brackets, there are affixed to the stub shafts a pair of pulleys E^{38}, i. e., one pulley on each shaft, which pulleys are driven by a continuous belt E^{39} threaded around them in opposite directions as well as around two other pulleys E^{40} and E^{41} arranged on stub shafts E^{42} and E^{43} mounted on the keyboard frame, one somewhat above and to the rear of the pulleys E^{38}, and the other below said pulleys near the bottom of the keyboard frame, the belt and pulley arrangement being such as to drive the shafts H^{16} in opposite directions as is required for reasons which have been previously set forth (Figs. 56, 57 and 58).

The stub shaft E^{43} is threaded at one end into the keyboard frame and is formed at its outer end with a head E^{44} for retaining the pulley E^{41} in place, the pulley being recessed so that its outer face is flush with that of the pulley (Fig. 57). The pulley E^{41} is formed with two grooves E^{45} and E^{46}, one for the belt E^{39} which drives the pulleys E^{38}, and the other for a continuous belt E^{47} which also passes around a pulley E^{48} on a continuously rotating countershaft E^{49}. As long as the belt travels in the outer groove E^{46} of the pulley E^{41}, the keyboard will be continuously driven in the required manner. However, when it is desired to move the keyboard unit forwardly from its normal position, the driving belt E^{47} is shifted from the groove E^{46} in the pulley E^{41} rightward into a groove E^{50} of an idler pulley E^{51} of the same size and which is arranged immediately adjacent the pulley E^{41} (Fig. 57).

The pulley E^{51} is rotatably mounted on a stub shaft E^{52} threaded into the aforementioned outboard bracket E^{22} and coaxially aligned with the stub shaft E^{43} on which the double grooved pulley E^{41} rotates. The stub shaft E^{52} is also formed with a head E^{53} fitted into a recess of the pulley E^{51} so that its face is flush with that of the pulley, both pulleys E^{41} and E^{51} thus being located in close spaced relation.

A belt shifter E^{54}, secured to the slide bolt E^{21} at the bottom, extends forwardly and upwardly, being bifurcated at its upper end to straddle the driving belt E^{47}. Hence, when the slide bolt E^{21} is pulled outwardly to release the keyboard unit preparatory to moving it forwardly, the shifter E^{54} will carry the belt E^{47} off the double pulley E^{41} and onto the idler pulley E^{51}, thus automatically disconnecting the power drive from the keyboard mechanism without interfering with the position of the driving belt on the main driving pulley E^{48} and, of course, freeing the keyboard unit (Fig. 58). And conversely, when the keyboard unit is restored to its normal position, and the slide bolt E^{21} is pushed inwardly to locate and lock the keyboard unit in place, the shifter E^{54} acts automatically to carry the belt E^{47} from the idler pulley back to the appropriate groove E^{46} in the pulley E^{41}, thereby reestablishing the driving connection. At this point it might be stated that the slide belt E^{21} is formed at its right or outer end with a cross pin E^{55} to facilitate its adjustment by the operator.

According to the present invention, as one main magazine is substituted for another, there is rendered active automatically the group of reeds for a ninety of a seventy-two character font, depending upon the requirements of the newly selected magazine, the automatic selection of the appropriate reed group being under the control of the hand lever J by which the selection of the magazines is effected. Also, in accordance with the invention, the group of reeds associated with the auxiliary magazine are connected for operation by the apropriate keys of the main keyboard and disconnected therefrom through the manipulation of a pair of finger keys located at the front of the machine adjacent the control box. The keys are designated "Aux." and "Main" (Fig. 23) indicating, respectively, the auxiliary and main magazines. When the "Aux." key is depressed, the reeds associated with the auxiliary magazine are placed under the control of the keyboard, whereas when the "Main" key is depressed, the keyboard control reverts to the reeds associated with the main magazines.

With regard to the main magazines, the selection of the proper reed group involves the performance of a definite series of operations in sequence as the new magazine is substituted for the old. In order, these operations are as follows: First, the rocker arms F^{15} in the train of reed-operating connections are locked against operation; and simultaneously therewith, the usual feeler devices associated with the distributing and assembling mechanisms are operated to insure that there are no matrices to interfere with the shifting movement of the magazines. Second, means are rendered active to shift the horizontal rock bars F^{2} to a neutral position which, as will be recalled, corresponds to that in which the rock bars are connected to the group of reeds allocated to a seventy-two font magazine. In those cases where the magazine in operative position is a seventy-two font magazine, no functional movement of the rock bars will take place. The third operation in sequence involves the release of the magazine shift frame bolts A^{10}, and the fourth, the energizing of the pneumatic cylinder and piston device A^{9} at one end or the other depending upon the direction in which the shift frame must be moved to bring the selected magazine into operative position. Upon the arrival of the selected magazine in operative position, the foregoing operations are reversed in proper sequence, it being noted here, however, that, while the locking bolts A^{10} do not enter the notches A^{12} corresponding to the newly selected magazine until such magazine is in operative position, actually the bolts are freed for operation prior to the magazine's arrival in order that they will snap into the proper notches when the magazine does arrive. In other words, the locking bolts, in the final analysis, determine the proper location of the shift frame in selecting any given magazine for operation. After the bolts A^{10} have seated, the horizontal rock bars are shifted laterally to the left or are held in their neutral positions, according as the newly selected magazine contains a ninety or a seventy-two character font. Subsequent to the location of the rock bars, the keyboard it unlocked for the composition of matrices from the newly selected magazine. While the controls are designed to effect the performance of the various operations in the sequence stated, conditions of course may arise to interfere with the performance of any one of them. Accordingly, safety devices have been included which act to prevent the performance of subsequent operations in the event a preceding operation fails of completion.

The keyboard locking device includes two transverse plates K and K^{1} located, one overlying the forward ends of the rocker levers F^{15} operating the front bank of actuating reeds F^{3}, and the other overlying the rear ends of the rocker levers F^{15} operating the rear bank of actuating reeds

F^3 (see Figs. 1, 11 and 20). The plates K, K^1 are arranged for parallel movement from an upper position clear of the rocker levers F^{15} (in which position of the plates, the rocker levers are free to perform in the usual way) to a lower position into engagement with the upper edges of the rocker levers to lock them against operation. It will be clear now how the thrust transmitting members H^4, by which the rocker levers F^{15} are actuated, serve as a safety measure to prevent breakage of the parts in the event the operator inadvertently touches a key of the keyboard during the period in which the locking plates K, K^1 are active. In addition to preventing the inadvertent operation of the escapement reeds F during a magazine shifting operation, the locking plates K and K^1, as they are moved to active position, serve also to restore any escapement reeds that may, through sticking, have failed to return to normal position. This is accomplished through the rockbar F^2, the actuating reed F^3 and the rocker lever F^{15}, associated with the offending reed, all of which elements are positively interconnected, the locking plate effecting the operation through its action upon the rocker lever. While it is true that all of the escapement reeds, at any given time, will not have a rockbar F^2 connected to it, all of those reeds that have been in use immediately previous will have such a rockbar connection and as to those reeds, a return to normal position will be insured. No concern need be had with regard to the remaining reeds since they are always restored to normal position when the rockbars are disconnected from them and since, there is nothing to move them out of normal position in the absence of a rockbar connection.

The locking plates K, K^1 are mounted respectively upon the front and rear fixed keyboard frame members F^{17} by means of pin and slot connections K^2 located at the opposite ends of the plates, the slots being inclined in a direction such that, as the plates are moved leftward from their normal or inactive positions, they will be constrained to move downwardly to their active positions, i. e., from the position shown by the dot and dash lines to the position shown by the solid lines in Fig. 20. Somewhat to the right of the locking plates K, K^1 there is mounted a fore-and-aft rock shaft K^3 journalled in spaced bearings K^4 integral with the fixed bracket J^1, said shaft being provided adjacent its opposite ends with a pair of upstanding arms K^5, K^6 (Fig. 23). The front arm K^5 and rear arm K^6 are connected respectively with the front and rear locking plates K, K^1, the connections being through the medium of horizontal links K^7, K^8, pivotally secured at one end to the locking plates and at the other end to the arms K^5, K^6 near the top. The front arm K^5 is formed with a rightward extension K^9 in overlying engagement with the rounded portion of a nut K^{10} threaded on a shoulder screw *k* passing in a fore-and-aft direction through another arm K^{11} extending rightward and formed integrally with a sleeve K^{12} rotatably mounted on the rock shaft K^3 (Figs. 20, 23 and 24). A collar K^{13}, pinned to the shaft K^3, serves to lock the sleeve against longitudinal movement thereon, so that the underlying position of the nut K^{10} with reference to the arm K^9 will be maintained at all times. At its rear end, the sleeve K^{12} is formed with a second arm K^{14} extending to the right and overlying the upper end of a piston rod K^{15} forming part of a vertically disposed pneumatically operated cylinder and piston device K^{16} fixed at the underside of the bracket J^2. A pipe line K^{17}, connected to the cylinder below the piston, permits the cylinder under normal conditions to be vented to the atmosphere through valve mechanism later to be described. However, during the initial stages of a magazine shifting operation, the cylinder is charged with air pressure, which results in raising the piston rod K^{15} and turning the overlying arm K^{13} and, consequently, the sleeve K^{12} in a counterclockwise direction viewed from the front. By virtue of the connections just described, the rock shaft K^3 will likewise be turned in a counterclockwise direction, thus imparting to the locking plates K, K^1, through their respective arm and link connections K^5, K^6, K^7 and K^8, that movement toward the left which causes them to assume their active positions. Later on, after the magazine shifting operation has taken place, the cylinder of the pneumatic device K^{16} is vented to the atmosphere, thereby permitting the parts to be restored to their normal positions through the medium of a spring K^{18} connected at its upper end to the arm K^9 and having a fixed anchorage at its lower end in one of the ribs J^2 of the bracket J^1 (Fig. 20). The initial tension in the spring plus that imparted to it during the movement of the locking plates to active position will be adequate fully to restore the parts to their normal positions.

The above mentioned pneumatic cylinder and piston device K^{16} also serves to operate feeler devices for determining whether or not the magazines are free to be moved. As shown in Fig. 2, there is provided the usual feeler device to operate between the assembler entrance D and the operative magazine, said device consisting of a frame L with a cross element L^1 arranged to be moved downwardly across the assembler entrance to determine whether any obstructions are present (such as a protruding matrix) to interfere with the movement of the magazines. The frame L is operated from a pair of arms L^2 extending rearwardly from the rock shaft D^6 which, as previously stated, serves to lock the escapement levers D^2 in a position clear of the escapement devices. When the rock shaft D^6 is rotated in a clockwise direction the frame L is moved downwardly, whereas when it is rotated in the opposite direction the frame is restored to its normal position. A feeler device is also provided in conjunction with the distributor and includes a plate L^4 adapted to be moved rearwardly between two of the distributor screws to determine whether or not the distributor bar is free of matrices. The plate L^4 is supported by depending pivotally mounted arms L^5 which are normally spring-held in a position to maintain the feeler plate inactive or out of the matrix path.

The two feeler devices are conjointly operated through the medium of a vertically movable link L^6 located at the front of the machine and pivotally connected at its upper end to an arm L^7 fixed to and extending forwardly from the cross shaft D^6. The connections to the distributor feeler include an upwardly extending arm L^8 likewise fixed to said shaft D^6 and connected at its upper end to a horizontal rod L^9 operating a linkage including two bell crank levers L^{10} and L^{11} and an intermediate vertically disposed rod L^{12}, the upper bell crank lever being mounted in a position to push the distributor feeler plate L^4 beneath the distributor bar when the parts are operated. According to this arrangement, then, as the vertical rod L^6 at the front of the machine

is moved upwardly, the transverse shaft D^6 will be rocked in a clockwise direction, this operation serving to operate both of the feeler devices in well known manner; and, when the rod is moved downwardly, the feeler devices will be returned to their normal inoperative positions. Incidentally of course, the rock shaft D^6 acts to insure that the escapement levers D^2 are located in their normal positions wherein they are maintained until the rock shaft is restored. The rock shaft D^6 through the escapement levers D^2 and quite independently of the locking plates K, K^1, insures that the escapement levers are located in their normal positions during a magazine shifting operation.

The rod L^6 is connected at its lower end to the sleeve arm K^{11} by the shoulder screw *k* previously referred to and, consequently, will be raised to operate the feeler devices and restored to its normal position conjointly with the adjustment of the locking plates into and out of active position (Figs. 20, 23 and 24). However, should some obstruction be presented to the operation of the feeler devices, the sleeve K^{12} will be prevented from turning, with the result that certain other operations necessary to effect the substitution of one magazine for another will fail to take place. What these operations are will be mentioned at a later and more convenient place in the specification.

The locking plates K, K^1 are also rendered active to prevent the operation of the rocker levers F^{15} during the shift which connects the auxiliary magazine escapement reeds G for operation by the keyboard. This operation is effected by the rotation of the fore-and-aft rock shaft K^3 in a counterclockwise direction, as in the case of substituting one for another of the main magazines. Here, however, the rock shaft K^3 is turned by a separate arm K^{19} pinned directly to the shaft K^3 and which extends toward the right to overlie the upper end of a vertically movable piston rod K^{20} forming part of another pneumatically operated cylinder and piston device K^{21} secured to the bracket J^1 directly in back of the aforementioned cylinder and piston device K^{16} (Figs. 16, 23 and 24). A pipe line K^{22}, connected to the cylinder K^{21} at the bottom, permits the cylinder to be vented to the atmosphere under normal conditions through valve mechanism later to be described, the piston then being located in its lowermost position. Under such conditions, the rock shaft K^3 will be located in its normal position and the locking plates K, K^1 will be inactive except, of course, when the main magazines are being shifted. However, when the cylinder K^{21} is charged with air pressure through the pipe line K^{22}, the piston rod K^{20} will rise to rock the shaft K^3 and move the locking plates K, K^1 to their active positions through the connections previously described. Subsequent venting of the cylinder, after the connections for releasing the matrices from the auxiliary magazine have been established, will permit the locking plates to be rendered inactive by the restoration of the rock shaft K^3 to its normal position under the influence of the spring K^{18}.

The identical operations take place when the escapement reeds G associated with the auxiliary magazine are disconnected from the keyboard. In this connection, it will be noted that the sleeve K^{12}, which operates the rock shaft K^3 during a shift of the main magazines and which also controls other mechanism incidental to that shifting operation, is not disturbed when the rock shaft K^3 is turned to enable the auxiliary magazine to be connected for operation by the keyboard or disconnected therefrom. In other words, while the connections are partly common, separate controls are provided for operating the keyboard locking mechanism according to whether the operation involves a shift of the main magazines or a shift to or from the auxiliary magazine.

