

Feb. 21, 1950

J. H. GRUVER

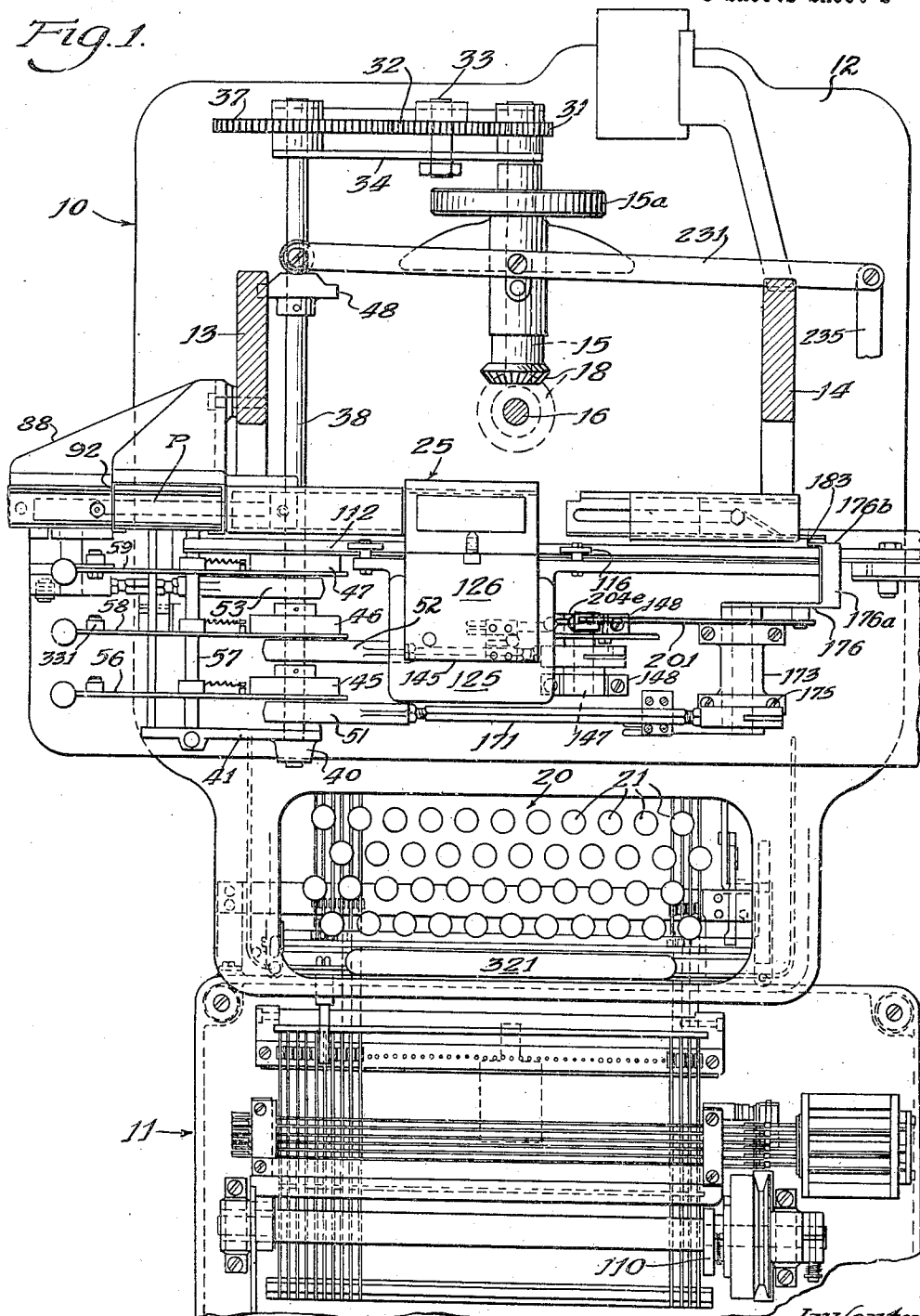
2,498,038

PLATE HANDLING MECHANISM FOR EMBOSsing MACHINES

Filed June 14, 1946

8 Sheets-Sheet 1

Fig. 1.



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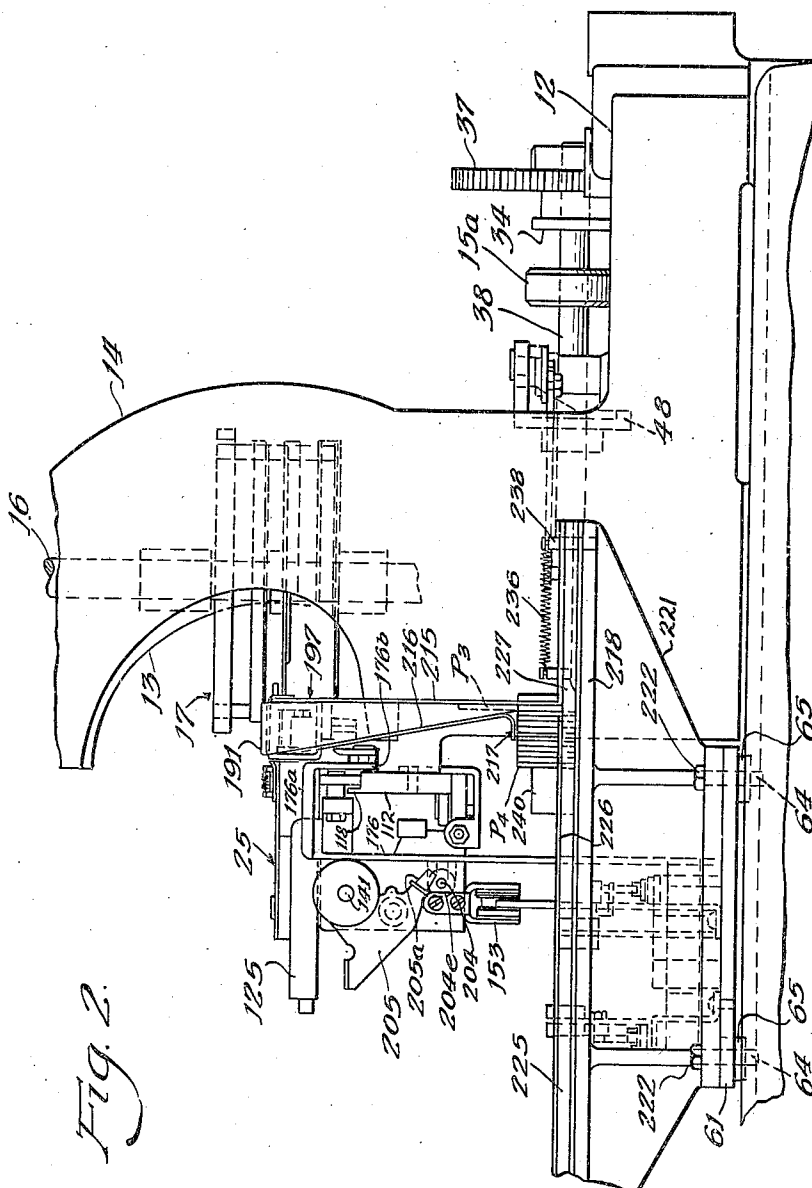
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PLATE HANDLING MECHANISM FOR EMBOSSING MACHINES

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PLATE HANDLING MECHANISM FOR EMBOSSED MACHINES

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8 Sheets-Sheet 3

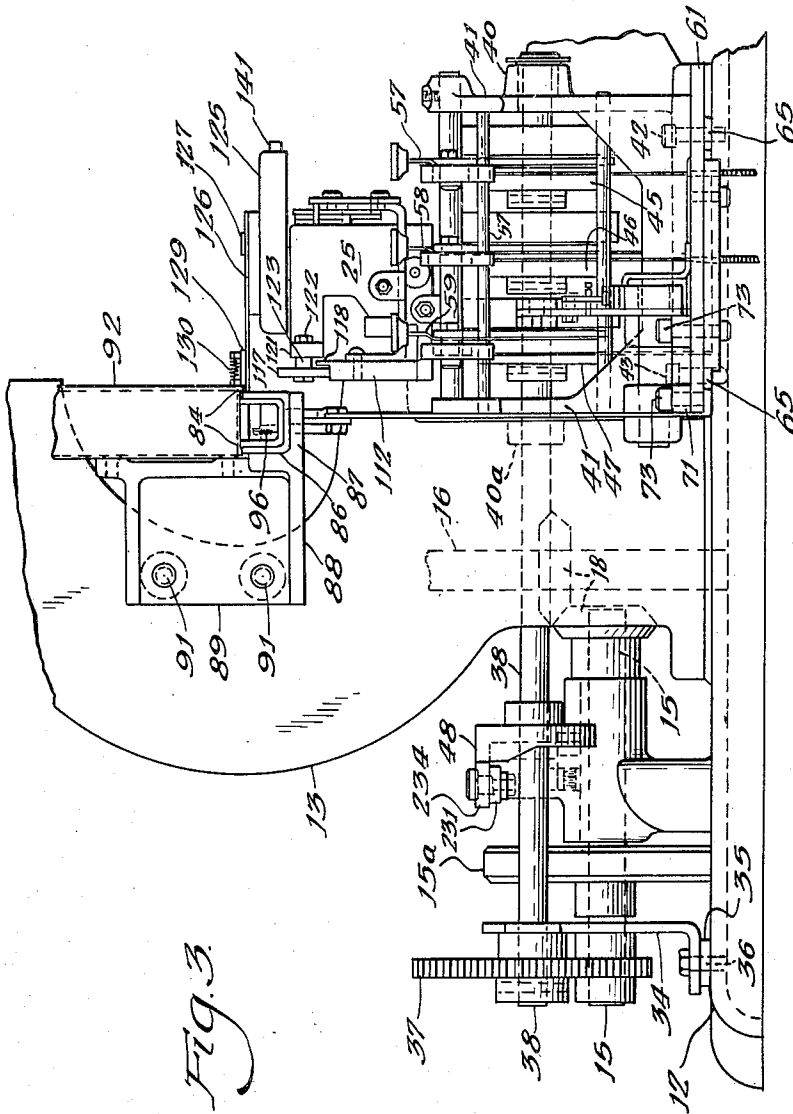


Fig. 3.

