

April 26, 1938.

C. CHISHOLM

2,115,455

EMBOSSING MACHINE

Filed Nov. 23, 1934

8 Sheets—Sheet 1

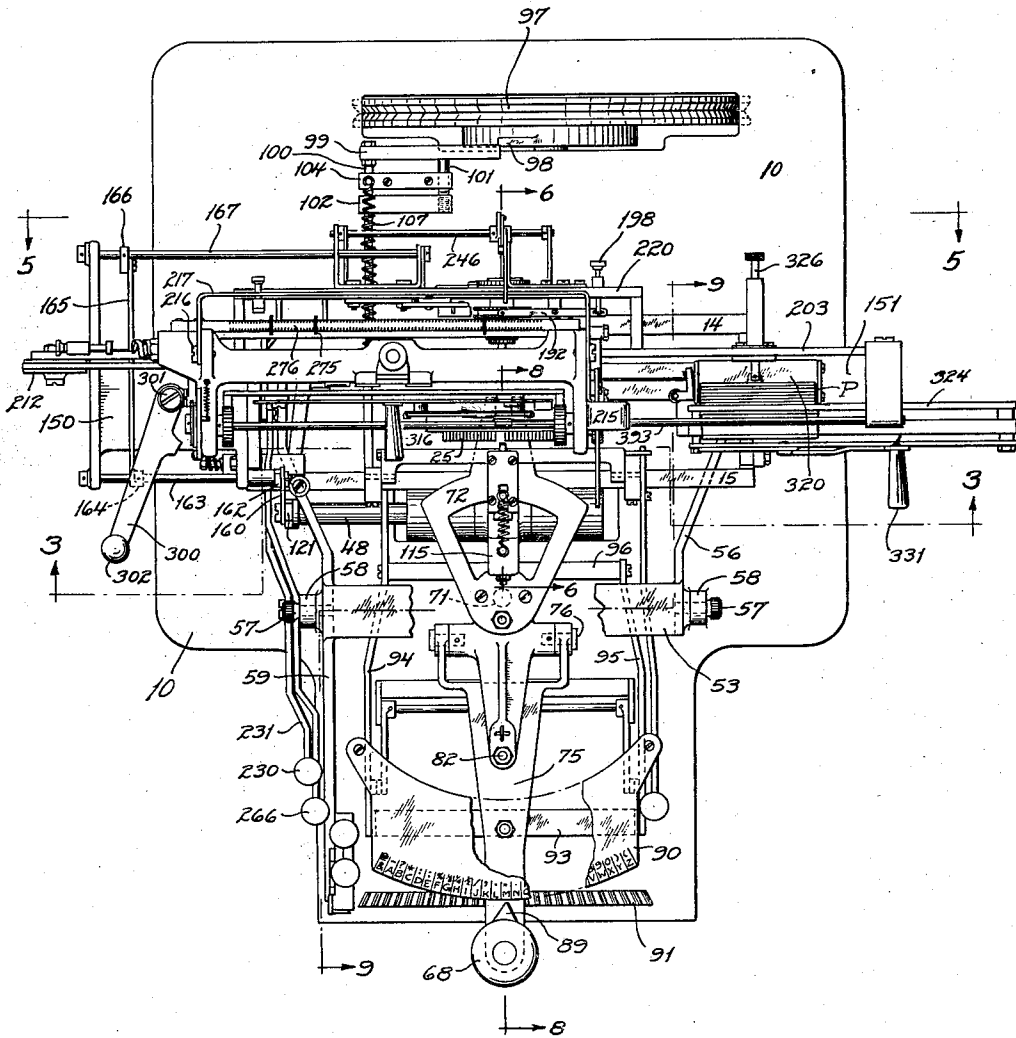


FIG. 1

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8 Sheets-Sheet 2

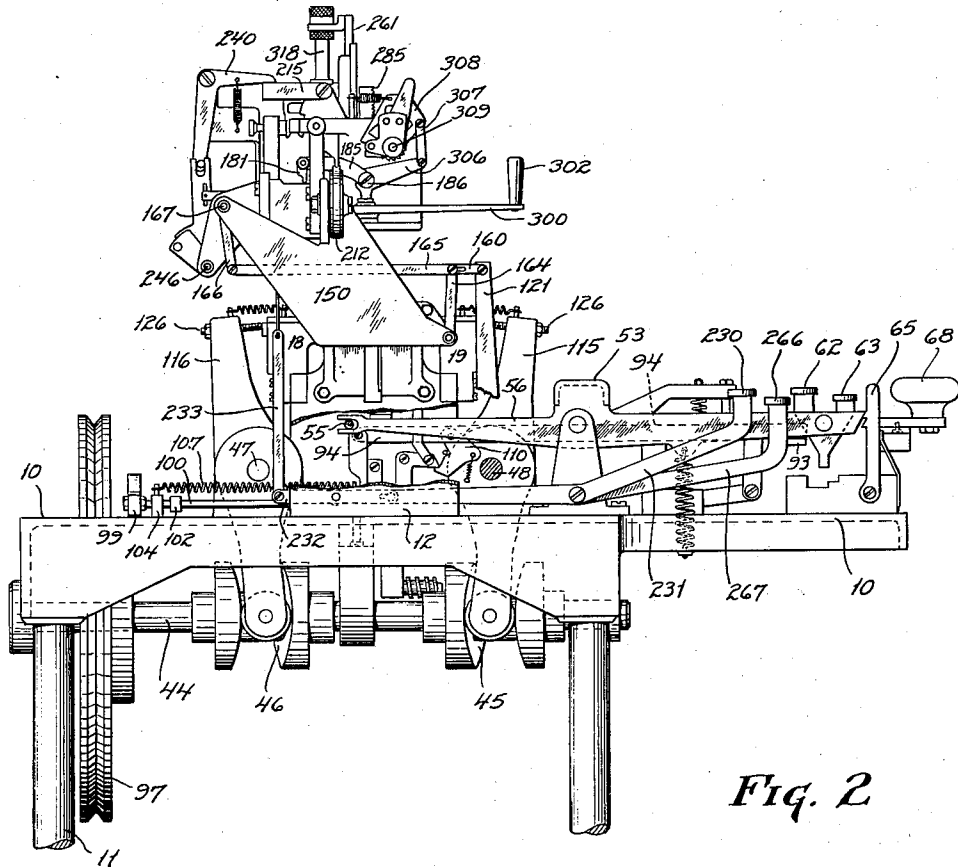


Fig. 2

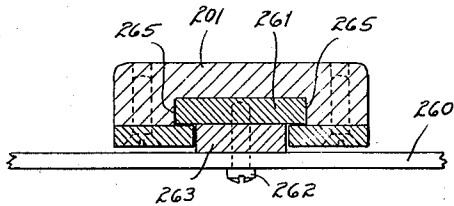


Fig. 16

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8 Sheets-Sheet 3