During the interval that the locking plates K, K^1 are active, the rock bars F^2 are shifted as required to accord with the new conditions of machine operation, i. e., if the condition is one of moving the shift frame to substitute in operative position a magazine containing a seventy-two character font for one containing a ninety character font, said rock bars will be shifted from their leftmost positions toward the right to their normal or neutral positions, thereby disconnecting them from the group of escapement reeds F active in releasing matrices from a ninety character font and connecting them with the group of escapement reeds active in releasing matrices from a seventy-two character font; and those connections will be maintained upon the arrival of the magazine containing the seventy-two character font in operative position. If the condition is one of substituting a magazine containing a ninety character font for one containing a seventy-two character font, the reverse operation will take place, i. e., the rock bars will be shifted leftward from their normal positions upon the arrival of the ninety character font magazine in operative position. Then there is the condition of substituting a magazine containing a ninety character font for one containing a different ninety character font. Here, the rock bars are first shifted rightward to their normal positions and then leftward upon the arrival of the new ninety character font magazine in operative position. If the shift is from a magazine containing a seventy-two character font to one containing a different seventy-two character font, the rock bars remain in their normal positions throughout the entire shifting operation. There is also the condition where a selected group of rock bars F^2 is moved to the right beyond their normal positions for endwise connection with the rock bars G^1 associated with the escapement reeds for releasing matrices from the auxiliary magazine. Here, that group of reeds only is effected, being moved rightward either from their leftmost positions or from their normal positions, depending upon whether the main magazine in operative position at the time contains a ninety or a seventy-two character font. And, lastly, there is the condition where the selected group of rock bars F^2 is disconnected from the rock bars G^1 associated with the auxiliary magazine when the use of that magazine is no longer desired. In this case, the selected group of rock bars is shifted leftward either to their normal positions or to their extreme leftmost positions, depending upon whether the main magazine in operative position at the time contains a seventy-two or a ninety character font.

In order that the rock bars F^2 may be shifted in a manner to conform with the various conditions just set forth, they are formed near their right ends with lugs M, extending forwardly in the case of the rock bars in the front bank, and rearwardly in the case of the rock bars in the rear bank (Figs. 25, 29 and 30). The lugs M on the rock bars not affected by a shift for rendering the auxiliary magazine active, are located somewhat inwardly from the right ends of the

bars and are provided with notches M^1 in vertical alignment. Those notches associated with the rock bars in the front bank are arranged to receive the rear edge of a vertical plate M^2 hinged adjacent its front edge, near the top and bottom, on bars M^3 fixed to the rock bar supporting frame. The rock bars in the rear bank are connected in like manner to a similar plate M^2, the only difference being that here the aligned notches M^1 in the lugs M receive the front edge of the plate which is hinged adjacent its rear edge.

The lugs M on the rock bars that are affected by the shift to the auxiliary magazine are located at the extreme right ends of those bars but otherwise the lugs are the same as those associated with the rock bars not affected by said shift, said lugs being formed with notches M^1 cooperating with a pair of vertical hinged plates M^4, one arranged to cooperate with the rock bars in the front bank and the other with the rock bars in the rear bank. The hinged plates M^4 are likewise the same as the hinged plates M^2 previously described, except that they are shorter in length and are located slightly to the right (Figs. 25, 29 and 30).

The front hinged plates M^2 and M^4, respectively, are formed at their lower ends with fingers M^5 and M^6 extending rearwardly, whereas the rear hinged plates M^2 and M^4, respectively, are formed at their lower ends with similar but forwardly extending fingers M^5 and M^6. The fingers M^5 on the longer plates M^2 are in fore-and-aft alignment and project into notches M^7 formed in the opposite edges of a transverse horizontal bar M^8 supported at its right end in a depending extension of the lower bracket M^3 and at its left end in a bracket M^9 depending from the frame which supports the rock bars (Figs. 25 and 26). The fingers M^6 on the shorter hinged plates M^4 are likewise located in fore-and-aft alignment and project into notches M^{10} formed in the opposite edges of a second transverse horizontal bar M^{11} mounted in the same bracket supports. The bars M^8 and M^{11}, for the greater portion of their lengths, are of the same thickness and are located one behind the other in the same horizontal plane. At their right ends, however, the bars are reduced to half thickness and are increased in width, the bar M^8 at the rear being cut away in its bottom portion, and the bar M^{11} at the front being cut away in its top portion, so that in this region the bar M^8 overlies the bar M^{11}. The notches M^7 and M^{10} which accommodate the fingers M^5 and M^6 at the lower ends of the hinged plates M^2 and M^4 are located in these wider sections of the bars, the fingers M^6 of the shorter hinged plates M^4 (i. e., those associated with the rock bars active in releasing matrices from the auxiliary magazine) being offset downwardly since the wider portion of their associated bar M^{11} is the one at the bottom (Fig. 30).

Where its thicker and thinner sections meet, the rear bar M^8 presents a shoulder M^{12} adapted to engage the left end of the thinner rearwardly extending portion of the front bar M^{11}. Both bars are pulled toward the left by individual springs M^{13} and M^{14} connected thereto and which have fixed anchorages at their left ends in the supporting bracket M^9. While the bars are arranged for relative movement, the position of the front bar M^{11}, with one exception, is controlled by the position of the rear bar M^8 because of their engagement at the shoulder M^{12}. In other words, assuming the rear bar M^8 to have a given position, the front bar will have a corresponding position, since its associated spring M^{14} pulls it leftward into engagement with the shoulder M^{12}. Furthermore, in all instances where the position of the front bar M^{11} is determined by the position of the rear bar M^8, the two fingers M^5 and M^6, and consequently the two hinged plates M^2 and M^4 at the rear, will be maintained parallel one with the other, as will likewise the two fingers M^5 and M^6 and the corresponding hinged plates M^2 and M^4 at the front.

From what has been said, it will be apparent that, when the rear bar M^8 is located in its rightmost position (Fig. 26), the hinged plates M^2 and M^4 (both front and rear) will locate the rock bars F^2 in their normal or neutral positions where they will be connected to the group of reeds for releasing matrices from a magazine containing a seventy-two character font. When the rear bar M^8 is moved leftward to the position shown in Fig. 27, the hinged plates M^2 and M^4 will be moved to adjust the rock bars to the position where they will be connected to the group of reeds for releasing matrices from a magazine containing a ninety character font. In both of these cases, the rear bar M^8 controls the position of the front bar M^{11}, so that in effect the bars act as a unit.

During a shift to render the auxiliary magazine active, however, the rear bar M^8 is left undisturbed and, instead, the front bar M^{11} is moved independently toward the right to swing the shorter hinged plates M^4 through an arc sufficient to move the rock bars F^2 controlled thereby rightward to effect their endwise connection with the rock bars G^1 associated with the auxiliary magazine, in the manner previously described (Fig. 28). The rear bar M^8, in its wider portion which overlies the corresponding wider portion of the front bar M^{11}, is notched at the front, as at M^{15}, to provide clearance for the independent movement of the front bar, the dimensions of the notch being such that no interference will be presented to the movement of the front bar M^{11} regardless of whether the adjustment of the rear bar is for a ninety or a seventy-two character font.

The adjusted positions of the bars M^8 and M^{11} are determined by two independently operated rocker members N and N^1 (Fig. 23). The rocker member N, which is associated with the rear bar M^8, extends in a fore-and-aft direction and is supported at its front and rear ends on pivot pins N^2 mounted in lugs N^3 projecting leftward from the lower control box frame member J^3 at the left (Fig. 23). At its rear end, the rocker member N is formed with an upwardly extending arm N^4 which, at the top, stands at the left of a banking screw M^{16} threaded through a lug M^{17} projecting from the bottom surface of the rear bar M^8, the banking screw being adjustable as required to insure the proper relation between the parts. The engagement of the banking screw M^{16} with the arm N^4 is continuously maintained by the spring M^{13} which acts to pull the bar M^8 toward the left as previously described. The forward portion of the rocker member N is located adjacent the left of the control box J^4 and is in the form of a rectangular frame consisting of two lateral members, one being the main portion of the rocker member itself and which is in alignment with the pivotal axis, and the other a parallel fore-and-aft member N^5 held in spaced relation with said main portion by end members N^6 formed integrally with the lateral members (Figs. 17 and 19). Said rectangular frame portion of the

rocker member extends rightward beneath the control box frame member J^3 (which is cut away for the purpose) and also beneath the slide J^{11} on which the control handle J is mounted. The rectangular frame member gives support to four transverse shafts N^7 having the same spacing in a fore-and-aft direction as the notches J^{10} in the control box and which, like the notches, correspond to the different magazines in the shift frame. At their right ends, the shafts N^7 are provided each with a banking plate N^8 adapted to engage the bottom surface of the slide J^{11} and thus determine the position of the rocker member N when the slide is located at the corresponding position. Each banking plate N^8 is adjustable to two different positions as determined by the setting of an arm N^9 fixed at the other end of its associated shaft N^7 adjacent the left face of the rocker member N (Figs. 17 and 19). At each shaft position, the rocker member N is provided with two holes N^{10} and N^{11} and the arm N^9 is adjustable to bring a hole N^{12}, with which it is provided in its upper end, into registry with either of the holes in the rocker member as desired. The hole N^{10} at each shaft position is used when a magazine containing a seventy-two character font is in the shift frame at the corresponding position, and the hole N^{11} when a magazine containing a ninety character font is in the shift frame at the corresponding position. When the magazine arrangement is initially determined, the holes N^{12} in the corresponding arms are set to register with the appropriate holes N^{10} and N^{11} in the rocker member, and a screw N^{13} is passed through the hole in the arm and threaded into the hole in the rocker member to maintain the adjustment. Once the arm settings have been made, they are not disturbed so long as the magazine arrangement in the shift frame remains unchanged.

When a shaft N^7 is set for a magazine containing a ninety character font, the banking plate N^8 at its right end presents a surface N^{14} which banks against the bottom of the slide J^{11} carrying the control handle when the slide is at the corresponding position. The level of the surface N^{14} is such that it allows the rocker member N to be turned, by the pull of the spring M^{13}, to position the associated bar M^8 for connecting the horizontal rock bars F^2 to the group of escapement reeds that are active in releasing matrices from a magazine containing a ninety character font. On the other hand, when a shaft N^7 is set for a magazine containing a seventy-two character font, the banking plate at its right end presents a different surface N^{15} to bank against the slide J^{11} and which is located at a higher level. This higher surface N^{15} will cause the rocker member N to locate the bar M^8 in its neutral or normal position to connect the rock bars F^2 to the group of escapement reeds that are active in releasing matrices from a magazine containing a seventy-two character font.

During the substitution of one main magazine for another, the rocker member N is turned in a clockwise direction, viewing the machine from the front, to restore the bar M^8 to its normal position or just slightly beyond its normal position to insure sufficient clearance between the slide J^{11} and the banking plates N^8, regardless of their settings, to permit the uninterrupted movement of the slide. A similar slight movement of the bar M^8 rightward beyond its normal position will also take place for the same purpose, even though previously it had been located in normal position. This movement of the rocker member takes place before the shift frame movement is inaugurated and is effected through the medium of a pneumatically operated cylinder and piston device N^{16} mounted in a horizontal position beneath the control box frame (Fig. 23). A piston rod N^{17} forming part of said pneumatic device extends leftward through the cylinder head and is located in registry with an arm *n* depending from the rocker member (Fig. 17). Normally, the pneumatic device is vented to the atmosphere through a pipe line N^{18} connected to the cylinder at its right end but, during a magazine shifting operation, the cylinder is charged, causing the piston rod to move toward the left and turn the rocker member N in the manner previously stated. The cylinder remains charged until the newly selected magazine arrives in operative position, whereupon it is again vented to the atmosphere, thereby allowing the rocker member to turn in a counterclockwise direction and permitting the rear bar M^8 to assume a position as determined by the setting of the banking plate N^8 on the shaft N^7 at the new position of the control handle J. If the setting of the banking plate N^8 at the new position is for a seventy-two character front, the rocker member will turn only the distance necessary to take up the clearance between the banking plate and the control handle slide J^{11}. On the other hand, if the setting of the banking plate is for a ninety character font, the rocker member will turn the distance necessary to permit the bar M^8 to move to its extreme leftmost position, or, in other words, to the position of adjustment for a magazine containing a ninety character font.

The rocker member N^1 for adjusting the front bar M^{11} toward the right during a shift to bring an auxiliary magazine into operation likewise extends in a fore-and-aft direction and is supported at its front and rear ends on pivot pins N^{19} mounted in lugs projecting rightward from the lower right-hand control box frame member J^3 (Fig. 23). At its rear end, the rocker member N^1 is formed with an upwardly extending arm N^{20} which, at the top, stands at the left of a banking screw M^{18} threaded through a lug M^{19} projecting from the bottom of the front bar M^{11} and which, like the banking screw M^{16} on the rear bar M^8, is adjustable to insure the proper relation between the parts (Figs. 23 and 25). When the auxiliary magazine is not in use, the arm N^{20} is located somewhat to the left of the banking pin so as not to interfere with the adjustment of the front bar M^{11} by the rear bar M^8 during an operation involving the substitution of one main magazine for another. During a shift to the auxiliary magazine, however, the rocker member N^1 is turned in a clockwise direction, causing the arm N^{20} to engage the banking pin and push the front bar M^{11} to its extreme rightmost position and thereby causing the rock bars G^1 associated with the auxiliary magazine to be connected for use, all as previously described.

The adjustment of the rocker member N^1 is effected by a pneumatically operated cylinder and piston device N^{21} similar to that for operating the other rocker member N. The device N^{21} is supported in a horizontal position, its piston rod N^{22} extending toward the left and registering with a depending arm N^{23} formed on the rocker member N^1. A pipe line connected to the cylinder at its right end permits venting to the atmosphere and charging with air pressure. Normally, the cylinder is vented but when the

"Aux." key at the front of the machine is depressed, the cylinder is charged with air pressure, whereupon its piston moves leftward to turn the rocker member N^1 and move the front bar M^{11} toward the right in the manner and for the purpose previously stated. In this case, the pneumatic device N^{21} remains charged with air pressure as long as the auxiliary magazine remains in use or until there is a shift back to the main magazines resulting from a depression of the "Main" key. As the "Main" key is depressed, the cylinder is again vented to the atmosphere, whereupon the bar M^{11} is pulled to the left by its spring M^{14} until it is arrested by banking against the shoulder M^{12} of the rear bar M^8. In other words, the bar M^{11} is again placed under the control of the bar M^8 and those rock bars F^2 which were shifted rightward into connection with the auxiliary rock bars G^1 will assume whatever position is demanded of them by the setting of the bar M^8.