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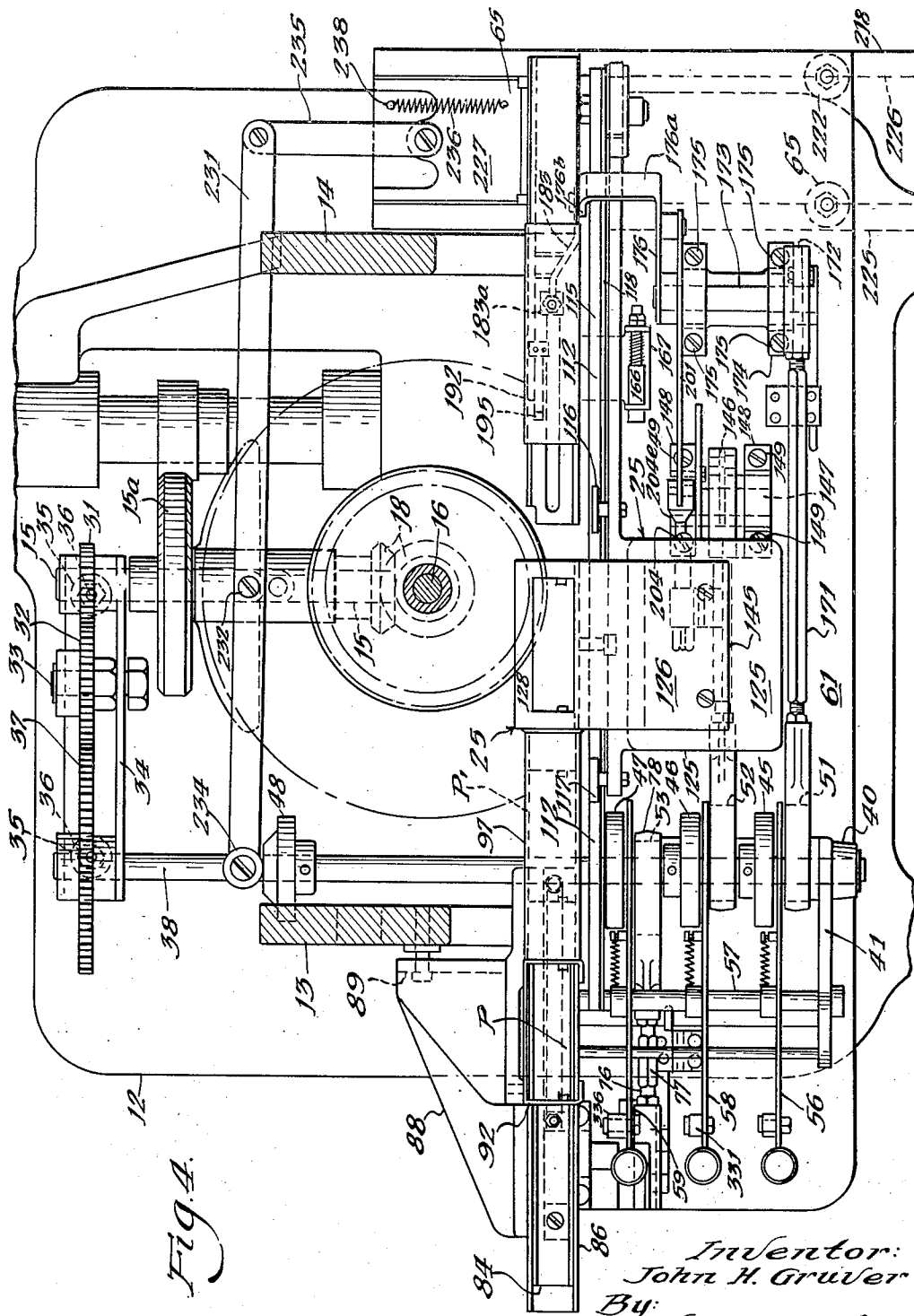
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PLATE HANDLING MECHANISM FOR EMBOSsing MACHINES

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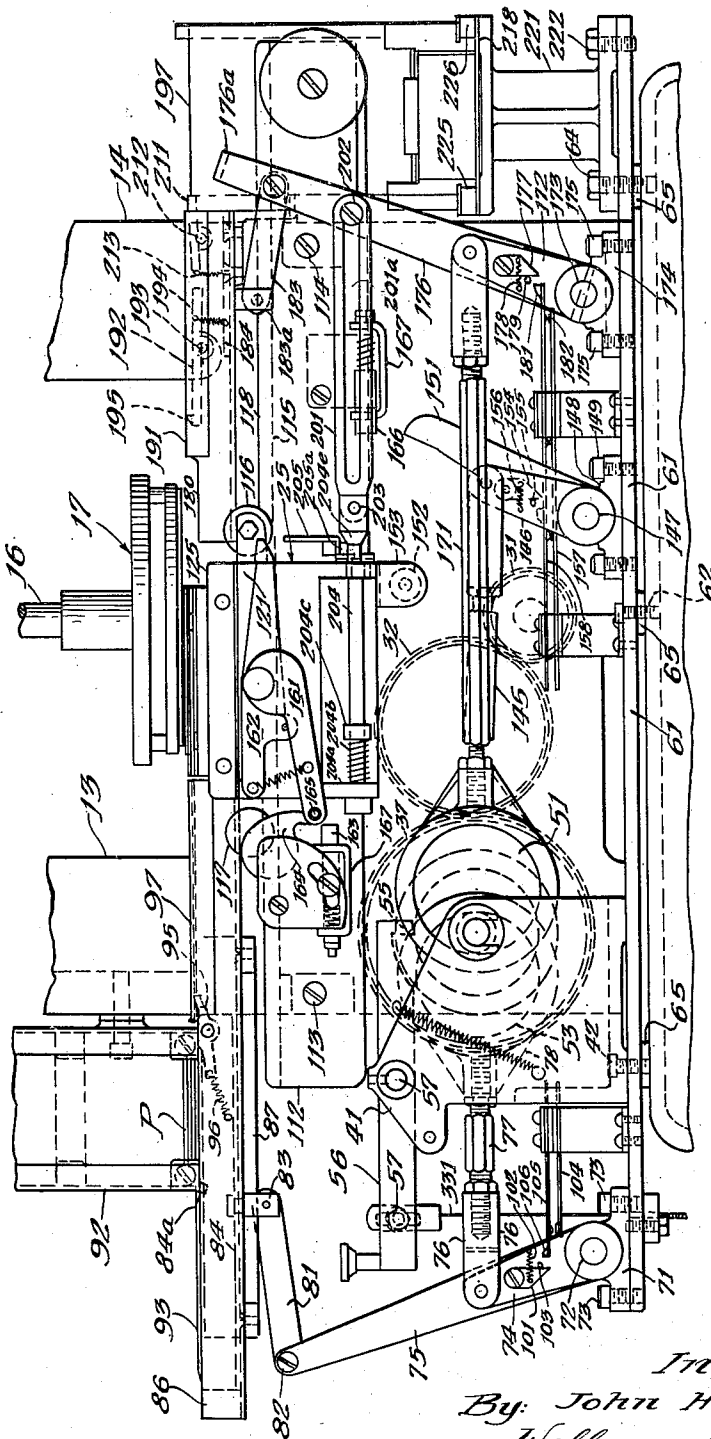
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PLATE HANDLING MECHANISM FOR EMBOSsing MACHINES

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Fig. 5.



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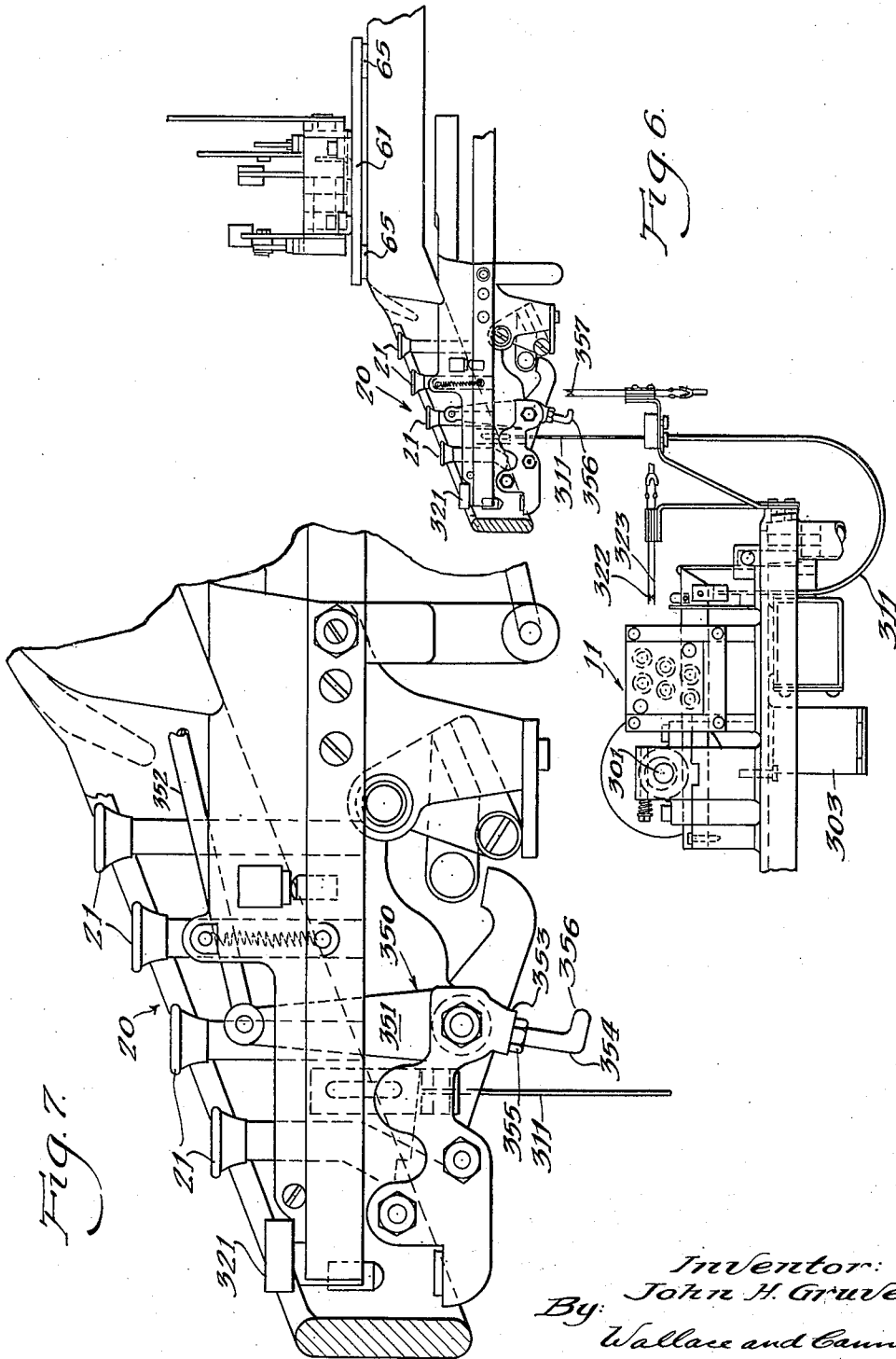
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PLATE HANDLING MECHANISM FOR EMBOSSED MACHINES