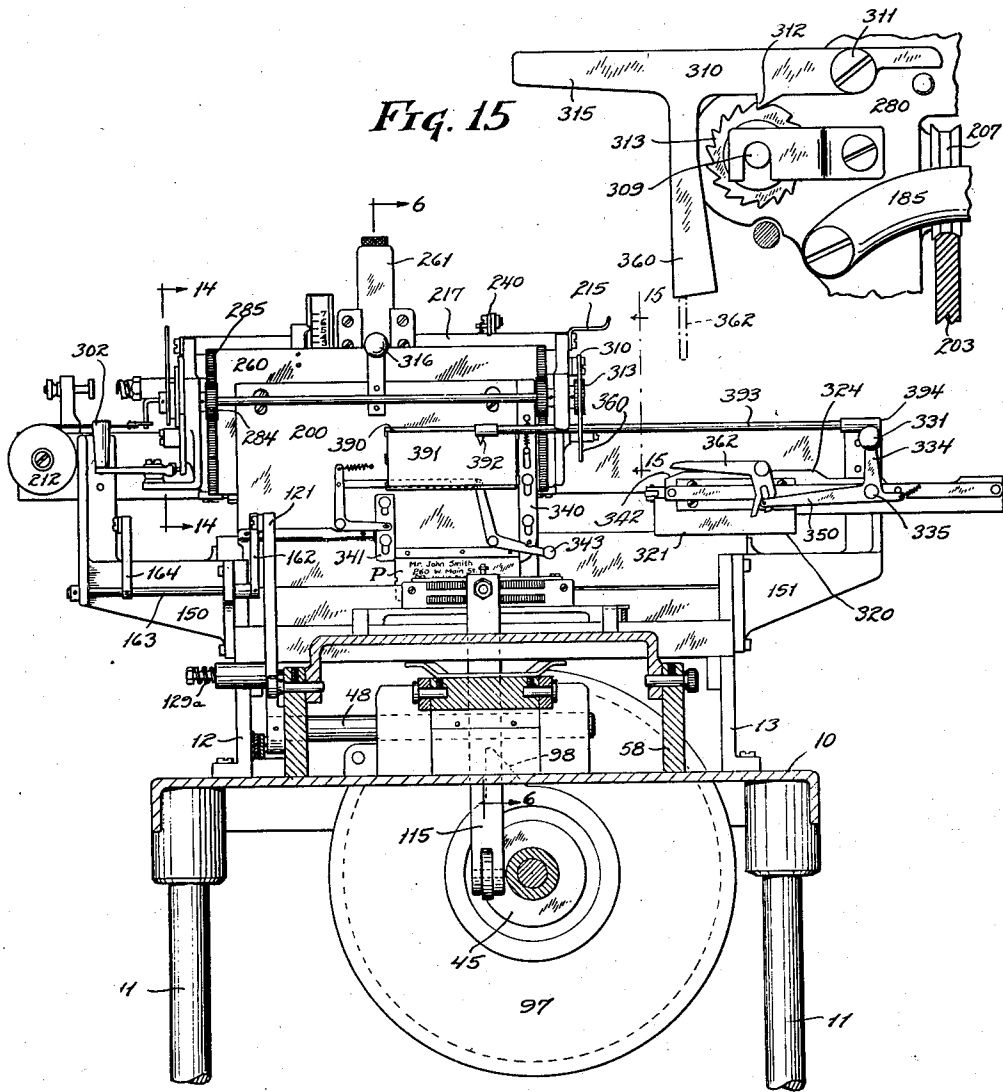


Fig. 15

Fig. 3

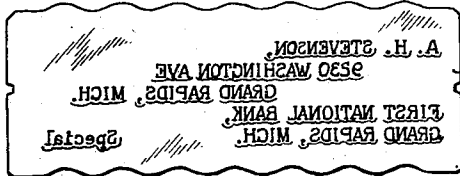


Fig. 18

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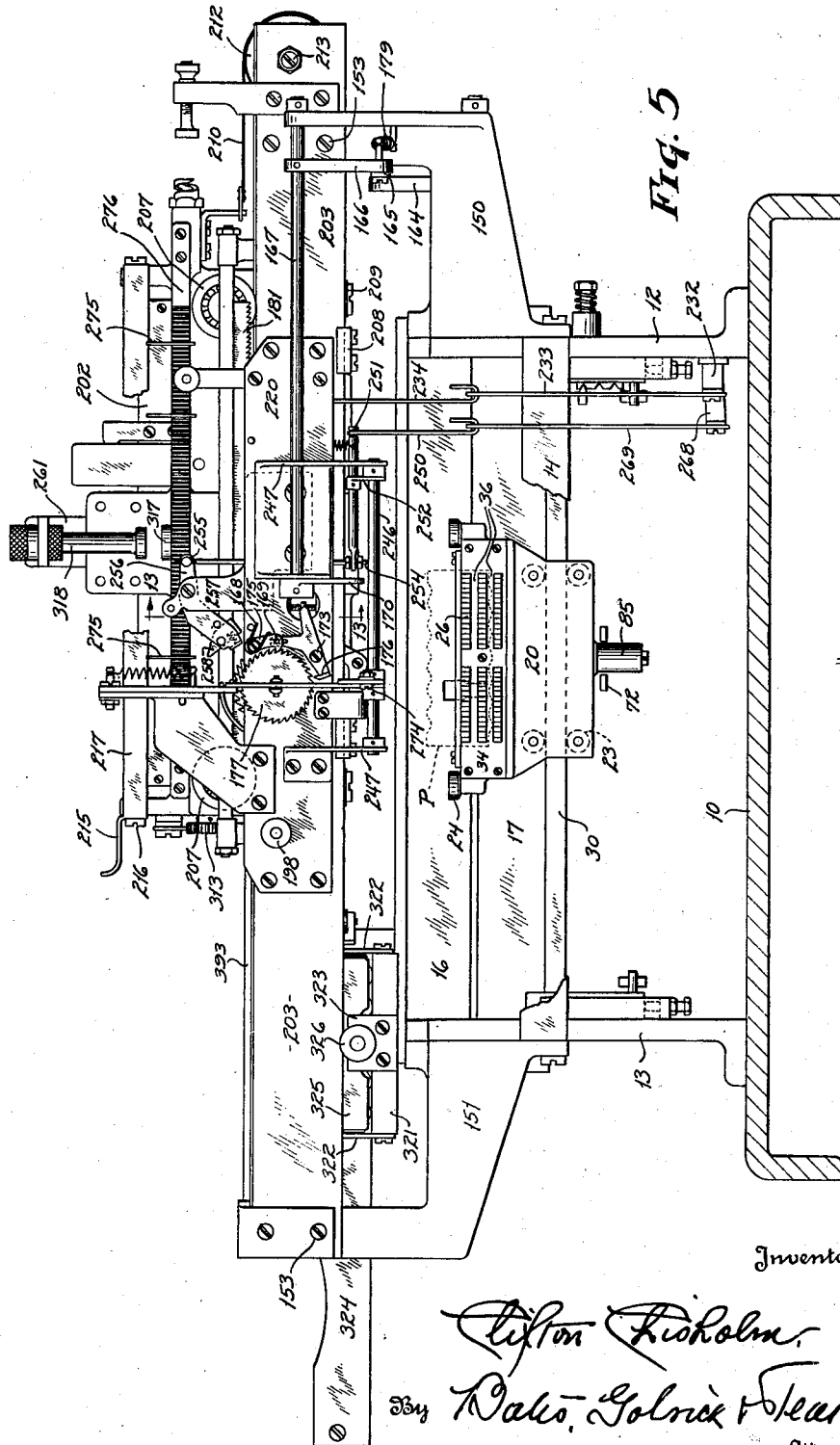


Fig. 5

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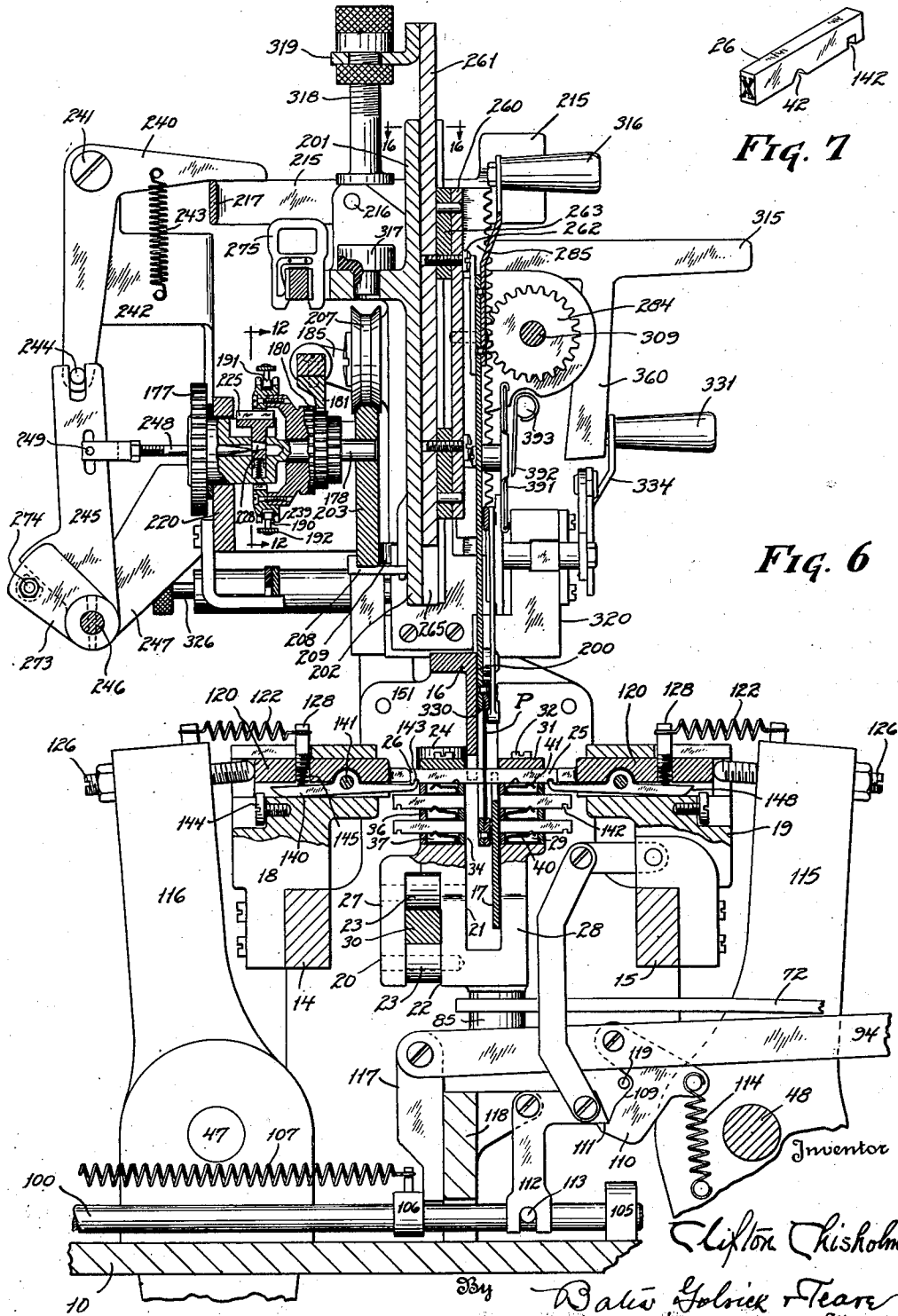
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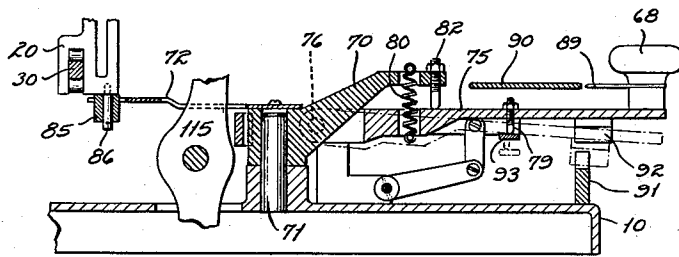


