June 5, 1934. C. C. McCAIN 1,961,156

EMBOSSING MACHINE

Original Filed July 10, 1929 6 Sheets-Sheet 1

Fig. 1.

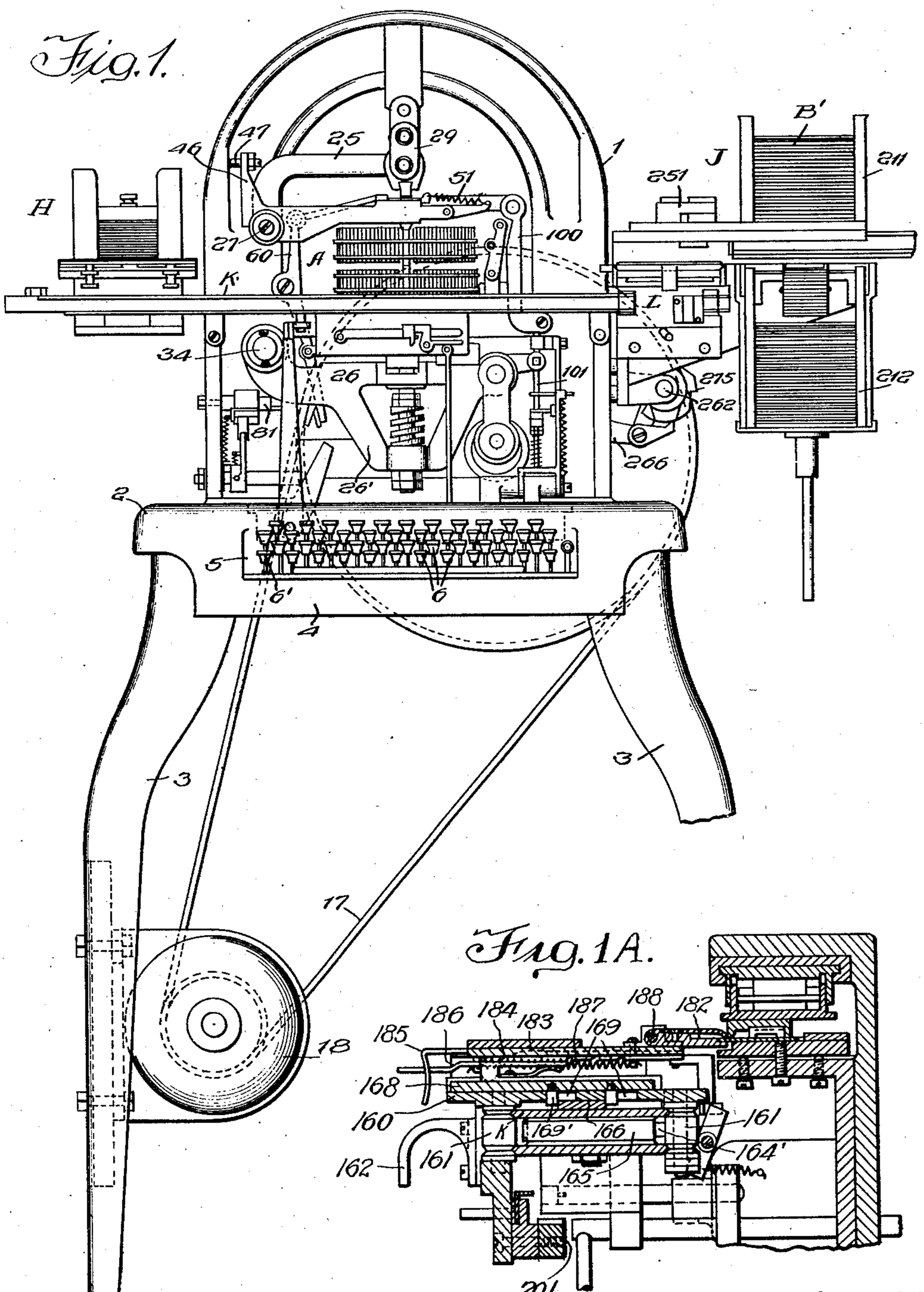

Fig. 1A.