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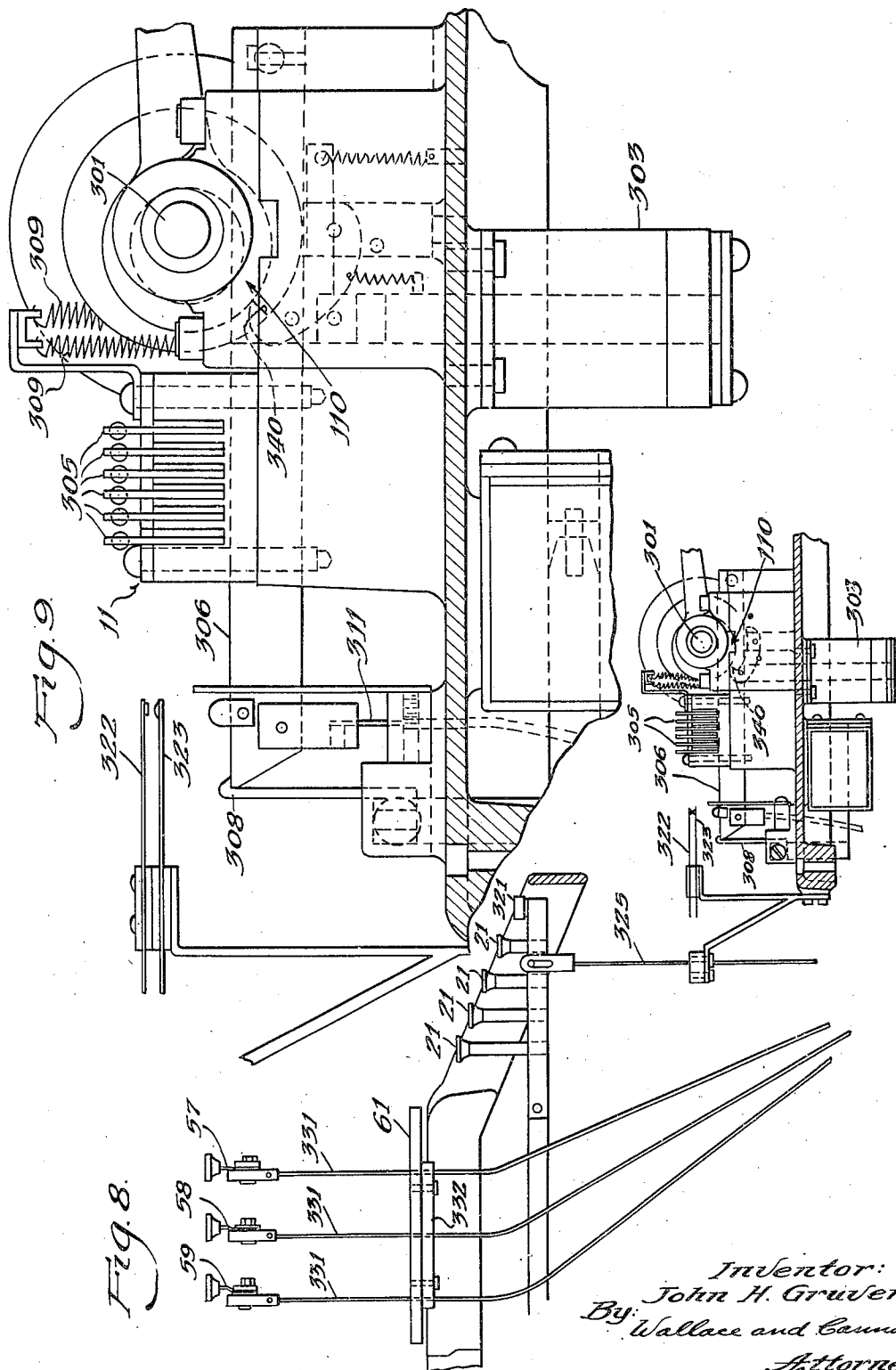
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PLATE HANDLING MECHANISM FOR EMBOSsing MACHINES

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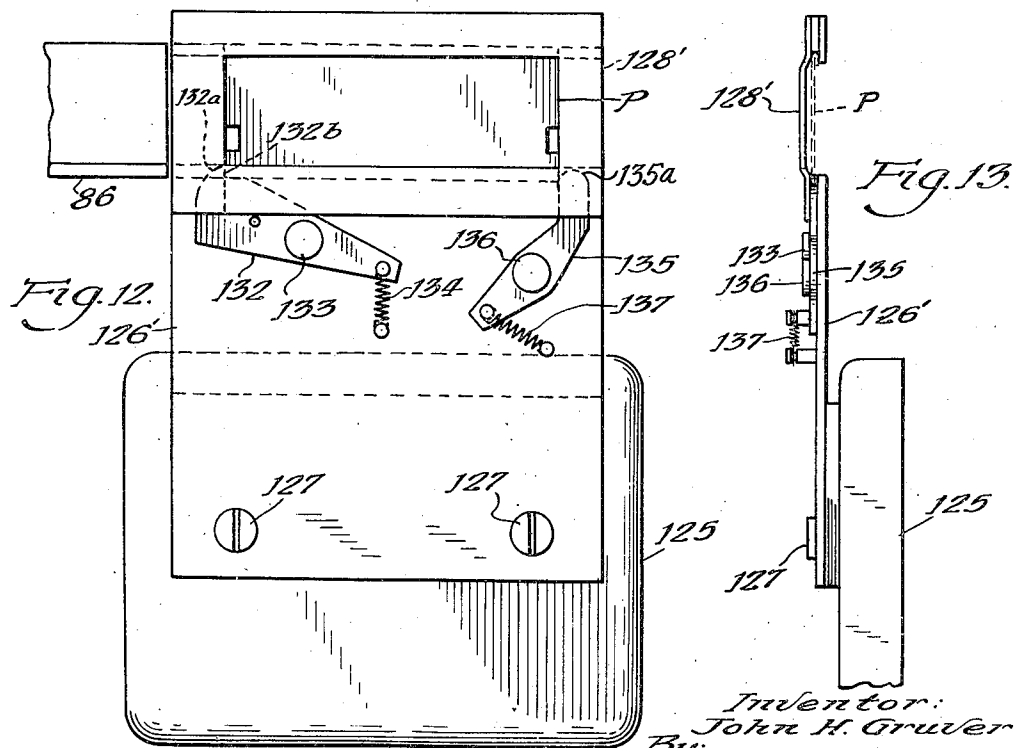
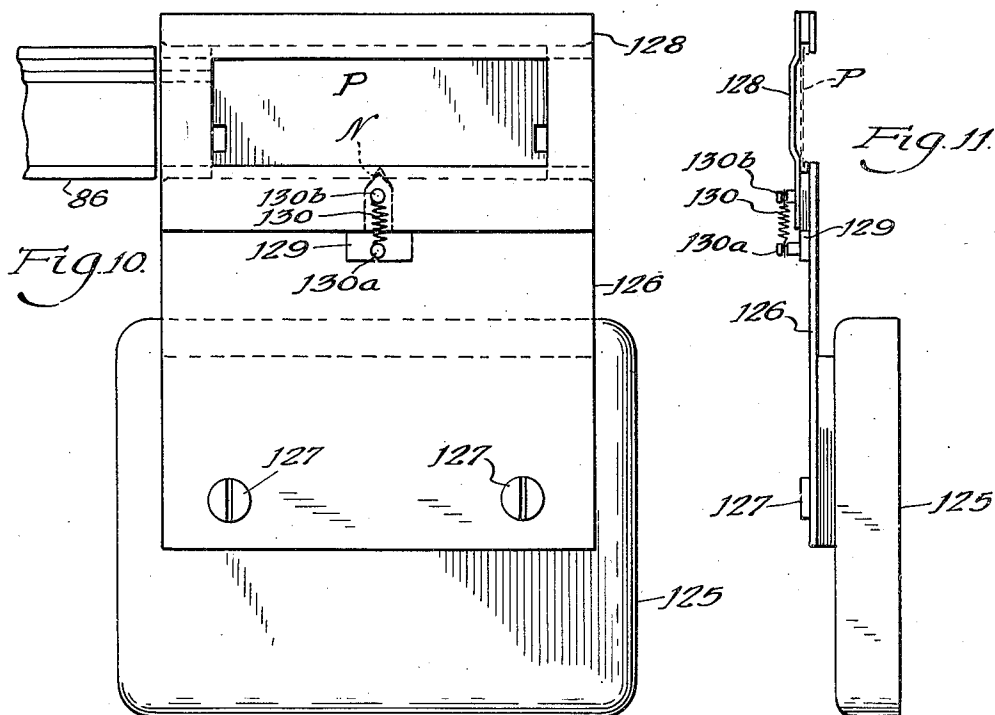
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PLATE HANDLING MECHANISM FOR EMBOSsing MACHINES

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE

2,498,038

PLATE HANDLING MECHANISM FOR
EMBOSSING MACHINES

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Application June 14, 1946, Serial No. 676,780

8 Claims. (Cl. 197—6.6)

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This invention relates to an embossing machine and particularly to an embossing machine of the character used for embossing printing plates formed of sheet metal and like material.