Fig. 8

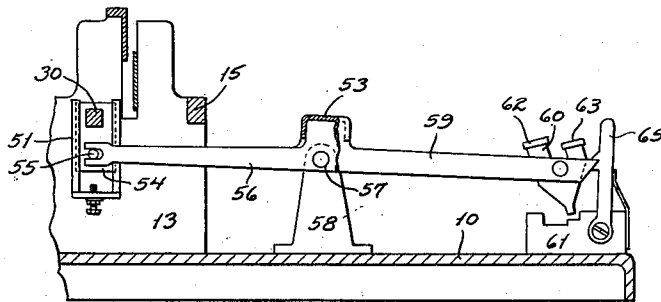


Fig. 9

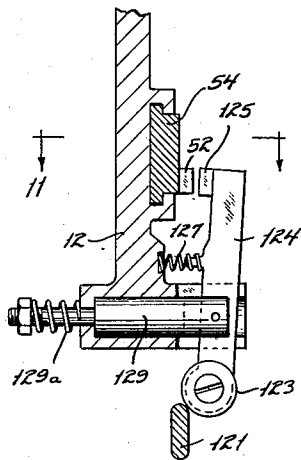


Fig. 10

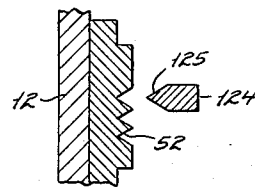


Fig. 11

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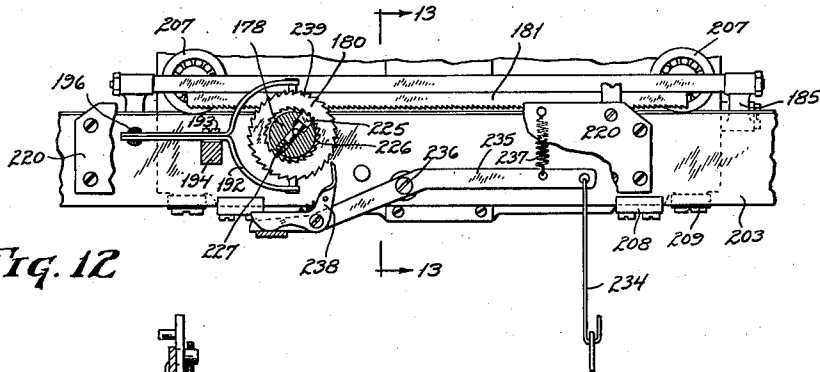


Fig. 12

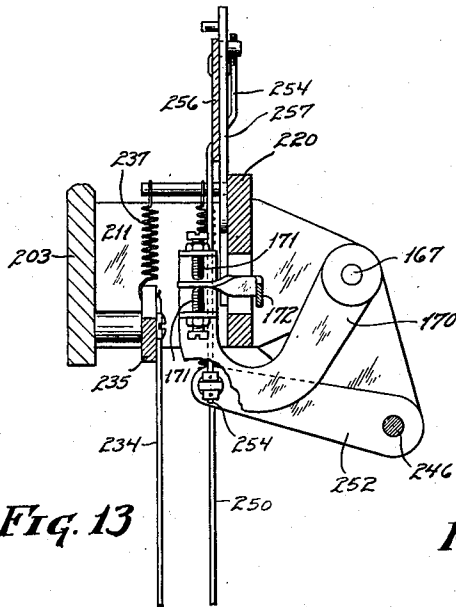


Fig. 13

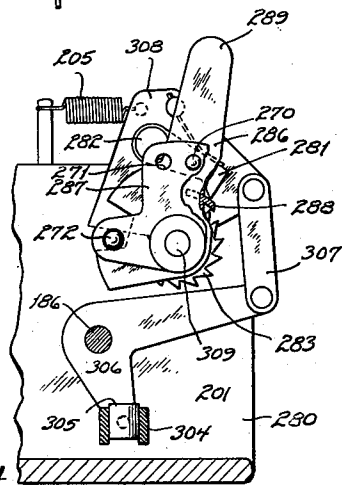


Fig. 14

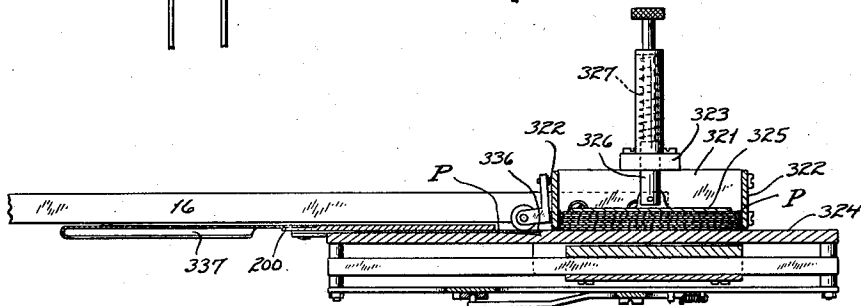


Fig. 17

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UNITED STATES PATENT OFFICE

2,115,455

EMBOSSING MACHINE

Clifton Chisholm, Cleveland, Ohio, assignor, by mesne assignments, to Addressograph-Multi-graph Corporation, Cleveland, Ohio, a corporation of Delaware

Application November 23, 1934, Serial No. 754,480

10 Claims. (Cl. 197—6.2)

This invention relates to a machine for embossing comparatively thin metal plates with characters which may be used for printing or similar purposes. This, therefore, is the general object of the present invention. More specifically, the present invention relates to an improvement or an attachment for embossing machines, such as shown in my prior Patents 1,557,754 and 1,728,390, issued October 20th, 1925 and September 17th, 1929, respectively. The mechanism of the present invention is especially adaptable for the embossing of metal plates, as distinguished from the embossing of metal strips, as disclosed in my prior patents. The machine includes the provision of a plate holding and feeding mechanism so arranged that it may be readily substituted for the strip holding and feeding mechanism shown in the machines illustrated in my prior patents, without alteration of the embossing mechanisms, per se, therein disclosed and claimed.

One of the objects of the present invention is the provision of a mechanism for feeding sheet metal plates to a carriage mounted in suitable guides for positioning the plate in the path of a pair of coating embossing dies and for moving the carriage step by step in one direction for the embossing of successive characters, as well as step by step in another direction to provide for the embossing of characters to form a plurality of parallel lines.

Another object of the invention is to provide the embossing machine with a movable plate holder adapted to position the metal plates between the embossing dies, and to provide a mechanism for feeding individual plates into and out of position on the plate holder.

Other objects of the invention will become hereinafter more fully apparent from the following description, which refers to a preferred embodiment of the invention, illustrated by the accompanying drawings. The essential characteristics of the invention will be set forth in the claims.