The valve mechanisms

As has been seen, all of the mechanisms entering into the substitution of one main magazine for another are actuated by pneumatically operated cylinder and piston devices. Thus, the magazine shift frame is raised and lowered by the double acting cylinder and piston device A^9, which is charged at the bottom and vented at the top if the shift frame is to be raised, and charged at the top and vented at the bottom if the shift frame is to be lowered (Fig. 16). The locking bolts A^{10} are operated by the cylinder and piston device A^{20}, which is charged at the front to withdraw the locking bolts from their notches A^{12} to release the shift frame for movement, and later vented to permit the bolts to snap back into position under spring action as the selected magazine arrives in operative position. There is also the cylinder and piston device K^{16} which is charged to render the keyboard locking devices K and K^1 active and vented to permit their restoration to inactive position, as well as the cylinder and piston device N^{16} which is charged to insure the location of the horizontal rock bars F^2 in a normal or neutral position prior to the magazine shift and vented to permit the adjustment of the rock bars to the position demanded by the character font of the newly selected magazine. In a word, there are four cylinder and piston devices involved, all controlled from individual valves O, O^1, O^2 and O^3 forming part of a valve assembly located at the front of the machine beneath the control housing J^4 and operated by the control lever J as it is moved from one notch J^{10} to another in effecting the substitution of one magazine for another (Figs. 17 and 18). The valves consist each of a valve housing presenting a chamber O^4 which communicates with a common manifold O^5 supplied with air under pressure through an airline O^6 connected to a suitable source of supply. Each valve is of the gate type and, with the exception of the valve O controlling the charging and venting of the magazine shift frame raising and lowering cylinder and piston device, includes a pivotally mounted gate member O^7 adjustable to one or another of two different positions. In one position of adjustment, a passageway O^8 in the gate member and which leads to the atmosphere communicates with the pipe line leading to the cylinder and piston device corresponding to the valve, thus venting the cylinder to atmosphere in that position of valve adjustment. In the other adjusted position of the valve, a transverse passageway O^9 in the gate member is brought into registry at one end with the pipe line connection and at the other end with a passageway O^{10} leading to the common manifold. In that position of valve adjustment, the corresponding cylinder and piston device is charged. It will be understood that in the venting position of valves, the passageways O^{10} communicating with the manifold O^5 are shut off by the gate members so as to prevent the escape of air, since the chambers in which the gate members are located open to the atmosphere.

The valve O associated with the cylinder and piston device A^9 for raising and lowering the magazine shift frame is different, in that there are two pipe lines O^{11} and O^{12} tapped into the valve housing, one communicating with the top of the cylinder A^9 and the other with the bottom of the cylinder, each pipe line terminating in a separate passageway O^{13} and O^{14} communicating with the valve chamber (Figs. 16 and 18). This valve also includes a pivotally mounted gate member O^{15} but formed with two passageways O^{16} and O^{17} communicating with the atmosphere, and one passageway O^{18} extending transversely through the gate member and communicating with a passageway O^{10} leading to the common manifold O^5, as in the case of the other valves. The gate member O^{15} has three positions of adjustment, one a neutral or central position wherein neither end of the cylinder is vented nor charged, a second position in which the passageway O^{13} leading to the top of the cylinder A^9 registers with the passageway O^{18} in the valve communicating with the manifold while the passageway O^{14} leading to the bottom of the cylinder registers with the passageway O^{17} leading to atmosphere, and a third position in which the conditions are reversed, i. e., the passageway O^{14} leading to the bottom of the cylinder registers with the passageway O^{18} communicating with the manifold while the other passageway O^{13} leading to the top of the cylinder registers with the passageway O^{16} leading to atmosphere. The passageway O^{18} is enlarged at the end adjacent the manifold opening O^{10} in order that communication therewith will continue in any of the valve positions, although in the neutral position of the gate member the opposite end of the passageway O^{18} is closed by the outer wall of the valve chamber.

The common manifold O^5 is formed in a central member O^{19} of the valve assembly (Figs. 17 and 18), the member serving as a support for the various valves O, O^1, O^2 and O^3 and extending upwardly beyond them, being formed at the top with two legs O^{20} and O^{21}, extending one rightward and the other leftward to underlie the lower frame members J^3 of the control housing and to which said legs are secured (Fig. 17). The gate members O^7 of the valves O^1 and O^2 at the left are fulcrumed, one adjacent the front face of the central member O^{19}, and the other adjacent the rear face thereof, on pivot pins O^{22} projecting from said faces. Both these gate members are formed with arms O^{23} extending to the right and terminating in raised nose pieces O^{24} for a purpose presently to appear (Fig. 21). The gate member of the two valves O and O^3 at the right are similarly fulcrumed, one adjacent the front face and the other adjacent the rear face of the central member O^{19}, on similar pivot pins O^{22} projecting from said faces. The gate

member of the front valve O^3 is formed with an arm O^{23} and nose piece O^{24} similar to those of the valves O^1 and O^2, except that its arm O^{23} extends to the left so that its nose piece O^{24} is located in fore-and-aft alignment with the nose pieces of the valves O^1, O^2. When the gate members of the valves O^1, O^2 and O^3 are in their normal positions, the pneumatic devices which they respectively control will be vented to the atmosphere and the laterally extending arms O^{23} thereof will be horizontally disposed.

During the substitution of one magazine for another, the gate members of the valves O^1, O^2 and O^3 are rocked to their active positions to charge the cylinders of their respective pneumatic devices by means of arms J^{23}, J^{24} and J^{25} depending from an overlying rocker member J^{26} which extends in a fore-and-aft direction and is journalled at its opposite ends in the front and rear frame members J^5 and J^6 of the control housing (Figs. 17 and 34). The arms J^{23}, J^{24} and J^{25} are spaced in a fore-and-aft direction along the rocker member J^{26} to overlie the nose pieces O^{24} of the valves O^1, O^2 and O^3, respectively, and are formed in their lower edges with cam surfaces against which the nose pieces are pressed by springs O^{25} reacting between the bottom edges of the arms O^{23} and the underlying valve housings (Fig. 21). Above the level of its pivotal axis, the rocker member J^{26} is formed with a fore-and-aft channel J^{27} open at the top to receive a rounded portion J^{28} presented at the lower end of the control lever J, the length of the channel being such as to accommodate the full movement of the lever J as it is shifted lengthwise in the fore-and-aft slot J^9 during the substitution of one magazine for another. A spring j, fastened at its upper end to an eye j^1 extending rightwardly from the rocker member J^{26} and which has a fixed anchorage at its lower end, urges the rocker member clockwise, thus tending to maintain the control lever J in its normal position in whatever notch it happens to be located (Fig. 17).

When the control lever J is in its normal position, i. e., seated at the base of one or another of the notches J^{10}, the cam surfaces at the lower ends of the arms J^{23}, J^{24} and J^{25} present concentric portions J^{29} to the nose pieces O^{24} and such are the radii of said concentric portions, that the valve gates will be located in their normal positions venting the cylinders with which they are respectively associated. However, as the control lever J is moved rightward to its vertical position, concentric cam portions J^{30} of greater radii are presented to the nose pieces O^{24}, causing the arms O^{23} to be cammed downwardly against the reaction of their underlying springs O^{25}, with the result that the valves are adjusted to charge their respective cylinder and piston devices. In this connection, however, it should be noted that the length, circumferentially, of the concentric surface J^{29} of the arm J^{23} operating the valve which controls the keyboard locking device is shorter than the corresponding surface of the arm J^{24} operating the valve controlling the shifting of the rock bars F^2 and that this latter surface, in turn, is shorter than the corresponding surface of the arm J^{25} operating the valve controlling the operation of the locking bolts A^{10}. To be more explicit, as regards the three valve actuating arms J^{23}, J^{24} and J^{25} the relation of their concentric surfaces is such that, as the control lever J is moved from its normal angular position to an upright position, the three valves O^1, O^2 and O^3 will be adjusted in sequence requiring, first, the adjustment of the keyboard locking devices K and K^1 to active position, second, the positioning of the horizontal rock bars F^2 in normal position and, third, the withdrawal of the locking bolts A^{10} to inactive positions. And, of course, later on when the control lever J is moved from its upright position into the notch corresponding to the selected magazine, the valves O^1, O^2 and O^3 will be restored to their normal positions in the reverse order so that, first, the cylinder and piston device A^{20} associated with the locking bolts A^{10} is vented to the atmosphere, permitting the bolts to enter the notches A^{12} in the shift frame corresponding to the newly selected magazine as the latter arrives in operative position, second, the cylinder and piston device N^{16} associated with the horizontal rock bars F^2 is vented, allowing them to be located as required by the character of the newly selected magazine and, third, the cylinder and piston device K^{16} associated with the keyboard locking devices is vented so as to release the keyboard for operation.

The fourth valve O in the group is that controlling the raising and lowering of the magazine shift frame. The gate member O^{15} of this valve is formed at the top with an arm O^{26} offset to the right and articulated by means of a link O^{27} to a crank arm O^{28} projecting leftward from another overlying fore-and-aft rocker member J^{31} journalled at its ends in the front and rear frame members J^5 and J^6 of the control housing (Figs. 17 and 34). The rocker member J^{31} is formed in its left edge with a longitudinal channel J^{32} to receive the rounded end portion of an arm J^{33} formed integral with and offset forward and to the right from the trunnion member J^{15} in which the control lever J is pivoted. Hence, when the control lever J is in any of the notches J^{10} or when it stands in a position perpendicular to the top of the control box J^4, the rocker member J^{31} will locate the gate member of the valve O in a neutral position, so that neither end of the cylinder A^9 is charged or vented to the atmosphere. When the control lever is tilted rearwardly, however, the rock member J^{31} is turned in a clockwise direction, looking at the parts from the front, to adjust the valve to charge the lower end of the cylinder A^9 and vent the upper end thereof, with the result that the shift frame will be raised; whereas, when the control lever is tilted forwardly, the rocker member is turned in the opposite direction so that the reverse conditions in the cylinder will obtain, i. e., the cylinder will be charged at the top and vented at the bottom, with the result that the shift frame will be lowered.

Suppose now, by way of example, that the top magazine A^1 (which contains a ninety character font) is in operative position, as will be the case when the control lever J reposes in the No. 1 notch (see Fig. 23), and that it is desired to bring the second magazine A^2 (which contains a seventy-two character font) into operative position. To effect the substitution, the operator moves the control lever out of the No. 1 notch J^{10} into the slot J^9, pressing it rightward and rearward along the flared contour of the notch. The lever is moved rearwardly along the slot J^9 in synchronism with the movement of the shift frame until it arrives opposite the No. 2 notch, where again it follows the flared contour until it seats in the bottom of the notch and has assumed the same relative position as it had in the

No. 1 notch before the shifting operation took place. While the motion of the control lever J as it is shifted from one notch to another is, in practice, an even and continuous one, it might be better for the sake of clarity to consider its movement in stages. When the lever J is seated in the No. 1 notch, the parts will be located as shown in Figs. 17 and 23, i. e., all of the valves O, O^1, O^2 and O^3 will be in their normal positions and the rocker member N, which controls the setting of the rock bars F^2, will be located by the rear adjustable bar M^8 in a position permitting said rock bars to be connected to the group of reeds for releasing the matrices from a magazine containing a ninety character font. As the control lever J moves from position No. 1 as shown in Fig. 17 to position No. 2 as shown in Fig. 21, it turns the fore-and-aft rocker member J^{26} in a direction to cause the gate member of the valve O^3 to be adjusted, under the control of the cam surface J^{30} at the lower end of the arm J^{23}, to its active position and thereby charge the cylinder K^{16} at its lower end. As the cylinder is charged, the piston K^{15} rises to rock the sleeve K^{12} counterclockwise which sleeve, in turn, operates the feeler devices and turns the shaft K^3 in the same direction to render the keyboard locking plates K and K^1 active in the manner previously described. As the control lever moves on from position No. 2 to position No. 3 in Fig. 31, the resulting further movement of the rocker member J^{26} causes the second arm J^{24} thereon to adjust the valve O^2 to charge the pneumatic device N^{16}, which thereupon causes the rock bars F^2 to be adjusted to their normal positions through the rear bar M^8 and the rocker member N upon which said pneumatic device acts (Fig. 33). As the control lever J moves to position No. 4 (Fig. 35), the third arm J^{25} on the rocker member J^{26} adjusts the valve O^1 to charge the pneumatic device A^{20} and withdraw locking bolts A^{10} from their notches A^{12}, thereby releasing the shift frame for movement. The control lever J is then rocked rearwardly to position No. 5 (Fig. 34), since suppositiously it was desired to raise the shift frame. This movement of the control lever results in tilting the second fore-and-aft rocker member J^{31} in a clockwise direction (see Fig. 36), with the result that the valve O controlling the supply of air to the magazine shift frame cylinder A^9 is adjusted to charge said cylinder at the bottom and vent it at the top (see also Fig. 37). As the shift frame moves upward, the control lever J will be moved bodily rearward along the slot J^9 due to its mounting on the slide J^{11}, which, it will be remembered, is connected to the magazine shift frame. As it is thus moved along the slot, the control lever will of course remain inclined toward the rear to continue the admission of compressed air to the cylinder and will be held against movement toward the left by the left wall of the slot J^9 to maintain the locking bolts withdrawn. Upon its arrival at the entrance to notch No. 2, however, the control lever J (under the influence of the spring *j*) will enter said notch, being moved to the left along the forwardly flared edge of the notch until it seats at the bottom thereof. As the control lever moves leftward along the flared edge of the notch and before it has assumed an upright position in a fore-and-aft direction, a corresponding movement of the rocker member J^{26} in a counter-clockwise direction will turn the arm J^{25} to a position permitting the valve O^1 controlling the admission of air to the locking bolt cylinder A^{20}, to be restored to its normal position by the action of its spring O^{25}, thereby venting the cylinder and releasing the locking bolts which then will stand ready to snap into the set of notches A^{12} corresponding to the second magazine when the shift frame has completed its full movement to bring the second magazine A^2 into operative position. During its final stage of movement, the shift frame will continue to move the slide J^{11} on which the control lever is mounted and such continued movement of the slide will rock the lever, which now is in the narrow portion of the No. 2 notch, back to its original or normal position with respect to the slide. As the control lever is thus mechanically restored to its normal position, air pressure will be shut off from the cylinder A^9 by the gate valve O, which is restored to its neutral position by the fore-and-aft rocker member J^{31} as the lever straightens up and the shift frame brought to rest, the newly selected magazine being located and held in operative position by the snapping of the locking bolts A^{10} into the appropriate set of notches. As the control lever J moves leftward to seat in the notch corresponding to the selected magazine (the No. 2 notch in this instance), the arms J^{24} and J^{23} on the fore-and-aft rocker member J^{26}, connected to the lever at its lower end, will act in sequence to permit restoration of the valves O^3 and O^2 controlling the positioning of the horizontal rock bars F^2 and the operation of the keyboard locking plates K^1 and K^2. Thus, as the valve O^3 is restored to its normal position, the cylinder N^{16} which actuates the rocker member N is vented to the atmosphere, allowing the rocker member to be positioned by the adjustable banking plate N^8 at the No. 2 position as it banks against the bottom of the slide J^{11}. As this plate is set for a magazine containing a seventy-two character font, the rocker member N will be positioned accordingly, with the result that the rear slide bar M^8 which is controlled thereby will locate the horizontal rock bars F^2 properly to cooperate with the group of reeds allocated to the seventy-two font magazine. As the valve O^2 is restored to its normal position, the cylinder K^{16} is vented to the atmosphere, thus allowing the fore-and-aft rock shaft K^3 to be turned by the spring K^{18} to restore the keyboard locking plates K and K^1 to inactive position, all as previously described. Hence, it will be seen that, while the start of the magazine shifting movement is due to a manual operation (by the movement of the hand lever through the various stages mentioned), the arrest of the newly selected magazine in operative position, as well as the adjustment of the keyboard connections as required by the character of the selected magazine, will be entirely automatic (by the movement of the control lever into the notch under the influence of the spring *j*). While such is the actual operation of the parts, the operator in changing from one magazine to another will ordinarily keep hold of the control lever throughout the whole period, this because the operation takes place so rapidly that there is no conscious realization on the operator's part of what is occurring. Indeed, so far as the operator is concerned, he merely has to move the control lever out of one notch and direct it into a new notch corresponding to the magazine to be selected.