A machine of the general character to which the present invention pertains is described in the patent to Duncan No. 1,518,904, patented December 9, 1924. The machine described in said patent has a manual keyboard similar to the keyboard of a standard typewriter which is operated manually to control embossing of printing characters upon printing plates such as are used in connection with printing devices or control devices employed in automatic machinery for addressing, billing, and the like.

Printing plates of the type mentioned above are used in great quantities in various types of business enterprise, particularly in those business systems where it is necessary to issue periodically, publications, bills, and the like, where large numbers of customers are involved. Normally a separate printing device is required for each customer and the task of keeping such printing devices up-to-date becomes considerable. In certain type of business, moreover, particularly in the publishing business where periodicals such as the more popular magazines are issued in large quantities, there are periodic changes in subscribers' lists and the task of revising and keeping a stock of printing plates up-to-date becomes particularly difficult. Where publications are issued on a subscription basis, for example, and subscriptions expire annually, there is a very large seasonal peak load imposed upon the publisher especially when subscriptions expire and new subscriptions are received in volume at a particular season of the year as, for example, at the end of the calendar year.

It has been customary in the past to revise the stocks of printing plates which may, for example, be used merely for addressing periodicals of the character referred to above, whenever changes in such plates are required. In the case of subscription lists expiring in large numbers at a particular time, this has in some instances, required the employment of large temporary forces of employees, and the use of much mechanized equipment, including plate embossing machines of the general character referred to above, which would not be required for the normal routine business of the organization. Thus peak work loads of the character mentioned are expensive and result in inefficient operations.

Accordingly, it has become desirable to provide means by which peak work loads of the char-

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acter referred to above may be handled more adequately without employment of a large amount of emergency equipment or a temporary force of employees. In copending applications by Clifton Chisholm, Serial Nos. 676,779 and 676,778, filed June 14, 1946, now Patents Nos. 2,453,782 and 2,453,781, dated November 16, 1948, there are described, respectively, a mechanism by which a control tape may be perforated under the control of a standard typewriting machine, and a mechanism by which such tape may be utilized for controlling the operation of an embossing machine of the general character mentioned above, thus dispensing with the requirement for trained personnel to operate such embossing machine. The present invention deals particularly with an embossing machine which is adapted to be operated by or in connection with the means disclosed in the aforesaid copending applications.

Accordingly, it is an object of the present invention to operate an embossing machine automatically under the control of a prepared record member.

Another object is to include automatic control mechanism in an embossing machine whereby such machine can be operated by a remote control mechanism, this being accomplished without interference with normal manual operation of the embossing machine when such is desired.

A further object of the present invention is to feed plate blanks automatically into, through, and out of an embossing carriage in an embossing machine, thus rendering the manual handling of printing plates unnecessary.

A still further object of the present invention is to equip an embossing machine, for printing plates and the like, with automatic mechanism for performing the various functions of feeding, embossing, spacing, ejecting, and stacking printing plates without requiring that manual control of any kind be exercised.

A still additional object of the present invention is to equip a plate embossing machine with automatic control mechanism of the aforesaid character, so designed that the maximum practicable speed of operation of the embossing mechanism is obtained and operation of the remote control mechanism is governed by the capabilities of the embossing machine.

Another object of the present invention is to equip an embossing machine with new and improved means for handling printing plates, by which such plates may be fed from one stack intermittently to the carriage where they are automatically embossed and thereafter be fed inter-

mittently to a receiver where they are stacked in proper relation for use in printing machinery.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a plan view of my improved embossing machine, including a remote control mechanism therefor;

Fig. 2 is a right end elevation of the embossing machine;

Fig. 3 is a left end elevation;

Fig. 4 is a plan view on a larger scale of part of the mechanism shown in Fig. 1;

Fig. 5 is a front elevation of the mechanism shown in Fig. 4;

Fig. 6 is a right end elevation of part of the mechanism shown in Fig. 1, showing the relation between a remote control mechanism and the keyboard of the embossing machine;

Fig. 7 is an enlarged view of part of the mechanism shown in Fig. 6;

Fig. 8 is a left end elevational view of part of the mechanism shown in Fig. 1, the view being analogous to Fig. 6 and showing other aspects of the relation between a remote control mechanism and manual control elements of the embossing machine;

Fig. 9 is an enlarged view of part of the mechanism shown in Fig. 8;

Fig. 10 is a plan view of one form of plate carriage;

Fig. 11 is an edge view of the carriage of Fig. 10;

Fig. 12 is a plan view of another type of plate carriage; and

Fig. 13 is an edge view of the carriage of Fig. 12.

In Fig. 1 there are shown the embossing machine 10 which comprises my present invention, and a remote control mechanism 11 for the embossing machine which, as previously mentioned, is described, and is claimed per se in one of the above mentioned copending applications by Clifton Chisholm, Serial No. 676,778.

The embossing machine 10 comprises a frame including a base 12 and a pair of upstanding frame members 13 and 14 by which the embossing mechanism proper is supported. As noted above, this machine is of the same general character as that described in the patent to Duncan, No. 1,518,904. The machine of the Duncan patent, however, is controlled manually, having a keyboard substantially identical with that of a standard typewriter and being operated in much the same manner. It should be pointed out, however, that the dies of embossing machines, because of the character of work they are required to perform, are not operated by the force applied manually to the keys by the operator as in the case of a typewriter. Depression of any key merely initiates an embossing operation which is performed by mechanical power means. This important distinction should be kept in

mind as this description proceeds, since it is the basis for a number of features which are necessarily included in an operative mechanism of this character. Whereas the machine of the Duncan patent is manually controlled, the present invention contemplates complete automatic control of the machine, with provision, however, for manual operation when such is considered necessary or desirable.

The remote control mechanism 11 forms no part of the present invention per se, but inasmuch as it is closely related to the present invention, it will be referred to at certain points in the description hereof. At this point it is sufficient to state that the mechanism 11 operates under the control of a record member such as a perforated tape, or the like, to actuate certain levers which are connected, as through Bowden cables, to the various keys and other controls of the embossing machine. It should particularly be noted that the remote control mechanism 11 is operated cyclically under the control of a single revolution clutch 110. Operation of this clutch is described in detail in the aforesaid Chisholm application, Serial No. 676,778, and will be mentioned briefly hereinafter, but it should be noted that because of mechanical limitations on the operating speed of the embossing machine, the cyclic rate of operation of the remote control mechanism is limited to the capabilities of the embossing machine and actuation of the single revolution clutch 110 occurs only when and as each operation of the embossing machine is being completed. This arrangement prevents the remote control mechanism from attempting to initiate successive premature functions of the embossing machine which would result if the control mechanism were operated at a rate in excess of that at which the embossing machine may be operated.

Returning to the description of the embossing machine per se, such machine is operated by a rearwardly extending horizontal shaft 15 which may be driven as through a gear wheel 15a, from any suitable power source such as an electric motor, not shown, and which is geared to drive other operating elements. A central vertical shaft 16 which carries the die assembly 17, Fig. 2, is driven from shaft 15 through bevel gearing 18. Between the gearing 18 and the die assembly 17, a friction drive or clutch is afforded as described in the aforesaid Duncan patent. The manual keyboard 20, which as previously noted, is similar to that of a standard typewriter, includes operating keys 21. The die assembly 17, Fig. 2, comprises an upper and lower die for each character to be embossed, such dies being arranged in pairs and carried by a frictionally driven die assembly 17 which rotates to dispose desired die elements in embossing position. As described in the aforesaid Duncan patent, depression of a character key 21 selectively interposes stop elements which result in disposing a pair of dies in an embossing station opposite the part of a plate to be embossed. Thereupon the opposed male and female dies are forced together by means well known in the art to emboss the plate between them. After embossing is completed, the dies are separated and the die assembly resumes rotation until another embossing operation is initiated by depressing a character key 21. A carriage 25 for plates being embossed is adapt-

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ed to be displaced or spaced after each character is embossed in a manner similar to that in which a typewriter carriage is displaced. A space bar, shift key, and tabulating key operate in the same manner as in a typewriter and the means by which these functions are accomplished are all well known in the art and need not be described herein.

In the prior art, as exemplified by the aforesaid Duncan patent, the plate carriage 25 has been operated manually except for the character spacing mentioned above. Thus as described in said patent, and more particularly as described in an earlier patent of Duncan, No. 921,600, patented May 11, 1909, the carriage has been mounted to travel back and forth in front of the embossing dies, but it has required manual insertion of a plate to be embossed, manual locking of such a plate therein, and manual retraction, line spacing, and unloading of the carriage. In the present invention means are provided for accomplishing all these and certain other functions automatically.