Referring now to the drawings, Fig. 1 shows a plan view of my proposed embossing mechanism; Fig. 2 is a side elevation looking at the left-hand side of Fig. 1; Fig. 3 is a vertical section, the plane of the section being indicated by the off-set lines 3—3 on Fig. 1; Fig. 4 is an enlarged vertical section, taken in substantially the same plane as Fig. 3, but illustrating certain parts in a different position; Fig. 5 is a vertical section, as viewed from the rear of the machine, the plane of the section being indicated by the line 5—5 in Fig. 1; Fig. 6 is a vertical section on an enlarged scale,

the plane of the section being indicated by the offset line 6—6 on Figs. 1 and 3, respectively; Fig. 7 is a perspective view of an embossing die such as is used in the machine illustrated; Figs. 8 and 9 are detailed sections of the operating mechanism of the embossing machine, the planes of the sections being indicated by the lines 8—8 and 9—9, respectively, on Fig. 1; Fig. 10 is a sectional detail, the plane of the section being indicated by the line 10—10 on Fig. 4; Fig. 11 is a sectional detail as indicated by the line 11—11 on Fig. 10; Fig. 12 is a section taken along the line 12—12 on Fig. 6; Fig. 13 is a section indicated by the line 13—13 on Figs. 5 and 12; Fig. 14 is a detail section, the plane of the section being indicated by the lines 14—14 on Fig. 3; Fig. 15 is a fragmentary elevation of a detail, as indicated by the lines 15—15 on Fig. 3; Fig. 16 is a horizontal section, as indicated by the lines 16—16 on Fig. 6; Fig. 17 is a sectional detail through the feeding mechanism, the plane of the section being indicated by the lines 17—17 in Fig. 4, the parts, however, being illustrated in a different position; Fig. 18 is a plan of a plate embossed by the mechanism illustrated in the drawings.

The mechanism which I have illustrated for operating the embossing dies is similar to that shown and described in the patents heretofore mentioned. The frame of the machine primarily comprises the horizontal plate 10, mounted on suitable legs 11, together with various standards, brackets and such, secured to the plate, and hereinafter described. Vertically extending upwardly from the frame are a pair of standards 12 and 13, which are connected as shown in Figs. 3, 4, 5 and 6, by suitable cross-bars 14, 15, 16 and 17. The bars 14 and 15 support stationary housings 18 and 19 for embossing plungers hereinafter described, while the bars 16 and 17 form a guideway between which the plates, to be embossed, project during the embossing operation.

In the embodiment illustrated, the plates comprise a thin metallic member, such as the address plates P, illustrated in Figs. 3, 4, 6 and 15. These plates are fed one at a time to a suitable plateholder, generally indicated at 200, as will be hereinafter more fully described. The plateholder 200 retains the plate P between pairs of oppositely facing dies 25 and 26, carried by a reciprocable die head 20. The die head comprises a block bifurcated above and below,—that is to say, the upper surface is provided with a groove 21 enabling the block to embrace opposite sides of the bars 16 and 17, as well as the plateholder 200, and in the underside of the die head there is

a groove 22, whereby the die block may straddle a supporting bar 30, supported by the side frame members 12 and 13. The die block carries in the groove 22 a pair of rollers 23, bearing against the upper and underside of a cross bar 30. Suitable rollers 24, carried by the die block, bear against the side of the cross bar 16 and retain the die block in alignment therewith.

The upwardly extending legs 27 and 28 of the die block carry a set of dies. The leg 27 carries the male dies 26 and the leg 28 carries the corresponding female dies 25. As shown in Figs. 3 and 6, each of the upstanding legs 27 and 28 is provided with transversely extending recesses 29, which are covered with top plates 31, secured to the block by suitable screws 32, and at their inner and outer faces are covered with longitudinal slot cover plates 34.

The slotted plates 34 form slideways for the dies. As shown in Figs. 6 and 7, each of the plates 34 has vertical rows of longitudinally extending slots. The bottom of each lowermost slot is slightly above the bottom of the recess, while the uppermost slot is open at the top, except as closed by the cover plate 31, heretofore described. Each of the slots in the plates 34 is the same height as a die and of sufficient length to carry several dies in contact with each other. The slots are vertically separated from each other by bars 36, providing chambers 37 in the block between the bottom of the recess and the lowermost row of dies, as well as between each row of dies and the adjacent row.

The chambers 37 carry springs 40 which preferably comprise a flat plate of metal slotted transversely to provide a series of tines which are bent back substantially parallel with the body of the spring plate and then upwardly and downwardly forming an inverted V-shaped portion 41 arranged to engage a notch 42 in the lower surface of the die superimposed above such tine. This latch acts to retain the die in its normal position regardless of vibratory or jarring motion imparted to the die block during the operation of the machine, as well as to position the dies axially upon their return from the embossing position.

The latch normally retains the dies with their inner faces flush with the walls of the groove 21, as shown by the lower dies in Fig. 6. At the proper time plungers 120 carried in the housings 18 and 19 force a pair of dies, which are centrally positioned, towards each other to emboss the interposed metal plate. The lower portion of the bar 16 and the upper portion of the bar 17 is cut away in its central region to allow the dies to be plunged toward each other.

The supporting bar 30 for the die head is bodily shiftable vertically to as many different positions as there are vertical rows of dies in the block 20, and mechanism to thus shift the bar enables the selection of upper, lower or intermediate die members as desired.

The shift mechanism for the die head is best illustrated in Fig. 9. On the inner face of the vertical frame standards 12 and 13 are a pair of guiding ribs 51. Between the ribs of each standard is a slide block 54. The ends of the bar 30 which supports the die head are mounted in the slide blocks. Projecting inwardly from the slide blocks are pins 55, which are embraced by forked ends of levers 56 pivoted as at 57 to upwardly extending frame brackets 58 and connected together by a cross-bar 53. The forward extension 59 of one of the levers 56 provides for the manual

operation of the lever, to raise the die head 20, gravity normally holding the die head in its lowermost position with the face of the uppermost dies opposite the embossing region of the plate P.

I have shown a Y-shaped member 60 pivoted to the forward portion of the lever 59. A suitable stepped abutment block 61 is secured to the bed plate 10 beneath this Y-lever. If the operator presses down on a finger button 62 on the rear leg of the Y-lever, the lower end of such lever swings forwardly and strikes the highest available stop on the abutment block, with the result that the die head is lifted only sufficiently to bring the intermediate die character into line with the printing region of the plate P and the plungers 120. Upon the other hand, if the operator presses down on a forward finger button 63, the Y-lever is rocked rearwardly and the lever 59 is thus moved downwardly until the Y-lever meets a second stop on the abutment block, thus bringing the lowermost row of dies opposite the printing region. A suitable latch 65 having a pair of rearwardly facing ratchet teeth which coact with the forward edge of the lever 59, serves to retain such lever in either of its depressed positions.

It is convenient to arrange the die characters in three rows, corresponding to upper case, lower case and numerals and punctuation points. Before the die head is shifted, it is convenient to determine which of the rows of the characters is to be used for the character to be embossed, and then the corresponding shift key or finger button is depressed or the die head is left in its normal position as required.

Any suitable means may be employed for shifting the die head horizontally, such as, for instance, a keyboard and the mechanism controlled thereby as shown in my prior patent, 1,557,754, or the shift lever mechanism, as shown in my prior Patent 1,728,380. I have here, however, shown the latter arrangement. The shift lever is, as shown in Figs. 1, 2 and 8, a compound device comprising, first, a lever arm 70 mounted on a vertical stationary pivot pin 71 rising from the frame; second, a rearward extension of this lever in the form of a plate 72, rigidly secured to the upper end of hub of the arm and loosely extending around the corresponding embossing lever 115 and at its rear end connected with the die head; third, a forwardly extending arm 75 pivoted to the arm 70 on a horizontal pivot 76; and fourth, a spring 80, anchored to the arms 70 and 75 and lifting the latter against an adjustable abutment screw 82 carried by the arm 70.

The compound lever just described is swung manually horizontally about the vertical pivot 71. The rear end of the extension 72 is bifurcated and slidably embraces a flat sided block 85, rotatably mounted on a pin 86 depending from the die block. The forward end of the arm 75 of the compound lever 70 carries a knob 68. Accordingly, when this knob is grasped by the operator and the lever is swung in one direction or another, the die head moves along the bar 30 to bring the desired pair of dies between the plungers 120.