During a magazine substitution requiring the shift frame to be moved downwardly, the operation is the same as before except that the control lever J is pushed rightward and forward along

the forwardly flared portion of the notch. The forward movement of the control lever causes the fore-and-aft rock member J^{31} to be turned in a counterclockwise direction, looking at the parts from the front, with the result that the valve O controlling the supply of air to the magazine shift frame cylinder A^9 is adjusted to vent the cylinder at the bottom and charge it at the top, and of course when the control lever arrives adjacent the notch corresponding to the newly selected magazine it will move leftward along the rearwardly flared portion of the notch until it seats at the bottom of the notch in the same manner as has been described previously, the only exception being that here the control lever is tilted to its normal position in a fore-and-aft direction by the forward movement of the slide J^{11} under the control of the shift frame which, as before, is arrested by the snapping of the locking bolts A^{10} into the appropriate notches as the selected magazine arrives in operative position.

It will be understood that, if one or more notches J^{10} intervene between the previously selected notch and the newly selected notch, as for example in shifting from notch No. 1 to notch No. 4, the operator will have to hold the control lever out of the intervening notches against the reaction of the spring as the control lever is moved bodily along the slot J^9, but again it is pointed out that the bodily shifting of the control lever by the slide J^{11} is so rapid that the operator is almost unconscious of the tendency of the control lever to be pulled into the intervening notches.

It may also be explained that if, during a change from one magazine to another, the operator wishes to arrest the movement of the shift frame at any point along the slot J^9, this can be done merely by manually straightening up the control lever within the slot so as thereby to shut off air pressure to the cylinder A^9. This capacity to arrest the movement of the shift frame at will is of advantage in avoiding possible damage to the parts in the event that the movement of the shift frame should be obstructed, as for instance by matrices protruding from one or another of the magazines. It is even possible by such manual arrest of the shift frame to bring a newly selected magazine into operative position before the locking bolts A^{10} are released, but it is obvious that this manual operation might present some difficulty because of the need for exact registration between the locking bolts and their cooperating notches A^{12} on the shift frame.

It will also be understood that if the newly selected magazine is one containing a ninety character font instead of a seventy-two character font, the rocker member N will be appropriately positioned by the engagement with the slide J^{11} of the adjustable plate N^8 at the new position which, of course, will be properly adjusted for a ninety character font magazine. The position assumed by the fore-and-aft rocker member N under the conditions stated will permit the rear slide member M^8 to move to its leftmost position, thus shifting the horizontal rock bars F^2 into connection with the group of escapement reeds for operating the escapements of a ninety character font magazine.

Safety devices

In order to prevent damage to the parts, certain safety devices have been installed to prevent the performance of one operation where something has intervened to prevent the previous operation from being carried out. Thus, should there still be a matrix undergoing distribution or a matrix projecting from the magazine in operative position, an obstruction will be presented to the operation of the feeler devices and this, in turn, will prevent rotation of the sleeve K^{12} which actuates the feeler devices (Figs. 23 and 24). The failure of the sleeve to rotate leaves the keyboard locking plates inactive since, it will be remembered it is the rotation of the sleeve that renders said plates active, and it also prevents the retraction of the locking bolts A^{10} to release the shift frame for movement. The means for preventing the retraction of the locking bolts includes the arm K^{14} which overlies the piston rod K^{15} of the pneumatic device for rotating the sleeve K^{12}. It will be observed that the arm K^{14} is extended toward the right where it stands in front of a raised lug P formed at the front end of a bar P^1, which latter extends in a fore-and-aft direction and is formed at its rear end with a similar raised lug P^2 standing in back of an arm P^3 extending downwardly from and pinned to the rock shaft A^{15} through which the shift frame locking bolts are operated (see also Fig. 16). The bar P^1 is guided for limited longitudinal movement in a fore-and-aft direction by spaced straps P^4 fixed to the machine frame and is urged to its forward position by a spring P^5 connected at one end to a pin projecting upwardly from the bar and anchored at its opposite end to the fixed strap P^4 at the front. Accordingly, when an obstruction to the operation of the feeler devices prevents the sleeve K^{12} from operating, the arm K^{14} continues to stand in front of the raised lug P and locks the bar P^1 against rearward movement. This, in turn, prevents the rotation of the shaft A^{15} and the retraction of the locking bolts A^{10} until the obstruction to the operation of the feeler devices is removed. On the other hand, when the feeler devices operate in the usual way without interference, the arm K^{14} lifts clear of the lug P, allowing the bar P^1 to move rearwardly, as the locking bolts are withdrawn from the notches in the shift frame, to locate the lug P in a position underlying the arm K^{14}, where the lug will remain until the locking bolts seat in the notches corresponding to the newly selected magazine, whereupon the bar P^1 will be pulled forward by the spring P^5 to its normal position concurrently with the restoring movement of the rock shaft A^{15}. Should the locking bolts A^{10} fail to seat properly in the notches, the bar P^1 will be held in its rearmost position, thereby preventing the restorattion of the arm K^{14} to its normal position and the consequent release of the keyboard locking device. Thus, this safety device performs a dual function, namely, it prevents the release of the shift frame locking bolts when some obstruction is presented to the operation of the feeler devices, and it also prevents the release of the keyboard locking device in the event the locking bolts fail to snap back into operative position.

A second safety device acts to prevent the operation of the rocker members N and N^1, which control the longitudinal adjustment of the horizontal rock bars F^2, in the event the keyboard locking device fails to function. This safety device includes two rock levers Q and Q^1 fulcrumed adjacent their centers on laterally spaced standards Q^2 mounted upon the fixed frame members J^2 which support the control box (Fig. 20). The left-hand lever Q, at its right end, underlies the right-hand lever Q^1 at its left end, and, when the levers are in their nor-

mal positions, as shown by the broken lines in Fig. 20, a lug Q^3 formed on the lower edge of the lever Q near its left end stands either at the right or at the left of an arm N^{24} projecting upwardly from the rocker member N, depending upon whether the position of the latter corresponds to an adjustment for a magazine containing a ninety or a seventy-two character font. The right-hand lever Q^1 is formed near its right end with a similar lug Q^4 which stands at the right or at the left of an arm N^{25} projecting upwardly from the rocker member N^1 which controls those rock bars F^2 that are endwise shiftable for connection with the rock bars associated with the auxiliary magazine, the position of the lug as regards the arm N^{23} depending upon whether the latter is set to render the auxiliary magazine inactive or active. The right-hand lever Q^1 is formed at its upper edge with a raised finger Q^5 which stands at the left of a pin Q^6 projecting forwardly from the link K^7 connecting the front keyboard locking plate K with its operating arm K^5. Normally, during the substitution of one main magazine for another or during a shift to the auxiliary magazine, the link K^7 moves endwise to the left, causing the pin Q^5 thereon to rock the right-hand lever Q^1 counterclockwise, the lever Q^1, in turn, rocking the left-hand lever Q clockwise to the respective positions shown by the solid lines in Fig. 20. When the levers are thus positioned, the lugs Q^3, Q^4 thereon will stand clear of the arms N^{24}, N^{25} on the rocker members N, N^1, permitting the latter to be adjusted as required by the shifting operation being carried out; and, after the shifting operation has been completed, the restoration of the keyboard locking plate K to its inactive position will permit the levers Q, Q^1 to drop back under gravity to their normal positions (the levers being unbalanced for that purpose), wherein the lug Q^3 will lock the rocker member N in one position or another according as the magazine in operative position contains a ninety or a seventy-two character font, and wherein the lug Q^4 will lock the rocker member N^1 in one position or another according to whether or not the auxiliary magazine is connected for use. However, should some obstruction be presented to the operation of the locking plates, or, in other words, should they fail to move to their active positions during an attempted substitution of one magazine for another or an attempted shift to render the auxiliary magazine active or inactive, the levers Q and Q^1 will not be operated and will remain in their normal positions to lock the rocker members N and N^1 against movement until the obstruction has been removed.

Another safety device serves to prevent the withdrawal of the shift frame locking bolts A^{10} in the event the horizontal rock bars F^2 are not adjusted to their normal positions preparatory to a magazine shifting operation (Figs. 31 and 32). To this end, the rocker member N, which serves to adjust the rock bars F^2 to their normal positions, is formed with an arm N^{26} extending downwardly and to the right and which is formed somewhat inwardly from its end with a shoulder N^{27} adapted, when the rocker member is in its adjusted position for a ninety character font magazine, to stand in the path of an arm N^{28} extending downwardly from the fore-and-aft rocker member J^{26} which is operated by the lateral movements of the control lever J. The relative positions of the two arms N^{26} and N^{28} are such that, should the rocker member N fail to return from the setting for a magazine containing a ninety character font to the setting for one containing a seventy-two character font, i. e., its normal setting, the movement of the fore-and-aft rocker member J^{26} will be arrested just prior to the adjustment of the valve O^1 to charge the pneumatic device controlling the retraction of the shift frame locking bolts (Fig. 32). In that case, the operator will be apprised of the obstruction by his inability to push the control lever J out of the notch J^{10} in which it is located.

However, if the rocker member N is properly adjusted to restore the rock bars F^2 to their normal positions or if they already are so adjusted, as will be the case where the magazine for which the substitution is to be made contains a seventy-two character font, the shoulder N^{27} on the arm N^{26} will stand clear of the arm N^{28} on the lever-controlled rocker member J^{26} and no interference to the movement of the latter will be presented (Fig. 31).

The auxiliary shift control mechanism

It will be recalled now that when it is desired to use the auxiliary magazine A^6, a key R marked "Aux." (signifying auxiliary) is depressed, with the result that a certain group of main rock bars F^2 are shifted rightward into endwise connection with the rock bars G^1 which actuate the escapement reeds associated with the auxiliary magazine, and that when the use of the auxiliary magazine is no longer desired, a key R marked "Main" is depressed to shift the rock bars F^2 in question leftward to break their connections with the rock bars G^1 and reestablish their connections with the appropriate main escapement reeds (Figs. 1 and 23).

The keys R and R^1 are formed at the front ends of a pair of key levers R^2 and R^3 pivotally mounted on a transverse pin R^4 supported, at its left end, in a plate R^5 secured to the control box J^4 and, at its right end, in a bracket R^6 secured to the plate R^5 and held in spaced relation therewith by spacing members R^7 at the front and rear (Figs. 17 and 38). The key levers R^2, R^3 are held in slight spaced relation by an intermediate collar R^8 encircling the pivot pin support. Each key lever is L-shaped, one leg extending forwardly from the fulcrum and terminating in the finger key itself, and the other leg extending downwardly. The keys R and R^1 are connected together in such wise that as one key is depressed, the other is raised and vice versa, the means for this purpose including a vertical bar or interponent R^9 fulcrumed somewhat above its center on a pin R^{10} mounted in the left face of the bracket R^6, said interponent being bifurcated, at its upper end, to engage a pin R^{11} protruding from the right face of the "Main" key lever R^3 and, at its lower end, to engage a similar pin R^{12} protruding from the left face of the "Aux." key lever R^2. The "Aux." key lever R^2 is formed with a slot R^{13} through which the pivot pin R^{10} extends and which is long enough so as not to present any interference to the movement of the key lever. When the auxiliary magazine is not in use, the "Main" key is depressed and the "Aux." key raised; whereas when the auxiliary magazine is in use, the positions are reversed, i. e., the "Aux." key is depressed and the "Main" key raised. This reversal in the key positions occurs automatically upon the depression of one key or the other. Thus, when the "Aux." key is depressed, its de-

pending leg will move rearwardly, acting through the interponent R^9 and the previously mentioned connections to rock the depending leg of the main key forward to raise the "Main" key (Fig. 39). On the other hand, when the "Main" key is depressed, its depending leg will move rearwardly, acting through the interponent R^9 to rock the depending leg of the "Aux." key forward to raise the latter key (Fig. 38).

At the lower end of the bracket R^6, there are mounted two valves R^{14} and R^{15}, consisting each of a valve housing mounted one at each side of the bracket and presenting chambers R^{16} and R^{17} which communicate with a passageway R^{18} extending transversely through the bracket, the transverse passageway in turn communicating through a vertical passageway R^{19} with an airline R^{20} tapped into the bracket at the bottom (Fig. 42). The airline communicates with a suitable source of air pressure. The chamber R^{16} in the valve R^{14} communicates, through a passageway R^{21}, with the airline leading to the cylinder N^{21} which is active in turning the rocker member N^1 to shift the slide bar M^{11} rightward to effect the connection of the auxiliary rock bars G^1 with their corresponding main rock bars F^2; whereas, the chamber R^{17} in the valve R^{15} communicates through a passageway R^{22} with the airline leading to the cylinder and piston device K^{21} which, in the manner previously described, controls the operation of the keyboard locking mechanism.

The valve R^{14} for controlling the shift of the rock bars F^2, and which is the one next adjacent the control box J^4, is provided with a gate R^{23} free to turn on a transverse rock shaft R^{24} extending through the bracket R^6 and also through said gate near the top. The gate is provided with an integral forwardly extending arm R^{25} terminating in a nose portion R^{26} underlying the lower edge of the depending leg of the "Aux." key lever R^2. The valve R^{15} for controlling the operation of the keyboard lock is provided with a gate R^{27} pinned at its upper end to the rock shaft R^{24} which supports the other valve gate but located at the opposite side of the bracket R^6. The rock shaft R^{24} extends rightward, looking at the parts from the rear (see Fig. 42), somewhat beyond the face of the valve gate R^{23} and, at its extreme end, has pinned thereto a forwardly extending arm R^{28} which likewise is formed with a nose portion R^{29} underlying the lower end of the "Aux." key lever R^2 (Fig. 38). In other words, while the gates R^{23}, R^{27} of the respective valves R^{14}, R^{15} are located on opposite sides of the bracket R^6, the arms R^{25}, R^{28} associated therewith and which are controlled by the movements of the "Aux." key are located on the same side of the bracket in close spaced relation. The nose portions R^{26}, R^{29} are pushed up into engagement with the lower end of the "Aux." key lever by compression springs R^{30} reacting upwardly against the lower edges of the arms and seated in recesses formed in the underlying valve housing. While the nose portions R^{26} and R^{29} are closely spaced in a lateral direction, the lower bearing surface of the "Aux." key lever in those areas engaged by the nose portions R^{26}, R^{29} are differently shaped and constitute cam surfaces for adjusting the valves to different positions as the "Aux." and the "Main" key levers are depressed. When the "Main" key R^1 is depressed and the "Aux." key R raised, the auxiliary magazine as previously stated will not be in use, and, at that time, both nose portions R^{24}, R^{29} will bear against a low portion R^{31} of the composite cam surface at the lower end of the "Aux." key lever R^2. Under those conditions, similar passageways R^{32} and R^{33}, formed respectively in the gates of the valves R^{14} and R^{15} and which communicate with the atmosphere, will register with the pipe lines leading to the pneumatic devices controlled by said valves. Thus, in Fig. 41, the valve R^{14} controlling the supply of air to the pneumatic device effective in shifting the rock bars F^2 is shown in its normal position venting said device to atmosphere and closing off the passageway R^{18} leading to the source of air pressure. It will be understood, however, that when the "Aux." key is in its raised position, both valves R^{14}, R^{15} will be thus adjusted and both of the pneumatic devices controlled by the valves will be vented to the atmosphere.