At its rear end the main drive shaft 15 carries a spur gear 31 which meshes with an idler gear 32 suitably supported on a stud 33. Stud 33 is carried by a bracket 34, supported as by resilient washers or posts 35 and studs 36 on the machine base 12. See Figs. 1, 3, and 4. The idler gear 32 meshes with a larger spur gear 37 which is keyed to a shaft 38. This shaft has its rear end mounted in the bracket 34 and extends forward horizontally to the front of the machine. The shaft 38 is constantly driven while the embossing machine is in operation and it constitutes a source of power for various automatic control functions to be described hereinafter. At its forward end the shaft 38 is supported in a pair of bearings 40 and 40a carried by a dual bracket 41 suitably secured as by studs 42, 43 to the base 12, Fig. 3. The ratio of gears 18, 31, and 37 is such that the shaft 16 which carries the embossing dies rotates considerably faster than the shaft 38. Hence shaft 16 is capable of carrying out its functions completely without interference from automatic operations under control of shaft 38. The latter, therefore, cannot be performed more rapidly than embossing operations under the control of shaft 16 can be completed.

The shaft 38 has keyed thereto, three clutch drums 45, 46, and 47 for operating various elements to be mentioned hereinbelow. It also mounts a cam 48 near its rear end for a purpose to be described presently. Each of the clutch drums 45, 46, and 47 is adapted to drive an associated eccentric 51, 52, or 53, Fig. 4, through means of a single revolution clutch which may be of any well known type, as, for example, of the roller type wherein release of a latch permits a spring to move a roller into position to cause an inner member to rotate with a drum 45, 46, or 47. Clutches of this character are well known in the art and require no further description. By their use, any one of the eccentrics 51, 52, or 53 may be operably connected to the shaft 38 by releasing a pawl or latch as 55, Fig. 5, such pawl being carried in this instance by a key operated lever 56 pivoted on a shaft 57, which in turn is mounted at its ends in the upstanding arms of the dual bracket 41 previously mentioned. The particular lever 56 just mentioned controls the ejection of a finished plate from the machine. Two other key operated levers 58 and 59 control, respectively, the return of the carriage and the feed of a plate into the carriage. The

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mechanism by which these operations are accomplished will next be described.

Referring to Fig. 5, it will be noted that an auxiliary base plate 61 is secured as by the studs 42, previously mentioned, and by means of additional studs 62 and 64, to the main base frame member 12. Suitable spacers 65 are provided, these being preferably of rubber, or like resilient material to minimize transmission of vibrations between the various parts. The auxiliary base plate 61 is thereby mounted behind and somewhat above the keyboard 20, as will be seen by reference to Figs. 1 and 3.

The auxiliary base plate 61 supports a bearing bracket 71 for a rock shaft 72, such bracket being secured as by studs 73 to the base 61 at its left end, as seen by an operator facing the machine and as shown in Fig. 5. The shaft 72 has keyed thereto a short upstanding arm 74 and a long upstanding arm 75. The short arm 74 is connected to a link 76 which comprises an adjustable turnbuckle 77 and an eccentric band 78 which engages the eccentric 53 driven by the drum 47 through single revolution clutch mechanism previously mentioned. The upper end of the long arm 75 has a link 81 attached thereto as by a screw or bolt 82.

The link 81 is secured to a lug 83 carried by a slidable feed member 84 which is formed as a channel shaped block fitting within the channeled upper recess of a fixed member 86. As best shown in Fig. 3 the member 86 is mounted on a horizontal flange 87 of a bracket 88 which is provided with a rearwardly extending and vertically disposed flange 89. The flange 89 is secured as by studs, or the like, 91 to the vertical frame member 13 previously mentioned, as shown in Fig. 3.

In addition to the fixed channel member 86, the bracket 88 supports a vertical feed magazine 92 which holds a stack of printing plate blanks P in position to be fed to the embossing machine. This magazine, as best shown in Fig. 4, is of a size and shape to freely receive such blanks and its right vertical end wall, as seen in Figs. 4 and 5, is spaced just far enough above the upper edges of the fixed channel member 86 that the lowermost blank P may be slid out of the stack by the engagement of projecting elements 84a on the upper edges of the slidable feed member 84. These projecting portions are integral with the side walls of the fixed channel member 86, and they project above the portions to the right, Fig. 5, by an amount just sufficient to engage the lowermost printing plate blank P in the magazine. As the feed member 84 is carried to the right, Fig. 5, the projections 84a push the bottom plate blank P out of the magazine, the right wall of the magazine being cut away above the edges of the member 86 as noted above to permit only one plate blank to be fed.

The feed slide 84 has a feed pawl 95 pivotally mounted between its upturned side wall flanges and a tension spring 96 is secured to the tail portion of this pawl to urge its forward end upwardly. When engagement of a single revolution clutch with clutch drum 47 causes the eccentric 53 associated therewith to be driven by shaft 38, the lever arm 75 slides the feed member 84 to feed out a plate blank P, as mentioned above. The upper edges of the side flanges or channel member 86 constitute supporting rails for the advancing plate blank and an inverted channel member or hood 97 is positioned over such rails,

to the right of the magazine 92 as seen in Fig. 5, to guide the blanks as they advance.

Rotation of the eccentric 53 causes the feed mechanism just described to advance a plate blank P to an intermediate position half way between the magazine and the embossing station, the stack of blanks in the magazine being supported temporarily on the raised edge portions 93 of feed member 84 to the left or rear of the shoulder portions 84a as seen in Fig. 5. As the feed member 84 is withdrawn to the left, Fig. 5, the raised edge portions 93 are withdrawn from under the stack of blanks P and at the same time the pawl 95 is withdrawn under and to the left of the blank P just fed to the intermediate position as described above. Spring 96 permits the pawl to yield until it clears the rear end of the blank P when it snaps up in position to advance such blank farther to the right on the next feeding movement of the member 84.

The arm 74 which is operated by the eccentric 53, and which causes operation of the feed mechanism as just described, carries a pivoted cam member 101 which, as seen in Fig. 5, is normally urged counter-clockwise by a spring 102 to a position abutting a stop pin 103. A pair of electrical contacts 104 and 105 are mounted in the path of this cam member, the upper one, 105, having a cam portion 106 formed at its outer or left end as seen in this figure. When the arm 74 moves clockwise, the end of the contact 105 merely rocks the cam member 101 to the left, spring 102 not having sufficient strength to close the contacts. However, on return to the left as seen in Fig. 5, the stop pin 103 causes the cam 101 to positively close the contacts. This operation energizes an electric circuit to a solenoid which actuates the single revolution clutch 110 of the remote control mechanism 11 to advance the record member, such as a perforated tape mentioned above, to a new position for a subsequent sensing of perforations therein to initiate another operation of the embossing machine. Hence a new control operation of the mechanism 11 is not initiated until the arm 74 has been substantially restored to its normal rest position at the left as seen in Fig. 5. This operation is typical of several to be described, all of which are necessitated by the fact that a new operation of the embossing machine may not be initiated until a current one is substantially completed. In other words, the remote control mechanism is required to wait for the embossing machine, the heavy and somewhat ponderous character of the working parts of such machine requiring such limitation on its operating speed. The operation of the single revolution clutch 110 which drives the remote control mechanism in cycles will be mentioned more fully hereinbelow, and is described in detail in the aforesaid copending application by Clifton Chisholm, Serial No. 676,778.

The embossing carriage 25, which, as previously mentioned, carries a plate P during the embossing operations, is supported for horizontal travel by a rail member 112 suitably secured to the vertical frame members 13 and 14 by screws 113 and 114 as best seen in Figs. 4 and 5. This rail has a supporting ledge 115 along which rollers 116 and 117 on the carriage 25 may run. An upstanding flange 118 forms a part of the rail 112 and serves to keep the rollers on the track 115 as best shown in the end views, Figs. 2 and 3.

The carriage 25 comprises a vertically disposed plate 121 to which the rollers 116 and 117 are suitably attached as by bolts 122 and spacers 123.

Mounted upon a framework which includes the plate 121 is a horizontal shiftable cross slide in the form of a plate 125 which extends forwardly toward the keyboard 20 of the embossing machine and which mounts a horizontal plate carrying or clamping member 126 suitably secured to its upper surface as by screws 127, Fig. 10.

The plate carrying member shown in Fig. 10 comprises a channel jaw member 128 which extends rearwardly from plates 125 and 126 and which may be positioned in line with the feed rails of member 86 along which a plate P is advanced in the manner previously described. As shown in Fig. 11, the jaw member 127 includes inturned flanges or ledges which support the lower edges of a plate. As shown in Fig. 10, the printing plate or blank P has a V-shaped notch N cut in the forward edge thereof and the printing plate carrying device 128 includes a slidable detent 129 urged rearwardly into engagement with such notch by a tension spring 130. This spring is secured between a pin 130a carried by the detent and another pin 130b carried by the jaw member 128.

An alternative form of printing plate holder is shown in Figs. 12 and 13 and for some purposes this form is preferred since the printing plate or blank P need not be notched as it is shown in Fig. 10. The supporting plate 126' is substantially identical with the supporting plate 126 of Fig. 10 and carries at its forward end a channel member 128' substantially identical with the channel 128 to receive a plate from the feed mechanism. A spring actuated pawl 132 is pivoted near the left side of supporting plate 126' as shown at 133 and is normally urged clockwise as seen in Fig. 12 by a spring 134. This pawl has a cam shaped end 132a which is contacted by a printing plate blank advancing from the left and is rotated counter-clockwise against the tension of spring 134 when the plate is pushed into the receiver. The pawl 132 also has a notch 132b which engages the rear corner of the printing plate when the latter is fully positioned within the carriage by the pawl 95 carried by the feed member 84. Another pawl 135 is pivoted at the right or exit end of the carriage on a suitable pivot pin 136 and is urged counter-clockwise as seen in Fig. 12 by a tension spring 137. This pawl has a rounded end 135a adapted to be carried out of the way as a completed printing plate P is pushed out of the carrying jaw member 128'. Hence a plate P is held in operating position during embossing operations by the two pawls 132 and 135 which prevent endwise displacement thereof. Subsequently, when the plate has been fully embossed and a new plate is to be fed into the carriage, the plate P on sliding to the right rotates the pawl 135 against the force of its spring and is ejected into a discharge channel by means and in a manner to be described hereinafter.