The arm 75 preferably carries a pointer 89 (Figs. 1 and 8) which stands adjacent to the arcuate edge of an indicating plate 90 extending horizontally above the lever. The forward edge of this plate is marked with various characters corresponding to the dies. I have illustrated in Fig. 1 the row of alphabetical characters which serve as an indication for both upper and lower

rows of dies. Behind each row is a row of punctuation marks, numerals and special characters corresponding to the third row of die heads.

When the die head has been brought into the desired position by the lateral movement of the knob 89, herein described, the next operation is a downward movement of the knob which locks the lever and die head in position, and initiates the embossing operation. To effect the locking, I provide across the machine, beneath the lever 75, a stationary comb 91 (Figs. 1 and 8). This stationary comb has upwardly facing notches with beveled entrances. To effect the locking I provide on the underside of the lever 75 a beveled edged blade 92, to coact with these notches. The notches in the comb have their walls arranged radially with reference to the pivot pin 71, as shown in Fig. 1, so that the bevels of the blade and the walls of the notches accurately position the die head and hold it locked when the knob is depressed. The dies are preferably equally spaced on the die head. That is, the die blocks are of equal width and stand one against the other in the die head, as shown in Fig. 3. As the comb 91 is parallel with the path of movement of the die head, it follows that the notches will be equally spaced to cause each notch to correspond to a die in the die block, though as the pivot pin 71 is further from the comb than from the die, the unit of spacing of the comb will be greater than that of the die.

Extending transversely of the machine, beneath an adjusting screw 79 on the arm 75, as shown in Figs. 1 and 8, is a universal bar 93 secured to the forward end of a pair of arms 94 and 95 pivoted in axial alignment to a bracket 96. The arm 94 extends rearwardly of its pivot and operates to release a single rotation clutch to cause an operation of the embossing mechanism.

The single rotation clutch may be of any approved form. It is illustrated in Fig. 1, as embodied in a main belt pulley 97. The clutch has a shoulder 98 normally engaging a slidable abutment 99, which normally holds the clutch open. When this abutment is drawn forwardly to clear the shoulder 99 the clutch goes into action and makes a single rotation. At the conclusion of the rotation the abutment 99 has returned to position, the shoulder 98 strikes the abutment and terminates the rotation. This is the usual method of operation of single rotation clutches, and it is not deemed necessary to explain it in detail as any single rotation clutch may be employed, for instance, the clutch shown in my prior Patent #1,557,754.

I prefer to make the abutment 99 in the form of a comparatively stiff leaf spring, which provides a shock absorber, when the shoulder 99 impinges the abutment at the conclusion of the rotation. This abutment is carried by a pair of rods 100 and 101, which are connected by the cross bar 102, and are slidably mounted in a stationary bracket 104 secured to the bed plate. The rod 100 extends forwardly from the cross bar 102, as shown in Figs. 2 and 6, and at its forward end is guided in a bracket 105, Fig. 6. Secured to the rod 100 is a collar 106 forming an anchorage for the forward end of a tension spring 107. The rear end of this spring is connected to the stationary bracket 104. The spring thus tends to return the abutment 99 into the path of the clutch shoulder 98.

Pivotally connected to the lever 94 (Figs. 2 and 6) is a dog 110. This dog has a shoulder 111 normally beneath horizontal arm of a bell crank 112

pivoted to a stationary bracket of the machine. The lower end of this bell crank is bifurcated and engages a pin 113 projecting from the rod 100. A spring 114 anchored to the dog and some other suitable point retains the dog shoulder normally in the position shown in Fig. 6. Pivotally suspending from the rear end of the lever 94 is a block 117, normally lying between the collar 106 on the rod 100 and a stationary rib 118 of the frame. This block in this position forms a lock preventing the release of the clutch.

When the arm 75 of the compound lever is depressed, the concomitant elevation of the rear end of the lever 94 withdraws the lock 117 and, by reason of the dog 110, rocks the bell crank 112 drawing the rod 100 forwardly, thereby releasing the single rotation clutch which causes the embossing operation, at present to be described. The continued upward movement of the rear end of the arm 94 causes the inclined surface 109 of the dog 110 to engage a stationary pin 119 (Fig. 6) which cams the dog 110 out of engagement with the bell crank 112, permitting the rod 100 to return to its normal position under the influence of the spring 107 which brings the abutment 99 into the path of the clutch shoulder 98. When the lever 94 turns to its normal position, consequent upon the operator removing the pressure from the knob 68, the locking block 117 depends between the collar 106 and the rib 118 and thereby locks the clutch.

Immediately after the clutch has been released, as above described, the clutch operates to impart a single rotation to a cam shaft 44 (Fig. 2). On this cam shaft are a pair of grooved cams 45 and 46, which coact with the lower end of a pair of embossing levers 115 and 116 secured to shafts 47 and 48 mounted in suitable frame brackets. Each embossing lever carries near its upper end an adjustable abutment pin 126 (Figs. 2 and 6) which pins are designed to coact with corresponding plungers 120, heretofore referred to as slidably mounted in the housings 18 and 19. The plungers 120 are normally retained in contact with their respective pins 126 by springs 122, one end of each of which is secured to its respective embossing arm 115 or 116 and the other ends to pins 128 carried by the respective plungers 120.

When the die head is in the embossing position, the selected dies are directly behind the inner ends of the two plungers and accordingly the operation of the cams 45 and 46 rock inwardly the upper ends of the embossing levers to cause the plunger to shove the dies 25 and 26 towards each other, thus embossing the plate P.

Before the plungers engage the die block an accurate locking of the die block as controlled by the shift key takes place, thus insuring proper horizontal alignment of the characters. The mechanism used to accomplish this is best shown in Figs. 1, 4, 10 and 11. The embossing lever 115 is rigidly secured to the rock shaft 48, which carries a rock arm 121, Figs. 1 and 3, which at the beginning of the movement of the lever 115 engages a roller 123 on a lever 124, pivotally carried by the standard 12. The rear end of this lever has a bevelled face 125 which is designed to enter any of three notches 52 on the slide 54, according to the vertical position, as given by the shifting lever 59, heretofore described. This accurately locks the die block in the proper elevation and maintains it there until the embossing action is completed. On the return stroke of the embossing arm 115, a spring 127 returns the lever 124 to its normal position. To prevent the strain on the

parts, the lever 124 is pivoted to a plunger 129, mounted in a housing formed in the standard 12, the plunger being normally maintained in the housing by a comparatively stiff compression spring 129a.

As plungers 120 are struck by their respective embossing levers and shoved towards their respective dies 25 and 26, which have previously been positioned in alignment with the plungers, they carry with them respective pawls 140, (Fig. 6) which are pivotally mounted on pins 141 carried by the plungers so as to enable the pawls to swing in a vertical plane in longitudinally extending slots in their respective plungers.

When the plungers 120 are in their normal or withdrawn position, the pawls 140 extend beyond the inner face of the plungers towards the die block. The outer end of each pawl 140 is provided with an upwardly extending hook 143 arranged to engage notches 142 in the dies to withdraw them as the plunger withdraws consequent upon the return movement of the embossing arms.

As the plungers are moved toward the dies, and when the hooks 143 of their respective pawls 140 reach positions immediately beneath respective notches 142 in the dies which are in alignment with the plungers, the rearmost end of each pawl is carried past an abutment, such as the head of a screw 144, and a compression spring 145, carried by the plunger, forces the hook 143 into the notch 142 of the die. Further movement of the plunger causes the nose thereof to abut the die and thus shove that die towards the coacting die to emboss the plate P.

As soon as the plate is embossed, the embossing levers are returned, withdrawing the plungers 120, the pawls 140, and the dies to which the pawls are hooked. When the lever 115 or 116 returns, a spring 122, interposed between the lever and its respective plunger 120, retains the plunger in contact with the abutment pin 126, carried by the embossing lever, thereby withdrawing the plunger and its associated pawl 140. The pawl which is still in engagement with the die withdraws the latter. However, when the die has been withdrawn to its normal or rest position, a bevelled surface 148 of the pawl engages the abutment 144 and causes the pawl to be cammed, swinging the hook 143 out of engagement with the die.

Immediately before the die reaches its withdrawn position, the notch 42 in the die is engaged by its respective tine of the spring 40, and is cammed into position, thereby relieving the pressure between the pawl and the die at the time of disengagement of the hook 143 from the notch 142 in the die.

The embossing mechanism just described is substantially that shown, illustrated and claimed in my prior patents, Nos. 1,557,754 and 1,728,390, heretofore mentioned. However, the die head is that shown in my pending application Serial No. 638,717, filed October 20th, 1932, which carries individual die members, and has been substituted for the die head shown in the patents referred to, and together with my prior patents may be referred to for a more complete description of the die head and embossing mechanisms, per se.