As the "Aux." key is depressed, a high portion R^{34} of its cam surface engages the nose R^{29} on the arm of the valve gate associated with the valve R^{15} controlling the pneumatic device which operates the keyboard locking plates K^1, K^2. As the nose rides up on said high portion of the cam surface, the valve gate R^{27} is adjusted to a position causing a transverse passageway R^{35} therein to register with the passageway R^{18} in the bracket and also with the passageway R^{22} leading to the cylinder K^{21}, with the result that the cylinder is charged and the fore-and-aft rock shaft K^3 turned to render the keyboard locking plates active in the manner previously described (Figs. 20, 38 and 41).

As the "Aux." key continues its downward movement, the nose R^{26} on the arm associated with the other valve R^{14} likewise meets a rise R^{36} in the cam surface, with the result that the associated valve gate is also adjusted to a position causing a transverse passageway R^{37} in the gate to register with the passageway R^{18} in the bracket and also with the passageway R^{21} leading to the cylinder of the pneumatic device N^{21} associated with the fore-and-aft rocker member N^1 controlling the adjustment of the front slide bar M^{11}. As the pneumatic device is charged, the rocker member N^1, assuming that it has been released by the safety device Q^1 under the control of the keyboard locking mechanism, will be rocked in a counterclockwise direction to shift the slide bar M^{11} toward the right, thereby turning the hinged plates M^4 in a direction to move the appropriate group of rock bars F^2 endwise for connection with the rock bars G^1 of the auxiliary magazine.

As the "Aux." key continues to its lowermost position, the valve R^{14} maintains its adjustment, charging the pneumatic device N^{21} just referred to, but the nose portion R^{29} on the arm R^{28} associated with the other valve R^{15} meets a drop R^{38} in the cam surface, with the result that the valve, under the reaction of its spring R^{30}, is adjusted to normal position, venting the pneumatic device K^{21} and allowing the keyboard locking plates K, K^1 to be restored to their inactive positions. The safety device Q^1 will also be restored to its normal position, with the result that the rocker member N^1 is locked in its newly adjusted position. In other words, the rock bars G^1 associated with the auxiliary magazine will be connected for operation by the appropriate keys of the main keyboard through the corresponding main rock bars F^2 and the other elments of the keyboard mechanism.

When the "Main" key R^1 is depressed, the "Aux." key lever R^2 is rocked forward to its original position by the action of the interponent R^9 previously described. During the first stage in the return movement of the lever R^2, the valve R^{15}

is adjusted to charge the pneumatic device K^{21} as the nose portion R^{29} rides from the low portion R^{38} to the high portion R^{36} of the cam surface at the lower end of "Aux." lever. The charging of the pneumatic device K^{21} renders the keyboard locking devices active, turning the latch Q^1 to release the rocker member N^1. With the rocker member N^1 released, the front slide M^{11} will be free to move leftward as the pneumatic device N^{21} is vented by the adjustment of the valve R^{14} occasioned by the dropping of the nose portion R^{26} from the high portion R^{36} of the cam surface to the low portion R^{38} thereof as the "Aux." lever continues its forward movement. The front slide M^{11} is pulled to the left by its spring M^{14} to a position as determined by the rear slide M^8, thereby moving th main rock bars F^2 which had previously ben connected with the auxiliary rock bars G^1 out of engagement with the latter and reconnecting them either to the group of main escapement reeds for releasing the matrices from a magazine containing a seventy-two character font or the group of main escapement reeds for releasing the matrices from a magazine containing a ninety character font, depending upon the adjustment of the rear slide M^8.

As the "Aux." key lever proceeds to its normal position, in other words, as the "Main" key reaches the limit of its descent, the nose portion R^{29} on the arm R^{28} controlling the adjustment of the valve R^{15} rides off the high portion R^{36} of the cam surface, allowing the valve to be adjusted to its normal position venting the pneumatic device K^{21}. This operation permits the keyboard locking device again to be rendered inactive with the accompanying restoration of the latches Q and Q^1 to their active positions. In a word, upon the depression of either the "Main" or the "Aux." key, the operations briefly include, first, rendering the keyboard locking mechanism active, second, the shifting of the appropriate main rock bars F^2 into or out of connection with the auxiliary rock bars G^1 according to which key is depressed and, third, the restoration of the keyboard locking mechanism to inactive position to free the keyboard for use. The entire operation is very rapid, no more time or effort being required to depress the keys R and R^1 than is customary for other key operated parts.

Safety devices associated with the auxiliary shift control mechanism

These safety devices include means for insuring that the main rock bars F^2 have been properly adjusted into or out of connection with the auxiliary rock bars G^1 during the depression of the "Aux." or the "Main" keys before the keyboard locking mechanism is rendered inactive at the conclusion of the shifting operation. To this end, the rocker member N^1 is provided near its front end with a depending arm S having a portion offset forward to cooperate with two rearwardly extending fingers R^{39} and R^{40} located one, at the lower end of the "Main" key lever R^3 and the other, at the lower end of the "Aux." key lever R^2 (Figs. 38, 39 and 40). When the "Main" key is in its depressed position, the rocker member N^1 will be turned to the limit of its movement in a counterclockwise direction (viewing the machine from the front), whereas when the "Aux." key is in its depressed position the rocker member will be turned to the limit of its movement in a clockwise direction. In the first instance, the arm S will stand in the path of movement of the finger R^{40} on the "Aux." key lever, although it will clear the finger R^{39} on the "Main" key lever, which then will be located just to the left of the arm S and will extend somewhat rearwardly beyond the front face thereof. On the other hand, when the "Aux." key is in its depressed position, the arm S will stand in the path of movement of the finger R^{39} on the "Main" key lever but will stand clear of the finger R^{40} on the "Aux." key lever, which will be located just to the right of the arm S and will extend somewhat rearwardly beyond its front face. During the depression of the "Aux." key, the rocker member N^1 normally should swing in a clockwise direction out of the path of the finger R^{40} so as not to interfere with the full depression of the key, in which case, of course, the keyboard locking mechanism will function as intended. However, should the rocker member N^1 for some reason fail to be rocked to the full limit of its movement, indicating that the main rock bars F^2 have not been properly connected with the auxiliary rock bars G^1, the arm S will remain in the path of the finger R^{40} and will arrest the rearward movement of the "Aux." key lever before the nose R^{29} on the arm R^{28} associated with the valve R^{15} controlling the pneumatic device K^{21} operating the keyboard locking mechanism rides down off the high portion R^{36} of the cam surface (see Fig. 39). The operator will know by the failure of the keyboard locking mechanism to release that something has interfered to prevent the rock bar shifting operation, whereupon the cause may be ascertained and remedied. And, likewise, during the depression of the "Main" key R^1, should the rocker member N^1 fail to be restored to the limit of its movement in a counterclockwise direction as it should, the finger R^{39} at the lower end of the "Main" key lever will bank against the arm S before the nose R^{29} rides off the high portion R^{34} of the cam surface back to the low portion R^{38} thereof. Here again, the keyboard locking device will fail to release and the operator will know that something has interfered to prevent the return to their proper positions of those main rock bars F^2 that previously had been connected to the auxiliary rock bars G^1.

The font distinguisher

The distributor box of the present machine is equipped with a font distinguisher which, as usual, will act to permit the matrices of the font in the active magazine to pass through the distributor box for distribution and which will act to resist the passage of a matrix should it be of a different font. The font distinguisher comprises a short rib T which is presented into the path of the matrices traversing the distributor box and in alignment with slots cut in the lower edges of the matrices, it being understood that the slots in all matrices of a given font are located relatively in the same position, although as between fonts the positions vary (Figs. 43 and 50). Thus, if the matrices traversing the distributor box are of the proper font, no interference to their distribution is presented; whereas, if a matrix, foreign to the proper font and which will be devoid of a font slot in the proper location, inadvertently finds its way into the distributor box, its passage therethrough will be arrested by the font distinguisher, requiring that the operator remove the offending matrix.

As a further feature of this invention, the font distinguisher is adjustable automatically as the different magazines are brought into operative position, the adjustment being determined by settable devices located at the front of the machine

adjacent the control box J^4 and which are initially set in accordance with the arrangement of fonts in the shift frame.

The adjustable rib T to which reference has been made is located in the distributor box in advance of the usual mechanism which lifts the matrices out of the box for distribution and is located on a short horizontal rod T^1 extending in a fore-and-aft direction through the front and rear walls of the distributor box at a level just below the bottom edges of the matrices when they are located by the usual rails T^2 which cooperate with their upper ears to give them support as they travel through the distributor box. While the rod T^1 itself clears the lower edges of the matrices, the rib T does not, but extends upwardly so that a matrix of a font different from that in the active magazine will be arrested by the rib since, as stated, its notch will be out of registry therewith as it traverses the distributor box. The rod T^1 is formed at its opposite ends with head portions T3 and T4, that at the rear serving to limit the movement of the rod in a forward direction and that at the front being arranged to bank against a short vertical arm of a bell crank T^5, whose position determines the setting of the rib T. The rod T^1 is resiliently held in engagement with the vertical arm of the lever T^5 near its upper end by a spring T^6 reacting between the front wall of the distributor box and an annular abutment formed on the rod T^1 located somewhat forward of said wall (Fig. 50).

The bell crank lever T^5 is fulcrummed on a bracket secured to a fixed part of the machine and is formed also with a forwardly extending arm T^7 connected by means of a vertical link T^8 to a rearwardly extending arm T^9 pinned on a transverse rock shaft T^{11} mounted in a fixed part of the machine frame (see Figs. 2 and 43). The arm T^9 is located considerably below the bell crank lever T^5 and the intermediate link T^8 is connected between the front end of the arm T^7 of the bell crank lever and the rear end of the arm T^9. On the shaft T^{11}, there is also mounted a forwardly extending arm T^{12} terminating at its front end in a rounded portion which engages the bifurcated end of a rearwardly extending arm T^{13} forming part of a rocker member T^{14} which is settable to determine the adjustment of the font distinguisher.

The rocker member T^{14} is formed with two arms T^{15}, T^{16}, spaced in a fore-and-aft direction and integrally connected by a fore-and-aft member T^{17} located adjacent the left side of the control box J^4, the arms extending rightward from said fore-and-aft member and being hinged at their right ends on hinge pins T^{18} extending, one into the front frame member and the other into the rear frame member of the control box J^4 (Figs. 23 and 44). The rearwardly extending arm T^{13}, previously referred to, is joined to the rear arm T^{15} at the left end of the latter and at a point somewhat to the left of the fore-and-aft member T^{17}. In a word, the arrangement is such that as the arm T^{12} swings in a fore-and-aft vertical plane upon its transverse axis, the rocker member T^{14} will swing about a fore-and-aft axis which is parallel to but spaced to the right of the plane of movement of the arm T^{12}.

As stated, the fore-and-aft member T^{17} is located adjacent the left side of the control box J^4 and on it there are mounted four adjustable banking plates T^{19} spaced in a fore-and-aft direction in positions corresponding to the four different settings of the control handle J (Figs. 45 to 49). The plates are rotatably mounted on bearing rods T^{20}, fixed at their right ends in the fore-and-aft portion T^{17} of the rocker member; and there is formed integrally with each plate a knob T^{21} which permits the plate to be rotatably adjusted to any one of a plurality of different positions, the knob being recessed to contain a spring T^{22} which encircles the bearing rod T^{20} and which reacts between a shoulder T^{23} presented at the base of the recess and a head T^{24} formed at the outer end of the rod. The spring tends to urge the right face of the plate against a shoulder T^{25} presented by the rod T^{20}. A fore-and-aft plate T^{26}, secured to the rocker member T^{17} at the top, overlies all of the plates T^{19} and constitutes a guard plate to prevent any inadvertent interference with their adjustment from external sources.

By rotating the knobs T^{21}, the plates T^{19} may be adjusted each to six different positions, in each of which the plate will present a downwardly facing bearing surface at a different level relatively to the member T^{14}. The position of the rocker member T^{14}, at any time, is determined by the adjustment of the plate at the position corresponding to the adjusted position of the control handle J, since the slide J^{11} on which the handle is mounted is provided with a portion T^{27} extending leftward beneath the fore-and-aft portion T^{17} of the rocker member and formed with a raised lug T^{28} which, at the top, presents a banking surface which is engaged by the active surface of that plate T^{19} located at the position of the slide J^{11}. The position assumed by the rocker member T^{14} at any time will determine the angular position of the arm T^{12} and this, in turn, through the arm T^9, the vertical link T^8 and the bell crank lever T^5, will determine the position of the font distinguisher T.

When the font arrangement has been decided upon, the operator adjusts the knob T^{21} in each position as required by the font in the magazine at the corresponding position in the shift frame. A convenient scale T^{29} located on the upper face of the guard plate T^{26} facilitates this operation (Fig. 23). Thus, if the magazine in No. 1 position contains an 8 pt. or a 16 pt. font, the scale indicates that the plate in the No. 1 position should be adjusted to position No. 5, the various positions being indicated about the periphery of a face plate T^{30} formed integral with the knob, the plate position being indicated by the number at the top. And, likewise, if the magazine in No. 2 position contains a 10 pt. or a 20 pt. font, the corresponding plate T^{19} will be adjusted to the No. 3 position, as indicated on the scale. And similar adjustments are made for the fonts in the magazines at the third and fourth positions. The different adjusted positions of the plates T^{19} are maintained by protrusions or detents t (there being one for each plate T^{19}) formed in the edge of a depending flange presented by the guard plate T^{26} and located in the same plane as the face plates T^{30} when the latter are in their normal positions. The detents t enter one or another of a series of notches t^1 formed in the peripheral edges of the face plates at positions corresponding to their different settings. In order to adjust any of the plates T^{19}, its knob must be pulled forwardly against the reaction of the spring T^{22} until the detent t clears the notch t^1 whereupon the knob may be turned to adjust the plate T^{19} to the new setting which likewise will be maintained by the engagement of the detent in the notch at the new position.