The carriage 25 per se forms no part of my present invention, being described in detail and claimed in my copending application Serial No. 710,269, filed November 16, 1946, now Patent No. 2,450,725, dated October 5, 1948. However, as more fully described in said application, the carriage comprises a frame member which includes the roller carrying plate 121 mentioned above and which supports the slidable top plate 125. As just described, slidable plate 125 has attached thereto the means 128 or 128' for engaging and holding a plate as the embossing operations are performed thereon. The slidable plate 125 embodies racks 75 secured to or integral with its downturned edges

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which mesh with pinions, not shown herein but carried by the shaft 141, Fig. 2. Rotation of shaft 141 by means described in detail in my aforesaid application causes the plate 125 to move rearwardly toward the embossing dies or forwardly away from such dies as may be required.

The eccentric 52, mentioned above and best shown in Fig. 4, is adapted to be driven by a one revolution clutch of which the drum 46 comprises a part. When the carriage return key lever 58, Figs. 5 and 8, is depressed, this clutch is engaged and the eccentric 52 through its band and the adjustable link 145, reciprocates a pivoted arm 146, first counter-clockwise, and then clockwise as seen in Fig. 5. The arm 146 is supported by a rock shaft 147 to which it is rigidly connected. The shaft 147 is mounted in a pair of bearing brackets 148 secured as by studs or screws 149 to the auxiliary base plate 61. Another arm 151 is rigidly secured to shaft 147 and is adapted to engage a roller 152 carried by a depending lug 153 on the carriage frame to restore the carriage to its initial position at the left as seen in Fig. 5. Spring means and an escapement mechanism not shown herein, but described in the aforesaid copending application and analogous to the means used in standard typewriters are employed to cause the carriage to move step by step to the right as characters are embossed on the plate. The arm 151 therefore serves as a restoring means for the carriage. Means are also associated with the carriage for causing it to space the cross slide 125 and the plate holder 126 rearwardly one line each time the carriage is returned to its initial position by the restoring means just described. Hence the operation of restoring the carriage not only brings it back to its initial position, where the embossing of the line can be started, but also line-spaces the plate P toward the embossing dies as successive lines are to be embossed thereon.

The arm 146 has pivotally attached thereto a cam member 154 which is urged clockwise, as seen in Fig. 5, to abut against a stop pin 155 by means of a tension spring 156. A pair of electrical contacts 157 and 158 are adapted to be closed by the cam member 154 as the arm 146 swings to the right after a carriage restoring operation. Closing of these contacts establishes an electrical circuit in the same manner as contacts 104 and 105 to energize the solenoid mentioned above which trips the one-revolution clutch 110 of the remote control mechanism 11. Thus as the carriage 25 is restored, the remote control mechanism is energized to advance the control tape another step which activates mechanism described in the aforesaid Chisholm application Serial No. 676,778, to begin embossing the next line on the plate or to initiate such other operation as may be indicated by control perforations in the tape.

The means by which the cross slide 125 is line-spaced toward the embossing dies after each restoring operation include a pivoted arm 161 which operates a lever 162 which, in turn, causes the shaft 141 to be rotated through pawl and ratchet mechanism as more fully described in my aforesaid copending application. A spring plunger 163 serves as a buffer or stop member to limit restoring movement of the carriage to the left, Fig. 5. A pivoted cam member 164 causes the arm 161 to swing downwardly by reason of contact with a pin 165 thereon with the lower sloping portion of the cam.

As noted above, the carriage travels step by step to the right as a line of characters is em-

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bossed on the plate carried thereby. A spring plunger 166 serves as a buffer to limit movement of the carriage to the right. The plunger 163 mentioned above, as well as the plunger 166, is slidably retained in a U-shaped bracket attached to the guide rail 112 by any suitable means, the springs which surround the plungers absorbing the shock of stopping the carriage.

As described in detail in the aforesaid applications of Clifton Chisholm, the tape which controls the remote control mechanism 11 is perforated in a manner to represent the various elements of a code. Code elements are provided to initiate such operations as plate feeding, shifting the keyboard from lower case to upper case, operation of all the character keys, word spacing, carriage return and line spacing. The operations of carriage return and line spacing are combined into one operation in the present invention. It should be noted however, that separate mechanism may be provided, if desired, for accomplishing line spacing independently of return of the carriage. To accomplish this, additional key and additional clutch eccentric link and lever mechanism similar to parts shown at 58, 52, and 46, would be provided for moving the carriage toward the embossing dies independently of its return to initial position as by the lever arm 151.

The tape used in the remote control mechanism 11 also bears coded indicia to control the operation of mechanism included in the present invention for removing a plate from the embossing machine. This mechanism will next be described.

The clutch drum 45 is adapted to be engaged by a one-revolution clutch, not shown, which is identical with the clutches used in connection with drums 46 and 47 described above. When the plate ejecting key lever 56 is depressed, this clutch causes the eccentric 51 to be rotated with the drum 45 for a complete revolution. An adjustable link 171 is connected between the band which surrounds the eccentric 51 and an arm 172 fixed to the rock shaft 173. Shaft 173 is journaled in a bracket 174 secured by studs or screws 175 to the auxiliary base plate 61. The shaft 173 carries a longer arm 176 which is fixed thereto and which has several functions. The upper part of the arm 176 is bent rearwardly toward the embossing mechanism to provide a horizontal portion 176a and a downturned free end portion 176b. This construction is best shown in Figs. 2 and 4. The arm 176 serves to restore the cross slide from a position toward the embossing dies where the last line on a completed plate has been embossed to an outward or first line position. The lever also serves to eject a finished plate from the carriage and carry it to an intermediate station and it serves further to carry a plate from the intermediate station to a chute through which the plate may drop into a packer. Where rolling mechanism is employed to smooth the printing surface of a finished plate, the ejection means are effective to feed the plate to such mechanism.

As in the case of the arms 74 and 146, the arm 172 carries a pivoted cam member 177 which is normally urged by a spring 178 to abut against a stop pin 179. This cam member is effective to close a pair of contacts 181 and 182 near the end of a cycle of operation of the arm 176 mentioned above. As in the case of the contacts 104, 105, 157, and 158, closing of the contacts 181 and 182 establishes an electrical circuit to the solenoid which controls the single revolution clutch 110

on the remote control mechanism. This is a further illustration of the principle that the remote control mechanism should be operated for each successive cycle only as the embossing machine substantially completes its operating cycle, since the speed of the embossing machine is the determining factor.

The downturned end portion 176b of the arm 176 is connected to a link 183 secured to a stud 183a which projects downwardly from a slidable plate advancing member 184. The member 184 is quite similar in structure and function to the feed member 84 previously described by which plates are fed from a stack into the embossing mechanism. The member 184 serves to withdraw plates from the carriage at the embossing station and carry them first to an intermediate station and subsequently to a discharge station. This member slides in a guide channel 186 which is generally similar to the guide channel 86. An overhanging channel member or hood 191 is provided to keep plates in alignment, and to guide them to discharge position as seen in Fig. 5. The feed member 184 carries a rear pawl lever 192 pivoted at 193 and urged clockwise as seen in Fig. 5 by a tension spring 194 so that a hook portion 195 on the trailing or left end of the lever will pass under and engage behind the trailing end of an embossed plate in the carriage. As the arm 176 moves to the right as seen in Fig. 5, the pawl or hook 195 draws an embossed plate out of the jaw member 128 or 128' which holds it in the carriage. This is accomplished against the opposition of the detent 129, Fig. 10, or the retaining member 135, Fig. 12, which serves to hold the plate in the carriage and in proper alignment during embossing operations. The pawl 195 carries the finished plate to an intermediate position about half way between the home or left position of the carriage and an ejection chute 197 which carries the plate to packing mechanism described hereinafter.

Before the pawl 195 can engage or remove a plate from the carriage, the cross slide 125 must be withdrawn outwardly from the embossing dies to its initial or first line position so that the plate will be in alignment with the channel member 186 over which it is ejected. Means are provided for accomplishing such movement of the cross slide or plate 125 which carries the plate engaging means and which holds the plate during embossing. Spring means borne by carriage 25 not shown herein, but described in my aforesaid co-pending application, tend constantly to draw the plate 125 outwardly, but a pawl and ratchet mechanism associated with shaft 141, by which the plate 125 is line-spaced toward the embossing dies as each line is embossed, serves to hold the plate against retraction by such spring means. Means for releasing such pawl and ratchet means include a link 201, Fig. 5, which is slotted longitudinally as shown at 201a and is slidably engaged with a stud or pin 202 carried by the arm 176. At its left end the slotted link 201 carries a pin 203 to which is pivotally attached a projecting rod 204. When the printing plate carriage 25 moves to the right, as seen in Fig. 5, during the embossing operations, the slotted link 201 merely slides over stud 202. However, when a plate has been finished and is to be ejected, movement of arm 176 to the left, Fig. 5, occurs, while the carriage is in its right hand position. This brings pin 202 into contact with the left end of slot 201a and thus moves rod 204 to the left, compressing a spring 204b between

a collar 204c on rod 204 and a frame element 204d in which rod 204 is slidably mounted.

When the arm 176 is rocked to the left as seen in Fig. 5, and as just described, a conical enlargement 204e on the stud 204 strikes a roller 205a on the under surface of a lever 205 and raises lever 205 which serves to release the pawl and ratchet mechanism which hold the plate 125 toward the embossing dies. Upon release of such pawl and ratchet mechanism, the carriage borne spring means mentioned above restores the sliding plate 125 to its outward or first line position and as the arm 176 then swings to the right, the plate which has been embossed is withdrawn along the upper flanges of the channel member 186, which constitute rails for it to ride over, and under the hood member 191 which retains and guides the plate along such rails. The plate is thus withdrawn to the intermediate position between the carriage and the chute 197.