The mechanisms disclosed in the patents, as well as the application herein referred to, were primarily designed to emboss a thin metallic ribbon or tape which was fed along the rail 16, heretofore mentioned, by a suitable feeding mechanism which advanced the ribbon one step

for each operation of each embossing mechanism. The present invention is concerned primarily with a plate feeding mechanism arranged to feed and locate individual plates, such as address plates or the like, in embossing position between the die head.

The plate holding and feeding mechanism of the present invention is preferably so designed that it may be bodily substituted as a unit for the ribbon feeding mechanism shown in my prior patents. This may be effected by the removal of the cross bars 16 and 17, which are secured to the vertical standards 13 and 14 by means of brackets, and replacing such parts by suitable brackets or standards 150, 151 (Figs. 1, 4 and 5) carrying new cross rails 16 and 17, together with my new plate supporting and feeding mechanism.

During the embossing operation, the plate P is mounted in the plate holder 200, which is supported by a carriage 201. The carriage is best shown in Figs. 1, 2, 3, 4 and 6 and, as shown, comprises a plate-like frame member 202, mounted for movement transversely of the machine, that is, from left to right or right to left of the machine, as shown in Fig. 1. The carriage is supported, above the embossing mechanism heretofore described, by a cross bar 203, the opposite ends of which are secured as at 153 to the brackets 150 and 151, which are mounted, as heretofore mentioned, on the standards 12 and 13, respectively, at opposite sides of the machine. As shown in Figs. 5 and 6, the carriage frame 201 has secured to its rear face a pair of grooved anti-friction rollers 207, which engage the upper surface of the cross bar 203. Suitable guide members 208, secured to the rear of the carriage frame 202, together with rollers 209, also secured to the frame 202 and engaging the lower portion of the cross bar 203, serve to maintain the rollers 207 in engagement with the cross bar, and to guide the carriage for movement transversely of the machine.

Immediately upon completion of each stroke of embossing mechanism, the carriage, together with the plate carried thereby, is moved toward the left (Figs. 1 and 4) a distance equivalent to the space required for one embossed character, thereby positioning the plate for the embossing of the next character.

The carriage is drawn to the left (Fig. 4) by a flexible tape 210, having one end secured to the carriage, as at 211, and the other end wound about a spring barrel 212. The spring barrel is of the usual type and hence not illustrated, in detail. Suffice it to say that the barrel has a coiled spring therein, tending at all times to rotate the barrel in a counter-clockwise direction about the axis 213 of the barrel.

The carriage is arranged so that, at the end of each embossing stroke, that is, during the return movement of the embossing levers, the spring barrel advances the carriage the distance required for the embossing of one character. For this purpose, I prefer to utilize the movement of the lever 121, heretofore described, as being rigidly mounted on the shaft 48, and which operates once during each action of the embossing mechanism. A link 160, connected to the upper end of the lever 121, as shown in Figs. 1 and 2, operates, through a lever 162, to rock a shaft 163. This shaft, in turn, through a crank 164, a link 165, and a lever 166, rocks a shaft 167 carried in suitable bearings supported by the frame mem-

ber 150 and a bar 220 carried by the carriage supporting bar 203.

Rigidly secured to the left-hand end of the rock shaft 167 (Figs. 5 and 13) is a lever 170, which, through the medium of a pair of adjusting screws 171, acts to rock a bell crank 172 about its pivot 173. The pivot 173 is carried by the bar 220, which is secured to, and spaced apart from, the bar 203 by suitable members 211. One arm of the bell crank 172 coacts with an escapement pawl 175, which is pivoted as at 174 to the bar 220. The other arm of the bell crank has integrally formed thereon an escapement detent 176 arranged to coact with the teeth of a ratchet wheel 177. The ratchet 177 is rigidly mounted on one end of a shaft-like member 178 journaled in and extending between the bars 220 and 203. Carried on the same shaft with the ratchet wheel 177 is a composite gear member 180, which meshes with a rack 181, carried by the carriage frame 201.

The arrangement, above described, is an escapement mechanism. Consequent upon the inward or embossing movement of the embossing arm 115, the bell crank 172 is rocked in a clockwise direction (Fig. 5), the detent 176 engaging the ratchet wheel 177, while the upper arm 178 of the bell crank coacts with a pin 169 in the pawl 175, and withdraws the pawl from engagement with the teeth of the ratchet wheel 177.

During the outward or embossing stroke of the embossing arm 125, a spring 179 interposed between the lever 166 and the frame member 151, rocks the bell crank 172 in a counter-clockwise direction, permitting a spring 168 to bring the pawl 175 again into engagement with the ratchet and disengaging the detent 176 from the ratchet. As the pawl reengages the ratchet it is moved into position to engage the ratchet tooth previously engaged, hence, upon the disengagement of the detent 176, the spring barrel mechanism 212, heretofore described, advances the carriage until the ratchet is rotated, because of the rack 181 and gears 180, a distance to bring the next ratchet tooth against the pawl.

The composite gear 180 is arranged so that dies having characters of different width thereon may readily be used, or so that the distance between the letters may be shortened or lengthened to variably space the characters in the lines of embossed characters on the printing plate. To this end the rack 181 is carried by the arms 185, which are pivotally connected to the carriage as indicated at 186 in Fig. 2. The rack is normally retained in engagement with the teeth of the composite gear member 180 by gravity. As shown in Fig. 6, the composite gear member 180 comprises three different gears, each differing in their total number of teeth from the others. The composite gear member is slidable, axially of the shaft 178, to the end that either one of the gears may be moved into contact with the rack 181, thereby enabling the spacing of the characters at any one of three predetermined distances. The gear member 180 is provided with an annular recess 190, arranged to be engaged by pins 191 carried by a clutch fork 192 (Figs. 1 and 12). The clutch fork is pivotally mounted as at 193 to a block 194, which is secured to the bar 203. A suitable plunger 196 is pivotally secured to the opposite end of the fork 192 and projects through the bar 229, as at 198, in Fig. 1, whereby the gear mechanism may readily be shifted by the operator.

At times it may be desirable to back space a plate, either to re-emboss a character or to posi-

tion the plate for embossing. Back spacing is accomplished by the depression of a finger key 230 by the operator. Such key is mounted on the forward end of a lever 231 (Figs. 1 and 2), which, through a compound lever 232, 233, draws downwardly a link 234 (Figs. 5 and 12). The link 234 operates to rock a lever 235 pivoted at 236 to the cross-bar 203 against the action of a spring 237, and causes a pawl 238 carried by one end of such lever to be brought into engagement with ratchet teeth 239 in the grooved hub of the gear member 180, rotating the gear member in a counter-clockwise direction a distance of one tooth, thereby moving the carriage towards the left in Figs. 5 and 12 or towards the right in Fig. 1, a distance equivalent to the spacing of one character.

The back spacing is accomplished without affecting the escapement mechanism, which permits the movement of the carriage under the influence of the spring barrel 212. As shown, the gear member 180 is loosely mounted on the shaft 178 and is drivingly connected thereto by a plunger 225 which is maintained in engagement with internally formed ratchet teeth 226 of the gear member by a spring 227. The arrangement is such that the clockwise rotation imparted from the shaft 178, by the escapement mechanism, is imparted to the gear member 180, whereas during the counter-clockwise rotation of the gear member, due to the action of the back spacer pawl 238, the gear member is rotated without affecting the shaft 178 or the escapement ratchet 177.

When the carriage has advanced to the extreme left-hand position, or when the carriage has advanced toward the bracket 150 and support 12, as far as is desired, the operator manually returns the carriage to the right-hand position, adjacent the bracket 151 and the support 13. Suitable members 302 and 215, hereinafter to be described in detail, are secured to the carriage 201 and positioned to be conveniently grasped by the operator. Either of such members may be used by the operator to manually move the carriage toward the right. Consequent upon the operator moving the carriage through the lever towards the right-hand end, the rack 181 acts to rotate the gear member in a counter-clockwise direction (Fig. 5). This is accomplished without affecting the escapement mechanism by the plunger 225 and internal ratchet 226, as heretofore explained in connection with the back spacing mechanism.

At times it is desirable to advance the carriage more rapidly than is possible by operating the spacing means, which, through the embossing mechanism, would advance the carriage step by step for successive embossing operations. To this end, the member 215 may be manually operated to disengage the plunger 225 from the internal ratchet teeth 226 of the gear member 180, thereby permitting the carriage to be freely advanced under the tension of the spring barrel 212.