As previously stated, the font distinguisher of the present machine is adjusted automatically during the substitution of one magazine for another. This operation is effected in the following manner: As the pneumatically operated locking bolts A^{10} are withdrawn to release the shift frame for movement (Fig. 16), a depending extension T^{31} at the forward end of the right-hand locking bolt engages a pin T^{32} projecting laterally from the lower end of a third arm T^{33} likewise pinned on the rock shaft T^{11}, causing the latter to turn in a clockwise direction (viewing the machine from the right) to raise the arm T^{12} and tilt the rocker member T^{14} upwardly so that all of the plates T^{19} thereon, regardless of their settings, will stand clear of the lug T^{28} on the control handle slide J^{11} (Fig. 45). At the same time, the arm T^9 extending rearwardly from the rock shaft T^{11} pulls downwardly on the link T^8, thereby turning the upper bell crank lever T^5 in a clockwise direction (viewing the machine from the left) and permitting the font distinguisher rod T^1 to move forwardly, under the reaction of the spring T^6, as far as the head T^3 at its rear end will permit it.

After the locking bolts have been withdrawn, the shift frame, in the manner previously described, is moved to bring the newly selected magazine into operative position, which movement of course is accompanied by a corresponding movement of the control lever slide J^{11} to the setting corresponding to said newly selected magazine. Upon reaching the new setting, the lug on the control handle slide J^{11} will be located directly beneath the plate T^{19} corresponding to the newly selected magazine and which is adjusted according to the font therein. Consequently, when the locking bolts A^{10} snap into the notches to lock the shift frame against further movement, the arm T^{33} will be released, thereby freeing the rock shaft T^{11} and permitting the rocker member T^{14} to move down under gravity to a position as determined by the adjustment of the plate in the new position. The rocker member T^{14} in turn, through the connections previously described, will adjust the font distinguisher bar T^1 rearwardly to accord with the new setting.

As a reminder to the operator, there is provided a frame T^{34} on the cover plate of the control box and which contains a series of windows, one for each magazine position, to receive a card with suitable insignia to indicate the character of the font in the magazine at the corresponding position (Fig. 23). A glance at the font marker will immediately apprise the operator of the location in the shift frame of the desired font, so that the only effort on his part necessary to render the desired font operative is to move the control lever J to the corresponding notch. In the manner previously described, all of the operations which must be performed to condition the newly selected magazine for operation are carried out automatically as the lever J is moved to its new position.

Conclusion

It is believed that the operations of the various mechanisms have been sufficiently described under the different headings and that, therefore, any further effort in that direction would be superfluous. While some of the mechanisms would doubtless have utility in other environments or in association with other mechanisms and apart from pneumatic operation, all of the mechanisms with the pneumatic features have been designed to cooperate with one another in the peculiar way already described in carrying out the basic principles of the present invention and also in furtherance of the general scheme of the Plastaras machine which, in essence, is an entirely new type of machine and one differing radically from the present day machines.

In the accompanying drawings, the invention has been shown merely by way of example and in preferred form, but obviously many variations and modifications may be made therein and in its mode of operation which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or embodiment, except insofar as such limitations are specified in the appended claims.

Having thus described my invention, what I claim is:

1. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, and intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use.

2. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of a series of escapement reeds, certain of which are common to both of said magazines but adapted to cooperate with differently located escapement devices in releasing the same character matrices from the respectively different magazines, key controlled actuating elements, and intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with the appropriate escapement reeds regardless of the magazine in use.

3. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of a series of escapement reeds, certain of which are common to both of said magazines and adapted to cooperate with differently located escapement devices and others with similarly located escapement devices in releasing the same character matrices from the respectively different magazines, key controlled actuating elements, and intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with the appropriate escapement reeds regardless of the magazine in use.

4. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of

matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of a series of escapement reeds, some individual to the magazines and others common to the magazines but adapted to cooperate with escapement devices for releasing different characters therefrom, key controlled actuating elements, and intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with the appropriate individual reeds according to the magazine in use and to common reeds that release the same character regardless of the magazine in use.

5. In a typographical composing machine equipped with a series of at least three magazines containing each a set of matrices which in the various magazines occupy differently located channels according to character, and with escapement devices for said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the different magazines, said intermediate devices including a series of elements common to all of the magazines and adjustable to as many different positions as there are magazines with differently located channels to permit the release of corresponding characters by the same keys of the keyboard.

6. In a typographical composing machine equipped with a series of at least three magazines containing each a set of matrices which in the various magazines occupy differently located channels according to character, and with escapement devices for said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the different magazines, said intermediate devices including one series of elements common to all of the magazines and a second series of elements common to fewer than all of said magazines, each series of elements being adjustable to as many different positions as there are magazines with differently located channels associated respectively with them whereby to permit the release of corresponding characters from the magazines by the same keys of the keyboard.

7. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of elements common to all the magazines and adjustable to three different positions, and another series of elements common to the main magazines and adjustable to two different positions, both series of elements acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and the one series of elements acting in its third position of adjustment to connect the auxiliary magazine for operation by the appropriate section of the keyboard.

8. A combination according to claim 6, wherein either series of elements is adjustable independently of the other.

9. A combination according to claim 6, wherein both series of elements are adjustable interdependently.

10. A combination according to claim 6, wherein one series of elements is adjustable without disturbing the adjustment of the other series.

11. A combination according to claim 7, wherein there are provided common means for adjusting both series of elements to connect either of the main magazines with the keyboard, and independent means for adjusting one series of elements to connect the auxiliary magazine with the keyboard.

12. A combination according to claim 7, wherein the series of elements common only to the main magazines are adjustable to connect either of said magazines with the keyboard without disturbing the keyboard connections with the auxiliary magazine when the latter is in use.

13. A combination according to claim 7, wherein the series of elements common to all the magazines is adjustable to connect and disconnect the auxiliary magazine to and from the keyboard regardless of the adjustment of the other series of elements.

14. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard and intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and the series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard.

15. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including a group of escapement reeds for each of the main magazines and for the auxiliary magazine, and two series of rock bars shiftable endwise as a unit to connect either group of escapement reeds associated with the main magazines operatively to the keyboard and shiftable one series independently of the other to connect the group of escapement reeds associated with the auxiliary magazine operatively to the keyboard.

16. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including a different group of escapement reeds for each of the main magazines and for the auxiliary magazine, a bank of key controlled rock bars associated with the main magazines and a bank of rock bars connected to the group of escapement reeds associated with the auxiliary magazine, means for adjusting endwise the first bank of rock bars into connection with one or another of the groups of escapement reeds associated with the main magazines, and means for adjusting certain of said rock bars into endwise connection with the bank of rock bars associated with the auxiliary magazine.

17. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, and intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including a different group of escapement reeds for each of the main magazines and for the auxiliary magazine, a bank of key controlled rock bars associated with the main magazines and a bank of rock bars connected to the group of escapement reeds associated with the auxiliary magazine, means for adjusting endwise the first bank of rock bars into connection with one or another of the groups of escapement reeds associated with the main magazines, and means for adjusting certain of said rock bars into and out of endwise connection with the bank of rock bars associated with the auxiliary magazine regardless of the adjusted position of the remainder of the rock bars.

18. In a typographical ocmposing machine equipped with an arbitrary arrangement of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, and shiftable as a unit to bring any selected magazine into operative position, and with escapement devices for the magazines, the combination of a keyboard, different groups of escapement operating connections operable by the keyboard and selectable for use according to the magazine in operative position, a plurality of devices corresponding each to one of the magazines in the shift frame and settable differently depending upon the channel arrangement in that magazine, and means acting under the control of said devices and as the shift frame is moved to bring a different selected magazine into operative position automatically to select for use the appropriate group of escapement operating connections for such magazine.

19. In a typographical composing machine equipped with an arbitrary arrangement of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, and shiftable as a unit to bring any selected magazine into operative position, and with escapement devices for the magazines, the combination of a keyboard, different groups of escapement operating connections operable by the keyboard and selectable for use according to the magazine in operative position, adjustable means for rendering operable one or another of said groups of escapement operating connections, a plurality of devices corresponding each to one of the magazines in the shift frame and settable differently depending upon the channel arrangement in the magazine, and means acting under the control of said devices and as the shift frame is moved to bring a different selected magazine into operative position to set the adjustable means to render operable the appropriate group of escapement operating connections for the newly selected magazine.

20. In a typographical composing machine equipped with an arbitrary arrangement of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, and shiftable as a unit to bring any selected magazine into operative position, and with escapement devices for the magazines, the combination of a keyboard, different groups of escapement operating connections operable by the keyboard and selectable for use according to the magazine in operative position, adjustable means for rendering operable one or another of said groups of escapement operating connections, a plurality of devices corresponding each to one of the magazines in the shift frame and settable differently depending upon the channel arrangement in the magazine, and means for setting the adjustable means in a neutral position preparatory to moving the shift frame in selecting a new magazine for use and for resetting said means to render active the appropriate group of escapement operating connections for the newly selected magazine, said resetting of the adjustable means being under the control of the device corresponding to the newly selected magazine.

21. A combination according to claim 19, wherein the magazine shift frame is moved under the control of means shiftable to different positions corresponding to the magazines in the shift frame, and wherein the settable devices corresponding to the different magazines are located at said positions, said control means by its position acting to select the device which in turn controls the selection of the appropriate group of escapement operating connections for the operative magazine.

22. A combination according to claim 19, wherein the groups of escapement operating connections include correspondingly grouped escapement reeds and wherein the adjustable means for rendering the groups operable include rock bars shiftable endwise into connection with one or another of the groups of escapement reeds as required by the channel spacing of the magazine in operative position.

23. In a typographical composing machine equipped with a main and an auxiliary magazine

arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, and mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired.

24. In a typographical composing machine equipped with a main magazine and an auxiliary magazine arranged side by side, escapement devices for the respective magazines, keyboard mechanism, and means for selectively establishing an operative relation between the keyboard mechanism and the escapement devices of either main or auxiliary magazine, the combination of a keyboard lock, and means for automatically rendering the keyboard lock active to prevent functioning of the keyboard mechanism during a change in the relation between the keyboard mechanism and the escapement devices of either of the magazines.

25. A combination according to claim 24, wherein the keyboard lock is automatically rendered inactive when the new operative relation has been established.

26. In a typographical composing machine equipped with a plurality of superposed main magazines shiftable as a unit to bring any selected one thereof into operative position, an auxiliary magazine arranged alongside of the main magazine, escapement devices for the respective magazines, keyboard mechanism, means for selectively establishing an operative relation between the keyboard mechanism and the escapement devices of either the main or of the auxiliary magazine in operative position, and means for shifting the main magazines, the combination of a keyboard lock, and means for automatically rendering the keyboard lock active to prevent functioning of the keyboard mechanism both during a change in the operative relation between the keyboard mechanism and the escapement devices of the auxiliary magazine or of the main magazine in operative position and during a shift to bring a different selected main magazine into operative position.

27. A combination according to claim 26, wherein the keyboard lock is automatically rendered inactive upon the establishment of the new operative relation or upon the completion of the magazine shifting operation as the case may be.

28. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, keyboard mechanism, intermediate means controlled from the keyboard mechanism for actuating the escapement devices of the respective magazines, and means for shifting the magazine unit, the combination of a lock operable automatically to prevent functioning of the keyboard mechanism during a magazine shifting operation, and safety means operable to prevent shifting of the magazines in the event the keyboard lock fails to function.

29. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, keyboard mechanism, intermediate means controlled from the keyboard mechanism for actuating the escapement devices of the respective magazines, means for shifting the magazine unit, and normally operative magazine positioning means movable to an inoperative position to permit the magazine shifting means to function, the combination of a lock operable automatically to prevent functioning of the keyboard mechanism during a magazine shifting operation, and safety means operable to prevent movement of the magazine positioning means to inoperative position in the event the keyboard lock fails to function.

30. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, keyboard mechanism, intermediate means controlled from the keyboard mechanism for actuating the escapement devices of the respective magazines, means for shifting the magazine unit, and normally operative magazine positioning means movable to an inoperative position to permit the magazine shifting means to function and back to operative position properly to locate the newly selected magazine, the combination of a lock operable automatically to prevent functioning of the keyboard mechanism during a magazine shifting operation, and safety means to prevent said lock from releasing the keyboard for operation in the event the magazine positioning means fail to be restored to operative position.

31. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, keyboard mechanism, intermediate means controlled from the keyboard mechanism for actuating the escapement devices of the respective magazines, means for shifting the magazine unit, and normally operative magazine positioning means movable to an inoperative position to permit the magazine shifting means to function and back to operative position properly to locate the newly selected magazine, the combination of a lock operable automatically to prevent functioning of the keyboard mechanism during a magazine shifting operation, and safety means operable, on the one hand, to prevent movement of the magazine positioning means to inoperative position in the event the keyboard lock fails to function and, on the other hand, to prevent said lock from releasing the keyboard for operation in the event the magazine positioning means fails to be restored to operative position.

32. In a typographical composing machine equipped with two magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and escapement devices for the respective magazines, the combination of two groups of key controlled escapement actuating elements adapted to cooperate, one group with the escapement devices of one magazine and the other group with the escapement devices of the other magazine, keyboard mechanism, means for shifting the control of the keyboard mechanism from

at least a portion of one group of escapement actuating elements to the other as required, a keyboard lock operable automatically to prevent functioning of the keyboard mechanism during the operation of the shifting means, and safety devices for preventing the operation of the said shifting means in the event the keyboard lock fails to act.

33. In a typographical composing machine equipped with a pair of superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and escapement devices for the respective magazines, the combination of two groups of key controlled escapement actuating elements adapted to cooperate, one group with the escapement devices of one magazine and the other group with the escapement devices of the other magazine, keyboard mechanism, means for shifting the control of the keyboard mechanism from one group of escapement actuating elements to the other as required, a keyboard lock operable automatically to prevent functioning of the keyboard mechanism during the operation of the shifting means, and safety devices for preventing the operation of said shifting means in the event the keyboard lock fails to act.

34. In a typographical composing machine equipped with a main magazine and an auxiliary magazine arranged side by side and containing each a set of matrices, escapement devices for the respective magazines, a group of key controlled escapement actuating elements for each magazine, keyboard mechanism, and means for shifting the control of the keyboard mechanism from one group of escapement actuating elements to the other as required, the combination of a keyboard lock operable automatically to prevent functioning of the keyboard mechanism during the operation of the shifting means, and safety devices for preventing the operation of said shifting means in the event the keyboard lock fails to act.

35. In a typographical composing machine equipped with a pair of superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine containing a set of matrices and arranged along side the main magazines, escapement devices for the respective magazines, a group of key controlled escapement actuating elements for each main and the auxiliary magazine, keyboard mechanism, and means for shifting the control of at least a portion of the keyboard mechanism from any group of escapement actuating elements to any other group thereof as required, the combination of a keyboard lock operable automatically to prevent functioning of the keyboard mechanism during the operation of the shifting means, and safety devices for preventing the operation of the shifting means in the event the keyboard lock fails to act.

36. In a typographical composing machine equipped with a pair of superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, said magazines being shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, a group of key controlled escapement actuating elements for the respective magazines, and means for shifting the magazines, the combination of means locatable automatically during a magazine shifting operation first in a neutral position and then in a position to select the appropriate group of escapement actuating elements as required by the channel spacing in the selected magazine, and safety devices for preventing shifting of the magazines in the event of a failure to locate said means in the neutral position.