The plate advancing member 184 referred to above carries, in addition to the pawl lever 192, another pawl lever 211 which is pivoted at 212 and urged counter-clockwise as by a spring 213. The forward or right end of the lever 211 as seen in Fig. 5 serves as a pusher to pick up a plate at the intermediate station and carry it to the discharge chute 197 as the arm 176 moves from its extreme left position to its normal position at the right as seen in Fig. 5. As will be noted by reference to Fig. 2, the chute and the end of the guide member 186 are so related that a plate will always drop with its rear edge downwardly. The side walls 215 and 216 of the chute 197 converge toward the bottom of the chute, the front or left wall as seen in Fig. 2, being bent toward the left to overlie previously packed plates as they are pushed from the chute forwardly along a receiving table 218. As mentioned above, plate rolling means, not shown, may be interposed between the intermediate station and the chute 197, if desired.

The receiving table 218, on which embossed plates are collected, is carried by a bracket 221 secured by one of the studs 64 and another stud 222 to the auxiliary base plate 61. Side wall members 225 and 226 are provided along the edges of the table, as best seen in Figs. 4 and 5, to keep plates in alignment as they are advanced along the table by a plunger 227 which is slidably mounted on the rear end of the table 218 and between the said walls 225 and 226.

The plunger 227 is actuated by a long lever 231 pivoted to the frame of the embossing machine as at 232 and caused to reciprocate by the face cam 48 previously mentioned as being secured to the shaft 38, Figs. 1 and 4. A cam follower 234 on lever 231 engages the cam 48. A link 235 connects the right end of lever 231 to the plunger or slide 227. A tension spring 236, Fig. 4, is secured between the plunger 227 and a stud 238 projecting from the table 218. This spring tends to urge the plunger rearwardly and to maintain contact between the cam follower 234 and the cam 48.

The operation of the packing mechanism just described is as follows:

An embossed plate is dropped into the chute 197, upon movement of the feed member 184 and pawl 211 to the extreme right position as seen in Figs. 4 and 5. The plunger 227 is so arranged as to receive the newly embossed plate on its upper edge as shown at P3, Fig. 2, but as the plunger is withdrawn to the rear or to the right as seen in Fig. 2, the plate drops in front of the

plunger head. Subsequently, as the plunger moves forwardly, the plate just received is pushed into the stack P4, and the stack moves forward by an amount equal to the thickness of one plate. By this means embossed plates are received from the embossing machine and stacked in the same order as they were embossed. Obviously, the order in which plates are embossed by the machine described is identical with the order in which coded indicia was prepared on the tape which controls the mechanism 11 for operating the embossing machine. A block as 240, Fig. 2, may be placed in the packer channel to hold the plates in vertical position, such block being slid along the channel as plates are packed into it.

The means by which the embossing machine is connected to and operated from the remote control mechanism described in the aforesaid Chisholm application will now be described briefly. A more complete description of connections to the control mechanism is contained in said application.

Referring to Figs. 6 to 9, it will be noted that the remote control mechanism 11 comprises a rotatable shaft 301 and a single revolution clutch mechanism indicated generally at 110, mentioned above, which is tripped whenever a solenoid 303 is actuated. When the one-revolution clutch is tripped, a control tape, not shown herein, is advanced one step to sensing means such as electrical contact elements which sense the presence of one or more perforations in the control tape. According to the perforations sensed, a group of longitudinally movable code bars 305 are selectively moved to dispose notches formed in their lower edges over certain selective operating levers 306 which are pivoted on a shaft 307. Latch mechanism 308 which normally holds levers 306 down is released and one selected lever 306 is permitted to rise under the influence of a spring 309 by reason of a combination of notches in the several code bars 305. On rising, any lever 306 which is equipped with a Bowden cable 311, pulls such cable, the other end of which is attached for example, to a character key 21, as shown in Fig. 7. There is one lever 306 for each character key 21 on the keyboard. In addition there are certain levers 306 which do not operate character keys, but which perform other functions. For example, a lever 306 is provided for operating the space bar 321 by electrical means. In this case, and as more fully explained in the aforesaid copending application of Chisholm, a pair of electrical contacts 322, 323, are closed when the bar 306 for operating the space bar 321 is permitted to rise and the closing of these contacts establishes an electric circuit to a solenoid which actuates the space bar through any suitable connecting means, as for example a Bowden cable 325. In a similar manner the shift key, which requires more power to operate than can be supplied through one of the springs 309 and lever 306 with its Bowden cable, is operated by a solenoid upon closing a pair of contacts similar to the contacts 322 and 323 shown in Fig. 9.

Additional operating levers 306 are provided for operating the keys 57, 58, and 59 which control a single revolution clutch as for feeding a plate into the carriage, retracting and line spacing the carriage, and discharging finished plates as described above. Each of these levers is operated by a Bowden cable 331 attached to an appropriate lever 306. The armor sheath for each such cable 331 may be secured to a plate 332 suitably attached to the auxiliary frame member

61 as shown in Fig. 8. It will be understood that the single revolution clutch 110 which drives shaft 301 is tripped, as by the solenoid 303, every time any operation of the embossing machine has been, or is about to be completed. As described in the aforesaid copending application of Clifton Chisholm, Serial No. 676,778, mechanical means such as a Bowden cable connection (not shown) to a latch pawl 340, Fig. 9 may be employed in addition to the solenoid 303 for tripping the clutch. The solenoid operates on the same pawl. The operating levers 306 are restored to their latched down positions after each operation of the clutch 110 by means and in a manner described in the application just mentioned.

As mentioned above, the embossing machine has a restoring mechanism for lifting any key 21 which has been depressed to its initial raised position after operation of the embossing dies incidental to depression of such key has been completed or substantially completed. Part of this restoring mechanism is shown at 350, Fig. 7, and it is employed to control the clutch 110 and initiate a new tape feeding step after each embossing operation, so as to present new control indicia to the control mechanism for the succeeding operation. This restoring mechanism includes a rocking lever 351 operated through a link 352, Fig. 7, by mechanism not shown. The hub portion 353 of arm 351 is drilled and tapped to receive a finger member 354 which may be threaded into the hub portion and fixed in place as by a lock nut 355. The finger member 355 has an extension 356 which is adapted to close a pair of electrical contacts 357, Fig. 6. Closing these contacts energizes the solenoid 303 to trip the clutch 110 in the manner referred to above.

It is believed that the operation of the machine will be clear from the foregoing description but a resume of such operations is briefly as follows: A control tape, not shown, is fed into the remote control mechanism 11 and its first effective code element causes operation of the plate feeder 84, for carrying a plate P from the stack to the position P1 intermediate the stack and the carriage which is at the embossing position. In starting the machine, a second operation is necessary to carry the plate P from the intermediate station P1 into the carriage, where it is retained by suitable clamping jaws 123 or 128' which may be either of the type shown in Figs. 10 and 11, or that shown in Figs. 12 and 13. After a plate has once been brought to the carriage, a single plate feeding operation is thereafter sufficient to replace it, the supply line being kept full until the supply of plates is exhausted.

A plate having been positioned in the carriage, such carriage is first so located as to present the portion of the plate where the first character in the first line is to be embossed opposite the embossing position in the die assembly. If, as is usually the case, the first character is to be a capital letter, the shift mechanism on the embossing machine is first operated. The next cycle has been initiated by the closing of the contacts 104, 105 upon completion of the feeding of a plate into the carriage. The shifting operation itself is therefore effective to initiate a new cycle of the shaft 301 in the remote control mechanism through the one-revolution clutch 110 to bring the first character code element on the tape to the sensing mechanism. When this occurs an operating bar or lever 306 in the sensing and control mechanism rises to draw its Bowden cable and to thereby actuate the appropriate character key

21 on the keyboard of the embossing machine. As described above, the key restoring mechanism of the embossing machine is utilized to trip the one-revolution clutch 110 of the control mechanism after each character is embossed. Hence the embossing of one character initiates feed of the control tape for the next character and this process is continued, no matter what operation is called for in the embossing machine. Any operation of the embossing machine concludes by initiating one more feed step of the tape in the remote control mechanism. Thus embossing of a line of characters on a printing plate proceeds automatically until the end of a line is reached.

As soon as a complete line has been embossed, the key lever 58 is operated in the same manner as the key lever 59 was operated, by means of a Bowden cable 331 connected to a lever 306. Operation of the key lever 58 is effective to cause the carriage to be returned to its initial position and the cross slide 125 is also line-spaced toward the embossing dies by the amount of one line, as previously described. Thereupon the second line is embossed and this procedure is repeated for the third, and, if required, four or more lines.

After a plate has been completely embossed, the key lever 56 is actuated by its Bowden cable 331, through a lever 306, to engage the one-revolution clutch which operates the eccentric 51 and the plate-ejecting and carriage-restoring lever 176. This lever, through the cam member 204e first releases the carriage plate 125 which is immediately withdrawn to its outer or first line position and thereafter the feed out mechanism 184 ejects the finished plate from the carriage, by means of the pawl 195, to the intermediate position described above. Subsequently, as other plates are completed, plates at the intermediate position are carried farther by the pawl 211, to drop down the chute 197 and be received by the packing mechanism on the table 218.

As mentioned hereinabove, it may be desirable to pass an embossed plate through smoothing mechanism such as a pair of rollers to equalize the height of the embossed printing characters on the plate and to remove surface irregularities. When this is desired, an appropriate roller mechanism may be provided at the intermediate station so that plates from the embossing mechanism are fed directly to rollers by the feed pawl 195. Such means are well known in the art and form no part of my present invention.