As shown in the drawings, the member 215 comprises a lever pivoted to the carriage 202 at 216 and provided with a bar portion 217, extending the full length of the carriage at the rear thereof, and which is positioned beneath a bell crank 240, pivoted at 241 to a bracket 242 carried by the stationary bar 220, heretofore mentioned. The depression of the hook member 215 by the operator causes the bar 217 to rock the bell crank 240 about its pivot against the action of a spring 243. Thereupon, a pin 244 in the

lower arm of the bell crank 240 rocks a lever 245 pivoted on a rock shaft 246 carried by suitable brackets 247 mounted on the bar 220. As shown in Fig. 6, the rocking of the lever 245 causes a plunger 248, slidably mounted in the gear shaft 178, and having a pin and slot connection 249 with the lever 245, to be moved toward the front of the machine. Consequent upon such forward movement, the bevelled nose of the plunger 248 enters a conical opening 228 in the plunger 225, drawing the latter plunger out of engagement with the internal teeth 226 of the gear member 190, thereby permitting the spring barrel mechanism 212 to advance the carriage until stopped by the engagement of the plunger 225 with the ratchet teeth 226, consequent upon the release of the lever 215 by the operator.

To enable the embossing of several lines of characters, one above the other, the plate holder 200 is mounted on the carriage for vertical movement. As shown in Figs. 4 and 6, the plate holder 200 is secured to a vertically reciprocable mounting plate 260 carried by the carriage 201. The mounting plate 260 is secured to a vertically extending bar 261 by suitable screws 262 which pass through blocks 263, serving to space the plate from the bar. The bar 261 is slidably mounted for vertical movement in ways 265 formed in the carriage frame 202. Hence, when it is desired to move the plate P to cause the embossing to take place in different horizontal regions, the bar 261 is raised or lowered, as desired. The mechanism for raising the bar 261, and consequently the plate P, step by step, is best illustrated in Figs. 1, 4 and 6.

As there shown in Figs. 1, 2 and 14, a suitable operating lever 300 is pivotally connected as at 301 to the carriage and carries the member or knob 302, whereby it may be conveniently grasped by the operator. The lever 300 has an arm 304 arranged to engage a member 305, carried by a bell crank 306 pivoted as at 186 to the carriage.

The bell crank 306 serves to operate a ratchet feed mechanism, which serves to raise the mounting plate 260 upwardly step by step. As shown in Figs. 2 and 14, the bell crank 306 is connected by a link 307 to a plate 308 which is pivotally mounted on a shaft 309, journaled in forwardly extending bracket portions 280 of the carriage frame 202.

Consequent upon the swinging of the knob 302 by the operator, toward the right (Fig. 1) the carriage is moved toward the right, and a pawl 281, pivoted to the plate 308 at 282, engages a ratchet wheel 283 and rotates the shaft 309. Rigidly mounted on the shaft 309, as shown in Figs. 4 and 6, are a pair of spur gears 284, which mesh with respective racks 285 secured to opposite ends of the mounting plate 260. Hence, each time the operator moves the carriage by means of the knob 302, the plate P will be raised the distance required for spacing the lines of characters.

The mechanism above described is so arranged that the operation of the knob 302 spaces the plate vertically for either single or double spacing of the lines. As shown in Fig. 14, a pair of plates 286 and 287 are pivotally mounted on the shaft 309. The plate 286 carries an arcuate tongue 288, which is interposed between the pawl 281 and the ratchet wheel 283, so that, depending upon the position of the tongue 288, the pawl may, consequent upon the swinging of the plate 286, advance the ratchet either one or two teeth

at a time. The plate 286 is provided with a handle-like portion 289, by means of which the tongue 288 may be rocked about the shaft 309, and thereby be adjustably positioned by the operator. A suitable boss 270 of the plate 286 enters either of two openings 271 in the plate 287, which is restrained from rotation by a pin 272 carried by the carriage frame bracket 280, thereby retaining the tongue 288 in its adjusted position.

A tabulating mechanism is provided by means of which the carriage may be moved horizontally under the impulse of the spring barrel 12 to certain preselected positions, so as to enable the tabulating of a series of figures or the like. The tabulating is accomplished by a series of stops 275, which are removably positioned in any one of a series of notches in a bar 276, which is rigidly secured to the carriage frame 202.

When the operator desires to tabulate, the stop members 275 are positioned so as to stop the carriage at the desired point. The operator next depresses a key 266 (Figs. 1 and 2) which causes the carriage to be released so that the spring barrel 212 may move the carriage to the desired position, as indicated by the stop 275. As shown in Figs. 2 and 5, the key 266 is secured to one end of a lever 267, which, through a compound lever 268, similar to the levers 231, 232, heretofore described, serves to draw downwardly a link 269. The link 269, through the medium of a link 250, draws downwardly a rod or pin 251 carried by a lever 252 rigidly secured to the shaft 246 heretofore mentioned in connection with the lateral shifting of the carriage. Pivotally connected at one end of the horizontal rod 251 is a vertical rod 254, the upper end of which is pivoted, as at 255, to a lever 256 carried by a bracket 257 mounted on the bar 220.

The downward movement of the vertical rod 254, concomitant with the depression of the key 276 by the operator, rocks the lever 256 in a clockwise direction (Fig. 5), causing an abutment member 258 carried thereby to be positioned in the path of the stop member 275, heretofore mentioned. The rocking of the shaft 246, due to the depression of the tabulator key, as well as rocking the abutment lever 256, causes the withdrawal of the plunger 225 from driving contact with the internal ratchet 226 of the escapement mechanism. As shown in Fig. 6, an arm 273 is rigidly secured to the shaft 246 and carries a pin 274 arranged to coast with the lever 245, heretofore mentioned. The movement of the arm therefore rocks the lever to cause the pin 248 to withdraw the plunger 225 from the internal ratchet 226, thereby permitting the spring barrels 212 to move the carriage until a stop 275 strikes the movable abutment 258, at which time the operator releases the stop key 276, thereby bringing the carriage quickly to the desired position.

The carriage or mounting plate 260 is retained in its raised position after the release of the member or knob 302 by a lever or pawl 310, (Fig. 15) pivoted as at 311, to the carriage bracket 280 on the right-hand side of the machine. The pawl 310 has a projection 312 arranged to engage the teeth of a ratchet 313, which is rigidly secured to the shaft 309. When it is desired to lower the carriage, the operator merely grasps a forwardly extending arm portion 315 of the pawl and raises the pawl, permitting the carriage to drop under the influence of gravity. Due to this ratchet mechanism, it is readily seen that the

operator may, by grasping a handle 316, which is rigidly secured to the plate holder 200 raise the plate at any time as much as desired. A suitable stud 318 carried in a rearwardly extending bracket 319 of mounting plate 260 is arranged to engage a rubber cushion or block 317 carried by the carriage frame member 202, thereby preventing damage to the parts, as well as limiting the downward movement of the plate holder.

The individual plates which are to be embossed are stored in a suitable magazine 320, which is mounted as a unit on the cross-bar 16, heretofore described, and a mechanism is provided to shove the plates, one at a time, from the magazine into position on the plate holder. The plate magazine and feeding mechanism is best illustrated in Figs. 1, 3, 4, 5 and 17. As there shown, the magazine comprises a base 321, secured to the cross bar 16, and provided with side and rear walls 322 and 323, respectively, and a movable front wall 324. A plurality of plates are placed in the magazine and are urged forwardly, toward the front wall 324 by a plate 325 carried by a plunger 326 slidably mounted in the rear wall 323 of the magazine and urged into contact with the plates by a spring 327.

Before the operator actuates the plate feeding mechanism, the carriage 201 is first moved to an extreme right-hand position (Figs. 1 and 4) and the plate holder thereon is raised to its uppermost position. This brings a pair of channels 330, formed in the plate holder 200, into alignment with the upper and lower edges of the foremost plate P in the magazine. The operator then grasps a knob 331, which is carried by a lever 334 pivotally secured to the movable front wall 324 of the magazine, as at 335, and moves the front wall of the magazine toward the left to the position shown in Fig. 17. A pin 332 carried by the wall member 324 limits the rocking of the lever 334.

The front wall 324 of the magazine is provided with a shoulder 336, which, as the magazine moves toward the left, engages the foremost plate P in the magazine, shoving it out of the magazine into the ways or channels 330 in the plate holder 200 and simultaneously the forward edge of this plate P shoves the plate which has been previously embossed out of such channels into a trough 337 from which the plate is readily removed by the operator.