37. In a typographical composing machine equipped with a pair of superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, said magazines being shiftable as a unit to bring any selected one thereof into operative position, escapement devices for the respective magazines, a group of key controlled escapement actuating elements for the respective magazines, means for shifting the magazines, and normally operative magazine positioning means movable to an inoperative position to permit the magazine shifting means to function, the combination of means locatable automatically during a magazine shifting operation first in a neutral position and then in a position to select the appropriate group of escapement actuating elements as required by the channel spacing in the selected magazine, and safety devices operable to prevent movement of the magazine positioning means to inoperative position in the event of a failure to locate said escapement actuating element selecting means in the neutral position.

38. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable as a unit to bring any selected one thereof into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism operable through intermediate connections to actuate the escapement devices, means for locking the keyboard during a magazine shifting operation, and power instrumentalities for operating said locking means.

39. In a typographical composing machine equipped with a plurality of matrix magazines, and escapement devices therefor, the combination of keyboard mechanism, intermediate connections including devices adjustable to connect at least a portion of the keyboard mechanism for the release of matrices from one magazine or another as desired, means for locking the keyboard during the adjustment of said devices, and power instrumentalities for operating said locking means.

40. A combination according to claim 38 wherein the power instrumentalities are pneumatically operated.

41. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable in opposite directions as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, means for connecting the keyboard mechanism for operating the escapement devices of the magazine in operative position, a reversible power drive for shifting the magazine unit in opposite directions, a settable control adapted upon changing the setting thereof to render the power drive operative to shift the magazine unit

to bring any selected magazine into operative position, and a keyboard lock likewise controlled by said settable control and adapted to render the keyboard mechanism functionally inoperative prior to a shift of the magazine unit and functionally operative subsequent thereto.

42. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable in opposite directions as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, means for connecting the keyboard mechanism for operating the escapement devices of the magazine in operative position, a power operated keyboard lock, and a settable control adapted upon changing the setting thereof to render the keyboard lock active and the power drive operative to shift the magazine unit to bring any selected magazine into operative position and the keyboard lock inactive again upon the arrival of the selected magazine in operative position.

43. In a typographical composing machine equipped with a plurality of superposed matrix magazines shiftable in opposite directions as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, means for connecting the keyboard mechanism for operating the escapement devices of the magazine in operative position, power operated magazine locating means, a power drive for shifting the magazine unit in opposite directions, a power operated keyboard lock, and a settable control adapted, upon changing the setting thereof, to render the keyboard lock active, the magazine locating means inactive and the power drive operative to shift the magazine unit to bring a different selected magazine into operative position, and, subsequently, to render the magazine locating means operative to locate the selected magazine in operative position and the keyboard lock inactive after the magazine has been thus located.

44. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable means for connecting the keyboard mechanism to one or another of said groups, a power device for effecting the shifting of said means, a power drive for shifting the magazine unit in opposite directions, and a settable control adapted upon changing the setting thereof to render the power device operative to locate said connecting means in a neutral position and render the power drive operative to shift the magazine unit to bring a different selected magazine into operative position and, subsequently, upon the arrival of the selected magazine in operative position to permit said connecting means to be located operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine.

45. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable means for connecting the keyboard mechanism to one or another of said groups, a power device for effecting the shifting of said means, power operated magazine locating means, a power drive for shifting the magazine unit in opposite directions, and a settable control adapted upon changing the setting thereof to render the power device operative to locate said connecting means in a neutral position, the magazine locating means inactive and the power drive operative to shift the magazine unit to bring a different selected magazine into operative position and, subsequently, to render the magazine locating means operative to locate the selected magazine in operative position and permit said connecting means to be located operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine.

46. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable means for connecting the keyboard mechanism to one or another of said groups, a power device for effecting the shifting of said means, power operated magazine locating means, a power drive for shifting the magazine unit in opposite directions, a power operated keyboard lock, and a settable control adapted upon changing the setting thereof to render the keyboard lock active, the power device operative to locate said connecting means in a neutral position, the magazine locating means inactive and the power drive operative to shift the magazine unit to bring a different selected magazine into operative position and, subsequently, to render the magazine locating means operative to locate the selected magazine in operative position and permit said connecting means to be located operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine and to render the keyboard lock inactive again.

47. In a typographical composing machine equipped with a main magazine and an auxiliary magazine arranged side by side and containing each a set of matrices, and escapement devices for the respective magazines, the combination of a group of key controlled escapement actuating elements for each magazine, keyboard mechanism, a keyboard lock, devices for shifting the control of the keyboard mechanism from one group of escapement actuating elements to the other as required, power instrumentalities for operating the keyboard lock and said shiftable devices, and means under the control of the operator for causing the power instrumentalities to lock the keyboard mechanism, operate the shiftable devices and then render the keyboard

lock inoperative after the required group of escapement actuating elements has been rendered operative.

48. In a typographical composing machine equipped with a main magazine and an auxiliary magazine arranged side by side and containing each a set of matrices, and escapement devices for the respective magazines, the combination of a group of key controlled escapement actuating elements for each magazine, keyboard mechanism, a keyboard lock, devices for shifting the control of the keyboard mechanism from one group of escapement actuating elements to the other as required, power instrumentalities for operating the keyboard lock and said shiftable devices, a main key and an auxiliary key, and means acting, upon the operation of the auxiliary key, to lock the keyboard mechanism, operate the shiftable devices to render operative the group of escapement actuating elements associated with the auxiliary magazine and thus render the keyboard lock inoperative and, upon the operation of the main key, to lock the keyboard mechanism, operate the shiftable devices to render operative the group of escapement actuating elements associated with the main magazine and again render the keyboard lock inoperative.

49. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, said magazines being adjustable as a unit to bring a selected one into operative position, an auxiliary magazine, and escapement devices for all said magazines, the combination of keyboard mechanism, intermediate devices including a group of escapement actuating elements for operating the escapement devices of each magazine and shiftable means for selectively connecting said groups with the keyboard mechanism, and a pair of power instrumentalities under the control of the operator and operable, one to adjust the shiftable means to a neutral position preparatory to connecting the keyboard mechanism with the group of escapement actuating elements appropriate to the main magazine in operative position, and the other to adjust the shiftable means to connect the keyboard with the group of escapement actuating elements appropriate to the auxiliary magazine.

50. In a typographical composing machine equipped with a plurality of superposed matrix magazines movable as a unit in opposite directions to bring any selected one thereof into operative position, and escapement devices for the magazines, the combination of keyboard mechanism, intermediate escapement actuating elements for connecting the keyboard mechanism for the release of matrices from the magazines, a double-acting pneumatically operated cylinder and piston device for moving the magazine unit, a lock for the keyboard mechanism, a pneumatically operated cylinder and piston device for operating the lock, a control valve for each of said pneumatic devices, and a common valve operating member acting when adjusted to bring a different selected magazine into operative position to set the valves to effect, in sequence, movement of the keyboard lock to active position, movement of the magazine unit in one direction or another as desired, and movement of the keyboard lock to inactive position upon the arrival of the selected magazine in active position.

51. In a typographical composing machine equipped with a plurality of superposed matrix magazines movable as a unit in opposite directions to bring any selected one thereof into operative position, and escapement devices for the magazines, the combination of keyboard mechanism, intermediate escapement actuating elements for connecting the keyboard mechanism for the release of matrices from the magazines, magazine locating devices, a lock for the keyboard mechanism, a double-acting pneumatically operated cylinder and piston device for moving the magazine unit, a pneumatically operated cylinder and piston device for the magazine locating devices, a pneumatically operated cylinder and piston device for the keyboard lock, a control valve for each of said pneumatic devices, and a common valve operating member acting, when adjusted, to bring a different selected magazine into operative position, to set the valves to render the lock active, the magazine locating device inactive and to move the magazine unit in one direction or another as desired and, subsequently, to render the magazine locating device active to locate the selected magazine in operative position and the keyboard lock inactive when the magazine is so located.

52. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable means for connecting the keyboard mechanism to one or another of said groups, a double-acting pneumatically operated cylinder and piston device for shifting the magazine unit, a pneumatically operated cylinder and piston device for shifting the other means referred to, a control valve for each of said pneumatic devices, and a common valve operating member acting, when adjusted, to bring a different selected magazine into operative position, to set the valves to shift said means to a neutral position, and to move the magazine unit in one direction or another as desired and, subsequently, upon the arrival of the selected magazine in operative position, to permit said connecting means to be located operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine.

53. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable instrumentalities for connecting the keyboard mechanism to one or another of said groups, magazine locating devices, a double-acting pneumatically operated cylinder and piston device for moving the magazine unit, separate pneumatically operated cylinder and

piston devices for the magazine locating devices and for the shiftable instrumentalities, respectively, a control valve for each of said pneumatic devices, and a common valve operating member acting, when adjusted, to bring a different selected magazine into operative position, to set the valves to shift said instrumentalities to a neutral position, render the magazine locating device inactive and move the magazine unit in one direction or another as desired and, subsequently, to render the magazine locating device active to locate the selected magazine in operative position, and permit the shiftable instrumentalities operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine.

54. In a typographical composing machine equipped with a pair of superposed magazines containing each a set of matrices occupying, as between the magazines, differently located channels according to character, said magazines being shiftable as a unit to bring a selected magazine into operative position, and escapement devices for the respective magazines, the combination of keyboard mechanism, a group of elements for actuating the escapements of each of the respective magazines, shiftable instrumentalities for connecting the keyboard mechanism to one or another of said groups, magazine locating devices, a lock for the keyboard mechanism, a double-acting pneumatically operated cylinder and piston device for moving the magazine unit, separate pneumatically operated cylinder and piston devices for the magazine locating devices, for the keyboard lock, and for the shiftable instrumentalities, respectively, a control valve for each of said pneumatic devices, and a common valve operating member acting, when adjusted, to bring a different selected magazine into operative position, to set the valves to render the lock active, shift said instrumentalities to a neutral position, render the magazine locating device inactive, and move the magazine unit in one direction or another as desired and, subsequently, to render the magazine locating device active, to locate the selected magazine in operative position, permit the shiftable instrumentalities operatively to associate the appropriate group of escapement actuating elements with the keyboard mechanism as required by the newly selected magazine, and restore the keyboard lock to an inactive condition.

55. In a typographical composing machine equipped with main and auxiliary matrix magazines arranged one alongside the other, and escapement devices for the respective magazines, the combination of a common keyboard, intermediate mechanism including shiftable instrumentalities for connecting at least a portion of the keyboard operatively with the main magazine or with the auxiliary magazine, a pneumatically operated cylinder and piston device operable in the shifting of said instrumentalities, a valve controlling the operation of the pneumatic device, and key means for adjusting the valve selectively to connect said portion of keyboard for the release of matrices from either of said magazines as desired.

56. In a typographical composing machine equipped with main and auxiliary matrix magazines arranged one alongside the other, and escapement devices for the respective magazines, the combination of a common keyboard, intermediate mechanism including shiftable instrumentalities, for connecting at least a portion of the keyboard operatively with the main magazine or with the auxiliary magazine, a keyboard lock, a pneumatically operated cylinder and piston device for operating said lock, a valve controlling the operation of the pneumatic device, and key means for adjusting the valve to render the lock operative during a shift of said instrumentalities to connect the keyboard for the release of matrices from either of said magazines.

57. In a typographical composing machine equipped with main and auxiliary matrix magazines arranged one alongside the other, and escapement devices for the respective magazines, the combination of a common keyboard, intermediate mechanism including shiftable instrumentalities for connecting at least a portion of the keyboard operatively with the main magazine or with the auxiliary magazine, a keyboard lock, a pneumatically operated cylinder and piston device for operating said lock, a valve controlling the operation of the pneumatic device, and key means acting, upon operation, automatically, to adjust the valve to render the lock active prior and inactive subsequent to the shifting of said instrumentalities.

58. In a typographical composing machine equipped with main and auxiliary matrix magazines arranged one alongside the other, and escapement devices for the respective magazines, the combination of a common keyboard, intermediate mechanism including shiftable instrumentalities for connecting at least a portion of the keyboard operatively with the main magazine or with the auxiliary magazine, a keyboard lock, a pneumatically operated cylinder and piston device operable in the shifting of said instrumentalities, a pneumatically operated cylinder and piston device for operating said lock, a valve for controlling the operation of each of said pneumatic devices, and common key means for adjusting said valves, one, selectively to connect said portion of the keyboard for the release of matrices from either of said magazines as desired and, the other, to render the keyboard lock active prior and inactive subsequent to the shifting of the instrumentalities for effecting said keyboard connections.

59. A combination according to claim 55 wherein the key means referred to include two keys depressible, one to effect the connection of the keyboard with the auxiliary magazine and the other to effect reconnection of the keyboard with the main magazine, said keys being interconnected and arranged to indicate by their relative positions whether the keyboard is connected to a main or an auxiliary magazine.

60. In a typographical distributing machine equipped with a plurality of superposed magazines containing matrices provided with notches differently located for different fonts, a magazine supporting frame shiftable to bring any selected magazine into operative position a matrix distributor serving the magazine in operative position and a font distinguisher adjustable automatically to cooperate with the notches in the matrices of the active font so as to pass those matrices for distribution while rejecting matrices of a foreign font, the combination of a plurality of devices, one for each magazine, and settable according to the font therein, means movable conjointly with the shift frame and relatively with respect to said devices to select that device which corresponds to the selected magazine, and means controlled by the setting of the selected

device for automatically adjusting the font distinguisher as required by the font in the selected magazine.

61. In a typographical distributing machine equipped with a plurality of superposed magazines containing matrices provided with notches differently located for different fonts, a magazine supporting frame shiftable to bring any selected magazine into operative position, a matrix distributor serving the magazine in operative position, and a font distinguisher adjustable automatically to cooperate with the notches in the matrices of the active font so as to pass those matrices for distribution while rejecting matrices of a foreign font, the combination of a plurality of devices located near the front of the machine within easy reach of the operator, there being one such device for each magazine and manually settable according to the font therein, means movable conjointly with the shift frame and relatively with respect to said devices to select that device which corresponds to the selected magazine, and means controlled by the setting of the selected device for automatically adjusting the font distinguisher as required by the font in the selected magazine.

62. In a typographical distributing machine equipped with a plurality of superposed magazines containing matrices provided with notches differently located for different fonts, a magazine supporting frame shiftable to bring any selected magazine into operative position, a matrix distributor serving the magazine in operative position, and a font distinguisher adjustable automatically to cooperate with the notches in the matrices of the active font so as to pass those matrices for distribution while rejecting matrices of a foreign font, the combination of power means for moving the shift frame, control means at the front of the machine operable at a plurality of different positions to arrest the shift frame and locate a corresponding magazine in operative position, a device at each of said positions settable according to the font in the corresponding magazine and adapted, when active, to adjust the font distinguisher for operation with said magazine, and means for automatically rendering active the device corresponding to the selected magazine.