While I have described my invention as being used in connection with an embossing machine, it will be understood that it might be used with other machines which are controlled in a similar fashion, and perform analogous functions. Thus the principles of my invention might be applicable to typewriting, type setting, telegraph printing and other machines of the same general character.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In an embossing machine having a plurality of settable pairs of cooperating punches and dies adapted to be moved selectively into an embossing position, a carriage, means including a mounting

rail supporting said carriage for reciprocation past said embossing position, spring means urging said carriage in a character spacing direction from an initial position toward an unloading position, an escapement means for controlling movement of said carriage in said character spacing direction, a cross slide mounted on said carriage for movement in line spacing and return directions transverse to the direction of the reciprocation of said carriage, workholding means on said cross slide defining a workholding position, plate loading means mounted adjacent said initial position for loading a printing plate on the workholding means of said workholder when said carriage is in said initial position, means for operating said plate loading means, carriage return means for returning said carriage through a return movement from said unloading position to said initial position, unloading means for effecting unloading of a printing plate from said workholding means when said carriage is disposed in said unloading position, and means operable by said unloading means to effect return movement of said cross slide early in the cycle of operation of said unloading means.

2. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position for the performance of a character-embossing operation on a printing plate, a guide rail, a reciprocable carriage mounted on said rail for movement in character spacing and carriage return directions past said embossing position and between an initial position and an unloading position, spring means urging said carriage in said character spacing direction toward said unloading position, escapement means for controlling such character spacing movement of said carriage, a cross slide mounted on said carriage for reciprocation transversely of the path of said carriage in line spacing and return directions, spring means urging said cross slide in a return direction, line spacing means on said carriage including a lever extended from said carriage generally parallel to the carriage path and operable when rocked to impart line spacing movement to said cross slide, a one-way cam means operable on said lever when said carriage is moved into said initial position to impart rocking movement to said lever to thereby effect line spacing movement of said cross slide, a release element on said carriage and operable to release said line spacing means to thereby enable return movement of said cross slide, workholding means on said cross slide in which a printing plate may be mounted, and plate unloading means operable when said carriage is in said unloading position to first operate said release element and then to unload a printing plate from said workholding means.

3. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position, a mounting rail, a carriage mounted on said rail for spring urged, escapement controlled movement past said embossing position and between an initial position and an unloading position, a cross slide mounted on said carriage for movement in line spacing and return directions transverse to the direction of the reciprocation of said carriage, workholding means on said cross slide defining a workholding position, plate loading means mounted adjacent said initial position for loading a printing plate on the workholding means of said workholder when said car-

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riage is in said initial position, means for operating said loading means, carriage return means for returning said carriage through a return movement from said unloading position to said initial position, unloading means for effecting unloading of a printing plate from said workholding means when said carriage is disposed in said unloading position, means operable by said unloading means to effect return movement of said cross slide early in the cycle of operation of said unloading means, and control means operable to detect completion of said unloading operation.

4. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position for the performance of a character-embossing operation on a printing plate, a guide rail, a reciprocable carriage movable on said rail for movement in character spacing and carriage return directions past said embossing position and between an initial position and an unloading position, spring means urging said carriage toward said unloading position in said character spacing direction, escapement means for controlling such character spacing movement of said carriage, a cross slide mounted on said carriage for reciprocation transversely of the path of said carriage in line spacing and return directions, spring means urging said cross slide in said return direction, line spacing means on said carriage operable to impart line spacing movements to said cross slide, a release element on said carriage for releasing said line spacing means to thereby enable return movement of said cross slide, a workholder mounted on said cross slide and affording a workholding position in which a printing plate may be mounted, plate loading and plate unloading means disposed respectively at said initial position and said unloading position, a carriage return lever for returning said carriage from said unloading position to said initial position, drive mechanism including a constantly operated drive shaft, release means operatively connected to said release element for releasing said line spacing means to effect return movement of said cross slide, a one-revolution unloading clutch operatively associated with said drive shaft, and operatively associated with said plate unloading means and said release means to effect release of said release element and to thereafter effect unloading of the printing plate, a one-revolution plate feed clutch driven from said drive shaft and operatively associated with said plate loading means for operating the same, a one-revolution carriage-restoring clutch driven from said drive shaft and operatively related to said carriage return lever for imparting restoring movement to said carriage, and means including cooperating elements on said carriage and on said rail and operable to impart line spacing movement to said cross slide as an incident to movement of said carriage into said initial position.

5. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position for the performance of a character embossing operation on a printing plate, a guide rail, a reciprocable carriage mounted on said rail for spring urged, escapement controlled movement past said embossing position and between an initial position and an unloading position, a cross slide mounted on said carriage for reciprocation transversely of the path of said carriage in line spacing and return directions, spring

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means urging said cross slide in said return direction, line spacing means on said carriage operable to impart line spacing movements to said cross slide, a release element on said carriage for releasing said line spacing means to thereby enable return movement of said cross slide, a workholder mounted on said cross slide and affording a workholding position in which a printing plate may be mounted, plate loading and plate unloading means disposed respectively at said initial position and said unloading position, a carriage return lever for returning said carriage from said unloading position to said initial position, drive mechanism including a constantly operated drive shaft, release means operatively connected to said release element for releasing said line spacing means to effect return movement of said cross slide, a one-revolution unloading clutch operatively associated with said drive shaft, and operatively associated with said plate unloading means and said release means to effect release of said release element and to thereafter effect unloading of the printing plate, a one-revolution plate feed clutch driven from said drive shaft and operatively associated with said plate loading means for operating the same, a one-revolution carriage restoring clutch driven from said drive shaft and operatively related to said carriage return lever for imparting restoring movement to said carriage, means including cooperating elements on said carriage and on said rail and operable to impart line spacing movement to said cross slide as an incident to movement of said carriage into said initial position, individual control elements for selectively initiating one-revolution cycles of the respective clutches, and control means operable to detect the completion of the operating cycles of the respective clutches.

6. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position for the performance of a character embossing operation on a printing plate, a guide rail, a reciprocable carriage mounted on said rail for spring urged, escapement controlled movement past said embossing position and between an initial position and an unloading position, a cross slide mounted on said carriage for reciprocation transversely of the path of said carriage in line spacing and return directions, spring means urging said cross slide in said return direction, line spacing means on said carriage operable to impart line spacing movements to said cross slide, a release element on said carriage for releasing said line spacing means to thereby enable return movement of said cross slide, a workholder mounted on said cross slide and affording a workholding position in which a printing plate may be mounted, plate loading and plate unloading means disposed respectively at said initial position and said unloading position, a carriage return lever for returning said carriage from said unloading position to said initial position, drive mechanism including a constantly operated drive shaft, release means operatively connected to said release element for releasing said line spacing means to effect return movement of said cross slide, a one-revolution unloading clutch operatively associated with said drive shaft and an operating lever actuated by said unloading clutch and operatively connected to said plate unloading means and said release means to effect release of said release element and to thereafter effect

unloading of the printing plate, a one-revolution plate feed clutch driven from said drive shaft and a lever actuated by said feed clutch and operatively associated with said plate loading means for operating the same, a one-revolution carriage restoring clutch driven from said drive shaft and operatively related to said carriage return lever for imparting restoring movement to said carriage, and means including cooperating elements on said carriage and on said rail and operable to impart line spacing movement to said cross slide as an incident to movement of said carriage into said initial position.

7. In an embossing machine having a plurality of settable pairs of cooperating punches and dies adapted to be moved selectively into an embossing position, a carriage, means including a mounting rail supporting said carriage for reciprocation past said embossing position, spring means urging said carriage in a character spacing direction from an initial position toward an unloading position, an escapement means for controlling movement of said carriage in said character spacing direction, a cross slide mounted on said carriage for movement in line spacing and return directions transverse to the direction of the reciprocation of said carriage, workholding means on said cross slide defining a workholding position, plate loading means mounted adjacent said initial position for loading a printing plate on the workholding means of said workholder when said carriage is in said initial position, means for operating said plate loading means, carriage return means for returning said carriage through a return movement from said unloading position to said initial position, unloading means for effecting unloading of a printing plate from said workholding means when said carriage is disposed in said unloading position, and means operable in timed relation to said unloading means to effect return movement of said cross slide prior to unloading movement of a plate by said unloading means.

8. In an embossing machine having a plurality of pairs of cooperating punches and dies adapted to be moved selectively into an embossing position for the performance of a character-embossing operation on a printing plate, a guide rail, a reciprocable carriage movable on said rail for movement in character spacing and carriage return directions past said embossing position and between an initial position and an unloading position, spring means urging said carriage toward said unloading position in said character spacing direction, escapement means for con-

trolling such character spacing movement of said carriage, a cross slide mounted on said carriage for reciprocation transversely of the path of said carriage in line spacing and return directions, spring means urging said cross slide in said return direction, line spacing means on said carriage operable to impart line spacing movements to said cross slide, a release element on said carriage for releasing said line spacing means to thereby enable return movement of said cross slide, a workholder mounted on said cross slide and affording a workholding position in which a printing plate may be mounted, plate loading and plate unloading means disposed respectively at said initial position and said unloading position, a carriage return lever for returning said carriage from said unloading position to said initial position, drive mechanism including a constantly operated drive shaft, release means operatively connected to said release element for releasing said line spacing means to effect return movement of said cross slide, a one-revolution unloading clutch operatively associated with said drive shaft and operatively associated with said plate unloading means to effect unloading of the printing plate, means operating in timed relation to said unloading means to effect release of said release element prior to unloading movement of a plate by said unloading means, a one-revolution plate feed clutch driven from said drive shaft and operatively associated with said plate loading means for operating the same, a one-revolution carriage-restoring clutch driven from said drive shaft and operatively related to said carriage return lever for imparting restoring movement to said carriage, and means operable as an incident to movement of said carriage into said initial position to impart line spacing movement to said cross slide.

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