The plate P, when in position on the plate holder 200, is normally restrained, against vertical movement by the channels 330, and against horizontal movement by a pair of bars 340 and 341, which are slidably mounted for vertical movement on the plate holder 200 and are arranged to engage opposite ends of the plate P. As the front wall 324 of the magazine is moved toward the left by the operator, a cam surface 342 engages one end 343 of a bell crank 344 pivoted as at 345 to the plate holder and rocks the bell crank in a counter-clockwise direction, causing the bell crank to engage a pin 346 carried by a bar 340, thus raising that bar. Simultaneously, the bell crank 344 raises the bar 341. The bell crank is connected by a link 347 to a second bell crank 348, which is pivoted as at 349 to the plate holder 200 and which has a pin and slot connection 351 with the bar 341. When the operator returns the front wall 324 of the magazine 320 to its normal position, shown in Fig. 4, springs 353 and 352 restore the stops 341 and 342 to their plate engaging positions.

The movement of the knob 333 towards the

right (Fig. 3) to restore the plate feed to its normal position, causes the rocking of the bell crank 334 in a clockwise direction, whereupon a pin 354 carried by one end of the arm 350 of the bell crank engages the bifurcated end 356 of the rock arm 357 pivoted as at 358 to a block 359, which is carried by the magazine base 321 and forms a guide for the moving front wall of the magazine. The rocking of the bell crank 334, therefore, rocks the lever 362 so that it engages a downwardly extending lug or arm 360 of the pawl 315 which serves to maintain the carriage in the uppermost position, as heretofore described. The raising of the arm 310 disengages the pawl from the ratchet 313 and permits the carriage to drop to its embossing position under the influence of gravity.

The plate, while being embossed, lies between the dies and therefore, to a great extent, is hidden from the view of the operator. I therefore provide means whereby the operator, at a glance may tell what portion of the plate is being embossed, that is, the position of the character in the line and the line being embossed. As shown in Figs. 3, 4 and 6, secured to the plate holder adjacent its upper end, is a frame 390, adapted to removably position a chart 391. The chart is provided with a series of vertical and transverse lines. The vertical lines indicate the character spacing of the carriage, whereas the horizontal lines indicate the line spacing of the carriage. A suitable pointer 392 carried by a rod or bar 393 which is secured to the frame member 151, coacts with the chart and indicates to the operator the exact position of the selected embossing die, relative to the plate which is being embossed. The chart 391 is so positioned that it is at all times visible to the operator. When the width of the character spacing is altered by bringing different gears 180 into active relationship with the carriage rack 181, as heretofore described, the chart 391 is removed from its holder and a new chart substituted therefor, bearing spaces corresponding to the distances the carriage is fed by the newly selected gear 180.

While I have described the plate holding and feeding mechanism as adapted for substitution for the ribbon feeding mechanism of existing embossing machines, made according to my prior inventions, it is to be understood that such substitution does not imply that the mechanism need be of the exact form illustrated in the drawings. For instance without disturbing the feeding mechanism of the present invention the plate holder 200 may be replaced by a plate holder having channels arranged to receive plates of different size or shape from those shown. Moreover, by merely deepening the die head, so that its vertical groove could accommodate a greater extent of plate holder, the latter could readily be adapted to carry an embossable plate nearly the size of the plate holder, so that one would thus be enabled to emboss a page form if desired.

While I have described in detail the die carrying and power actuating mechanism therefor of my prior patents and application, it is to be understood that the present invention is not limited to those particular details or indeed to a power operated embossing mechanism.

I claim:

1. In an embossing machine, a die holder, a plurality of pairs of coacting dies carried by said die holder, a plate holder arranged to extend between the dies of a selected pair, means to cause a selected pair of dies to coact to emboss a plate, means to move the plate holder in one di-

rection for letter spacing, means to move the plate holder in another direction for line spacing, a chart carried by said plate holder and visible to the operator, and means coacting with said chart to indicate the position of the selected dies relative to the plate embossed.

2. In an embossing machine, a die holder, a plurality of pairs of coacting dies carried by the die holder, a carriage adapted to support and position a plate to be embossed between the dies, embossing mechanism to cause a selected pair of dies to emboss the plate, means dependent upon the embossing mechanism to advance a carriage a step at a time, a tabulator mechanism under control of the operator to advance the carriage a plurality of steps to a predetermined point, and means whereby said tabulator may be operated to advance the carriage, independent of the operation of the embossing mechanism.

3. In an embossing machine, a frame, a pair of die holders, pairs of coacting dies mounted in said die holder, a pair of cross-bars rigidly mounted on said frame and extending between said rows of dies and each having an aperture through which a die of a selected pair extends to emboss a plate, said die holders being movable with respect to said apertures, and a plate holder mounted for movement parallel with and between said bars, whereby the inner faces of said bars may act to limit the movement of the plate holder in a direction parallel with the movement of said dies.

4. An embossing machine, comprising in combination a longitudinally movable carriage, a vertically disposed plate holder having a pair of parallel ledges behind which a plate may be moved in its own plane to engage its opposite margins, a plurality of pairs of cooperating dies disposed on such carriage and arranged on opposite sides of said plate holder, actuators disposed for cooperation with a selected pair of dies, means for moving the carriage longitudinally to bring the selected pair of dies into registration with said actuators, means for moving such actuators transversely into cooperation with said selected pair of dies, and a unitary member to initiate the movement of both of said means.

5. In an embossing machine, a frame, a pair of die holders, coacting dies mounted in said die holders, a pair of bars rigidly mounted on said frame and extending between said rows of dies and each having an aperture through which a die of a selected pair extends to emboss a plate, said die holders being movable with respect to the apertures, and a plate holder mounted between said bars for movement in each of two directions normal to each other, whereby the inner faces of said bars may act to limit the movement of the plate holder in a direction parallel with the movement of said dies regardless of the position to which the plate holder is moved.

6. In an embossing machine, a frame, a pair of die holders, coacting dies mounted in said die holders, a pair of bars rigidly mounted on said frame and extending between said rows of dies and each having an aperture therethrough slightly larger than the area of one die and through which a selected die may extend to emboss a printing plate, a plate holder mounted between said bars for movement in directions parallel therewith, said plate holder having an opening intermediate its ends substantially as large as the

printing plate, means to position a printing plate on said holder over the opening therein, whereby the plate holder will limit the movement of the plate in a direction parallel with the movement of said dies and whereby the bars will limit the movement of the plate holder in a direction parallel with the direction of movement of said dies.

7. In an embossing machine, a frame, a die holder movable thereon, a plurality of pairs of coacting embossing dies mounted in the die holder, a pair of spaced bars rigidly secured to the frame and extending between said dies, and each bar having an aperture through which one of the dies may extend to emboss a plate, a plate holder movable with respect to the apertures in said bars, and having an aperture intermediate its ends substantially larger than the aperture in said bars, means carried by said plate holder and adapted to overhang the edges of a printing plate and retain such plate in position on the plate holder over the aperture therein and against movement in the direction of the embossing movement of said dies, and wherein said bars act to restrain the plate holder from movement in a direction parallel with the embossing movement of said dies.

8. In an embossing machine, a die holder, a plurality of pairs of coacting dies carried by said die holder, a plate holder arranged to extend between the dies of a selected pair, means to cause a selected pair of dies to coact to emboss a plate, means to move the plate holder in one direction for letter spacing, means to move the plate holder in another direction for line spacing, a chart member having designations disposed laterally and vertically, a member coacting with the chart member to indicate the position of the selected dies and the location of the line in which they are to emboss, and means operatively connecting one of said members with the plate holder.

9. In an embossing machine, a frame, a die holder, a plurality of pairs of coacting dies carried by said die holder, a plate holder arranged to extend between the dies of a selected pair of dies, means to move the plate holder in one direction for letter spacing, and in another direction for line spacing, a chart movable with said plate holder and visible to the operator, and a pointer secured to said frame and coacting with said chart to indicate the position of the selected dies relative to the plate to be embossed.

10. In an embossing machine, a die holder, a plurality of pairs of coacting dies carried by the die holder, a carriage adapted to support and position a plate between said dies to be embossed, embossing mechanism to cause a selected pair of dies to emboss the plate, means dependent upon the embossing mechanism to advance the carriage a step at a time, a tabulator mechanism under the control of the operator to advance the carriage a plurality of steps to a predetermined point relative to the selected dies, means whereby said tabulator may be operated to advance the carriage independent of the operation of the embossing mechanism, a chart carried by said carriage and visible to the operator and a member coacting with the chart to indicate the position of the carriage and plate to be embossed relative to the position of the selected dies and thereby enable the operator to check the operation of said tabulator.

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