63. In a typographical distributing machine equipped with a plurality of superposed magazines containing matrices provided with notches differently located for different fonts, a magazine supporting frame shiftable to bring any selected magazine into operative position, a matrix distributor serving the magazine in operative position, and a font distinguisher adjustable automatically to cooperate with the notches in the matrices of the active font so as to pass those matrices for distribution while rejecting matrices of a foreign font, the combination of power means for moving the shift frame, control means at the front of the machine operable at a plurality of different positions to arrest the shift frame and locate a corresponding magazine in operative position, a device at each of said positions settable according to the font in the corresponding magazine and adapted, when active, to adjust the font distinguisher for operation with said magazine, and means for rendering a previously active device inoperative upon inauguration of the shift frame movement and the device corresponding to the selected magazine operative at the conclusion of the shift frame movement.

64. A combination according to claim 63, wherein the means for rendering the settable devices operative and inoperative are power operated.

65. A combination according to claim 63, wherein the means for rendering the settable devices operative and inoperative comprise a pneumatically operated cylinder and piston device controlled by the control means at the front of the machine.

66. In a typographical composing machine equipped with a plurality of superposed matrix magazines supported in a shift frame movable as a unit to bring any selected one thereof into operative position, the combination of feeler devices for determining the presence of matrices exterior of the magazines and capable of interfering with the shifting movement thereof, and power instrumentalities for operating said feeler devices.

67. In a typographical composing machine equipped with a plurality of superposed matrix magazines supported in a shift frame movable as a unit to bring any selected one thereof into operative position, the combination of feeler devices for determining the presence of matrices exterior of the magazines and capable of interfering with the shifting movement thereof, separate power instrumentalities for shifting said magazines and for operating said feeler devices, a common control for said power instrumentalities, and means for preventing shifting of the magazines in the event the feeler devices detect the presence of an interfering matrix.

68. In a typographical composing machine equipped with a plurality of superposed matrix magazines supported in a shift frame movable as a unit to bring any selected one thereof into operative position, and with normally operative magazine locating devices operable to release the shift frame for movement and to locate the shift frame with the newly selected magazine in operative position, the combination of feeler devices for determining the presence of matrices exterior of the magazines and capable of interfering with the shifting movement thereof, power instrumentalities for operating the magazine locating devices and for operating said feeler devices, a common control for said power instrumentalities, and means for preventing operation of the magazine locating devices in the event the feeler devices detect the presence of an interfering matrix.

69. In or for a typographical composing machine, the combination of a keyboard mechanism movable in a fore-and-aft direction from a normal position to a position forward of the overlying devices which it operates, and a supporting frame for guiding the keyboard mechanism in its movement, said supporting frame being mounted to allow a vertical component of motion to the keyboard mechanism to clear said overlying devices during such fore-and-aft movement.

70. In or for a typographical composing machine, the combination of a keyboard mechanism movable in a fore-and-aft direction from a normal position to a position forward of the overlying devices which it operates, and a supporting frame for guiding the keyboard mechanism in its movement, said supporting frame being pivotally mounted to allow the keyboard mechanism to be swung down clear of said overlying devices during such fore-and-aft movement.

71. In or for a typographical composing machine, the combination of a keyboard mechanism movable in a fore-and-aft direction from a normal position to a position forward of the overlying devices which it operates, a supporting frame for guiding the keyboard mechanism in its movement, said supporting frame being pivotally mounted to allow the keyboard mechanism to be swung down clear of said overlying devices during such fore-and-aft movement, and manually operable means including cam devices for effecting such swinging movement of the keyboard mechanism.

72. In or for a typographical composing machine, the combination of a power operated keyboard mechanism bodily movable from a normal operative position to an inoperative position clear of the devices which it operates, a power drive for the keyboard mechanism, means for locking the keyboard mechanism in its normal position and for unlocking it to permit its movement to inoperative position, and means for automatically disconnecting the power drive as the keyboard mechanism is unlocked and reconnecting the power drive as the keyboard mechanism is relocked in normal position.

73. In or for a typographical composing machine, the combination of a power operated keyboard mechanism bodily movable from a normal operative position to an inoperative position clear of the devices which it operates, means for locking the keyboard mechanism in its normal position and for unlocking it to permit its movement to inoperative position, means for driving the keyboard mechanism including a driven pulley on the keyboard mechanism, an idler pulley adjacent the driven pulley and mounted on a frame member with reference to which the keyboard mechanism is movable, a driving belt, and means for automatically shifting the belt from the driven pulley to the idler pulley as the keyboard mechanism is unlocked and for shifting the belt back to the driven pulley as the keyboard mechanism is relocked.

74. In or for a typographical composing machine, the combination of a keyboard mechanism movable in a fore-and-aft direction from a normal position to a position forward of the overlying devices which it operates, a supporting frame for guiding the keyboard mechanism in its movement, said supporting frame having pivotally mounted to allow the keyboard mechanism to be swung down clear of said overlying devices during such fore-and-aft movement, and manually operable means including cam devices movable between terminal positions in one of which the keyboard mechanism is located in its normal position and in the other of which the keyboard mechanism is located in its position clear of said devices, said cam devices being so designed that the weight of the keyboard acting thereon tends to maintain them in either of the terminal positions to which they are adjusted.

75. A combination according to claim 7, wherein either series of elements is adjustable independently of the other.

76. A combination according to claim 7, wherein both series of elements are adjustable interdependently.

77. A combination according to claim 7, wherein one series of elements is adjustable without disturbing the adjustment of the other series.

78. A combination according to claim 20, wherein the magazine shift frame is moved under the control of means shiftable to different positions corresponding to the magazines in the shift frame, and wherein the settable devices corresponding to the different magazines are located at said positions, said control means by its position acting to select the device which in turn controls the selection of the appropriate group of escapement operating connections for the operative magazine.

79. A combination according to claim 20, wherein the groups of escapement operating connections include correspondingly grouped escapement reeds and wherein the adjustable means for rendering the groups operable include rock bars shiftable endwise into connection with one or another of the groups of escapement reeds as required by the channel spacing of the magazine in operative position.

80. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, and means for locking the rock bars against rocking movement during the endwise shift thereof.

81. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and a series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard, and means for locking the rock bars against rocking movement during the endwise shift threof.

82. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock

bars associated with the auxiliary magazine according as the use of the latter is or is not desired, and means for locking the rock bars against rocking movement during the endwise shift thereof.

83. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, and means for automatically turning the rock bars to their normal positions prior to an endwise shift thereof, should any of said bars be located out of normal position.

84. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and a series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard, and means for automatically turning the rock bars to their normal positions prior to an endwise shift thereof, should any of said bars be located out of normal position.

85. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, and means for automatically turning the rock bars to their normal positions prior to an endwise shift thereof, should any of said bars be located out of normal position.

86. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, and means for automatically turning the rock bars to their normal positions prior to and endwise shift thereof, should any of said bars be located out of normal position and for locking said rock bars against rocking movement until such endwise shift has been completed.

87. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and a series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard, and means for automatically turning the rock bars to their normal positions prior to an endwise shift thereof, should any of said bars be located out of normal position and for locking said rock bars against rocking movement until such endwise shift has been completed.

88. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, and means for automatically turning the rock bars to their normal positions prior to an endwise shift thereof, should any of said bars be located out of normal position and for locking said rock bars against rocking movement until such endwise shift has been completed.

89. In a typographical composing machine

equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, normally inactive locking devices adapted when active to lock the rock bars against rocking movement out of their normal positions, and means for automatically rendering said locking devices active and inactive, respectively, prior and subsequent to an endwise shift of said rock bars, said locking devices being adapted when rendered active to restore to normal position any of such rock bars that may have been otherwise located.

90. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and the series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard, normally inactive locking devices adapted when active to lock the rock bars against rocking movement out of their normal positions, and means for automatically rendering said locking devices active and inactive, respectively, prior and subsequent to an endwise shift of said rock bars, said locking devices being adapted when rendered active to restore to normal position any of such rock bars that may have been otherwise located.

91. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, normally inactive locking devices adapted when active to lock the rock bars against rocking movement out of their normal positions, and means for automatically rendering said locking devices active and inactive, respectively, prior and subsequent to an endwise shift of said rock bars, said locking devices being adapted when rendered active to restore to normal position any of such rock bars that may have been otherwise located.

92. A combination according to claim 80, wherein there are provided safety means for preventing the endwise shift of the rock bars in the event the locking means fail to function.

93. A combination according to claim 82, wherein there are provided safety means for preventing the endwise shift of the rock bars in the event the locking means fail to function.

94. A combination according to claim 83, wherein there are provided safety means for preventing the endwise shift of the rock bars in the event the automatic turning means fail to function.

95. A combination according to claim 85, wherein there are provided safety means for preventing the endwise shift of the rock bars in the event the automatic turning means fail to function.

96. A combination according to claim 80, wherein the superposed magazines are mounted in a shift frame movable to bring any selected one into operative position, and wherein safety means are provided to prevent shifting of the magazines in the event the rock bar locking means fail to function.

97. A combination according to claim 80, wherein the superposed magazines are mounted in a shift frame movable to bring any selected one into operative position, normally operative magazine positioning means movable to an inoperative position to permit the shift frame movement, and safety means operable to prevent movement of the magazine positioning means to inoperative position in the event the rock bar locking means fail to function.

98. A combination according to claim 80, wherein the superposed magazines are mounted in a shift frame movable to bring any selected one into operative position, normally operative magazine positioning means movable to an inoperative position to permit the shift frame movement, and back to operative position properly to locate the newly selected magazine, and safety means operable to prevent release of the rock bar locking means in the event the magazine positioning means fails to be restored to operative position.

99. A combination according to claim 80, wherein the superposed magazines are mounted in a shift frame movable to bring any selected one into operative position, normally operative magazine positioning means movable to an inoperative position to permit the shift frame movement, and back to operative position properly to locate the newly selected magazine, and safety means operable, on the one hand, to prevent movement of the magazine positioning means to inoperative position in the event the rock bar locking means fail to function and, on the other hand, to prevent the release of the rock bar locking means in the event the magazine positioning means fails to be restored to operative position.

100. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements,

intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, and power instrumentalities for effecting the endwise shift of the rock bars.

101. In a typographical composing machine equipped with two superposed main magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, an auxiliary magazine, and escapement devices for all said magazines, the combination of a common keyboard, intermediate devices for operatively connecting the keyboard for the release of matrices from the main magazines and for operatively connecting a section of the keyboard for the release of matrices from the auxiliary magazine, said intermediate devices including one series of rock bars common to all the magazines and shiftable endwise to three different positions, and a second series of rock bars common to the main magazines and shiftable endwise to two different positions, both series of rock bars acting in different positions of adjustment to connect the different main magazines for operation by the keyboard, and the series of rock bars shiftable to a third position acting in said position to connect the auxiliary magazine for operation by the appropriate section of the keyboard, and power instrumentalities for effecting the endwise shift of the rock bars.

102. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, and power instrumentalities for effecting the endwise shift of the rock bars.

103. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, and power instrumentalities for operating said locking means.

104. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, means for locking the rock bars against rocking movement during the endwise shift thereof, and power instrumentalities for operating said locking means.

105. In a typographical composing machine equipped with two superposed magazines, one containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, separate power instrumentalities for operating said locking means and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

106. In a typographical composing machine equipped with a main and an auxiliary magazine arranged side by side, and with escapement devices for the respective magazines, the combination of escapement operating connections including two banks of escapement reeds, one bank for the main magazine and the other for the auxiliary magazine, a series of transversely disposed rock bars for operating each bank of escapement reeds, a keyboard permanently connected for operating the rock bars associated with the main magazine, mechanism under the control of the operator for shifting at least some of the last mentioned rock bars endwise, i. e., transversely of the machine, into and out of direct connection with the rock bars associated with the auxiliary magazine according as the use of the latter is or is not desired, means for locking the rock bars against rocking movement during the endwise shift thereof, separate power instrumentalities for operating said locking means and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

107. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shift-

able endwise to connect them with one group of escapement reeds or the other according to the magazine in use, separate power instrumentalities for moving said shift frame and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

108. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, magazine locating means operative to release the shift frame and relocate the same upon the arrival of a newly selected magazine in operative position, separate power instrumentalities for operating said magazine locating means and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

109. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, separate power instrumentalities for moving the magazine shift frame, for operating said rock bar locking means, and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

110. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, magazine locating means operative to release the shift frame and relocate the same upon the arrival of a newly selected magazine in operative position, separate power instrumentalities for operating said magazine locating means, for operating the rock bar locking means, and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

111. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, magazine locating means operative to release the shift frame and relocate the same upon the arrival of a newly selected magazine in operative position, separate power instrumentalities for moving the magazine shift frame, for operating said magazine locating means, for operating said rock bar locking means, and for effecting the endwise shift of the rock bars, and common means for controlling the operation of said power instrumentalities.

112. A combination according to claim 101, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

113. A combination according to claim 102, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

114. A combination according to claim 103, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

115. A combination according to claim 104, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

116. A combination according to claim 105, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

117. A combination according to claim 106, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

118. A combination according to claim 107, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

119. A combination according to claim 108, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

120. A combination according to claim 109, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

121. A combination according to claim 110, wherein the power instrumentalities referred to

comprise pneumatically operated cylinder and piston devices.

122. A combination according to claim 111, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices.

123. A combination according to claim 105, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

124. A combination according to claim 106, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

125. A combination according to claim 107, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

126. A combination according to claim 108, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

127. A combination according to claim 109, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

128. A combination according to claim 110, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

129. A combination according to claim 111, wherein the power instrumentalities referred to comprise pneumatically operated cylinder and piston devices controlled by valves adjustable by the operation of said common control means.

130. A combination according to claim 39, wherein the power instrumentalities are pneumatically operated.

131. A combination according to claim 41, wherein the power referred to is pneumatic power.

132. A combination according to claim 42, wherein the power referred to is pneumatic power.

133. A combination according to claim 43, wherein the power referred to is pneumatic power.

134. A combination according to claim 44, wherein the power referred to is pneumatic power.

135. A combination according to claim 45, wherein the power referred to is pneumatic power.

136. A combination according to claim 46, wherein the power referred to is pneumatic power.

137. A combination according to claim 47, wherein the power referred to is pneumatic power.

138. A combination according to claim 66, wherein said power instrumentalities are pneumatically operated.

139. A combination according to claim 67, wherein said power instrumentalities are pneumatically operated.

140. A combination according to claim 68, wherein said power instrumentalities are pneumatically operated.

141. In a typographical composing machine equipped with two superposed magazines mounted in a shift frame movable to bring any selected one thereof into operative position, one of said magazines containing a set of matrices occupying certain channels according to character, and the other a set of matrices occupying differently located channels according to character, and with escapement devices for said magazines, the combination of two groups of escapement reeds adapted to cooperate with the escapement devices of the respective magazines, key controlled actuating elements, intermediate rock bars permanently allocated to said elements and shiftable endwise to connect them with one group of escapement reeds or the other according to the magazine in use, means for locking the rock bars against rocking movement during the endwise shift thereof, feeler devices for determining the presence of matrices exterior of the magazines and capable of interfering with the shifting movement thereof, and connections whereby the operation of the rock bar locking means is dependent upon the absence of interfering matrices.

JAMES C. PLASTARAS.