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Fig. 2.

Fig. 2a.

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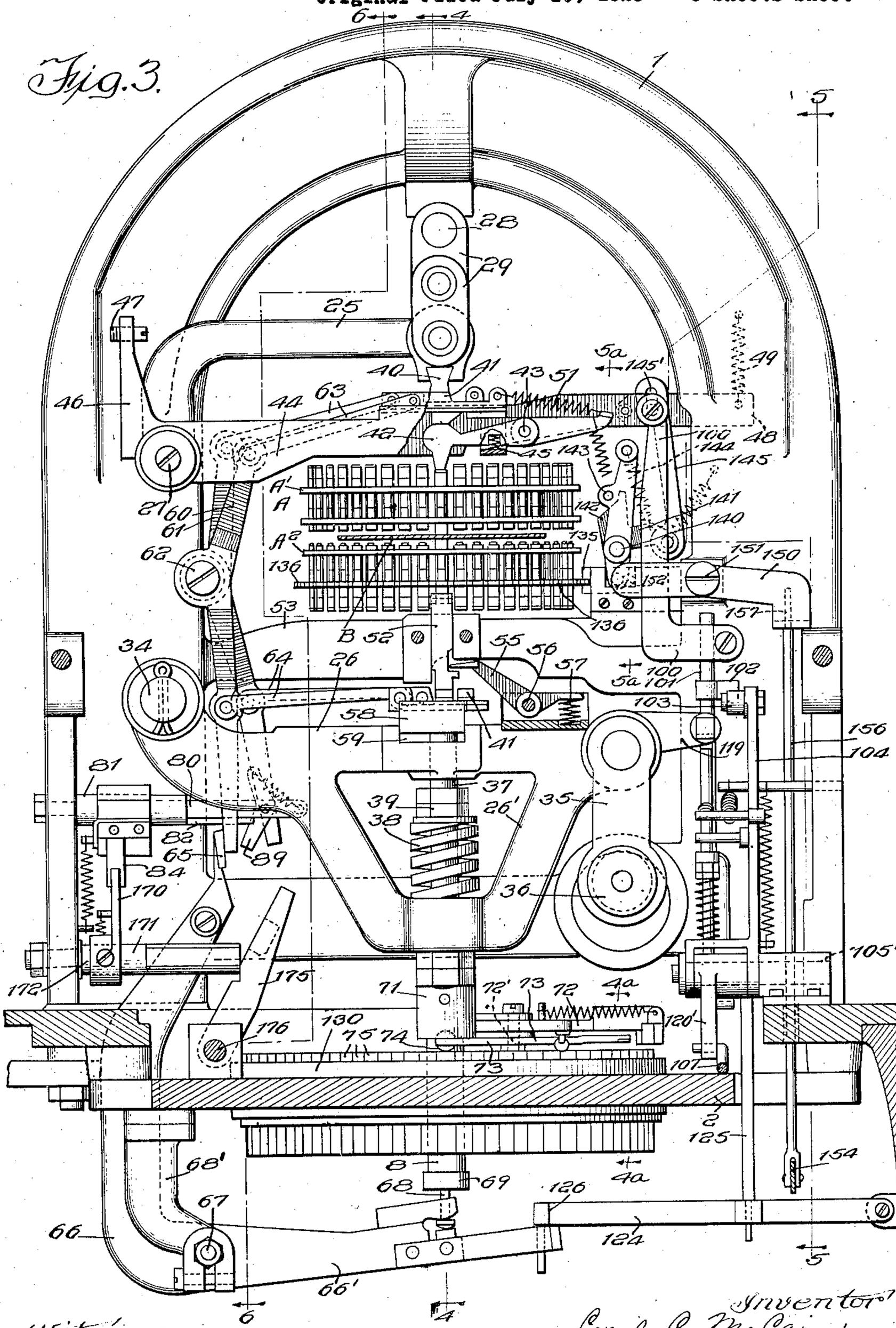
Fig. 3.



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EMBOSSING MACHINE

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Fig. 4.

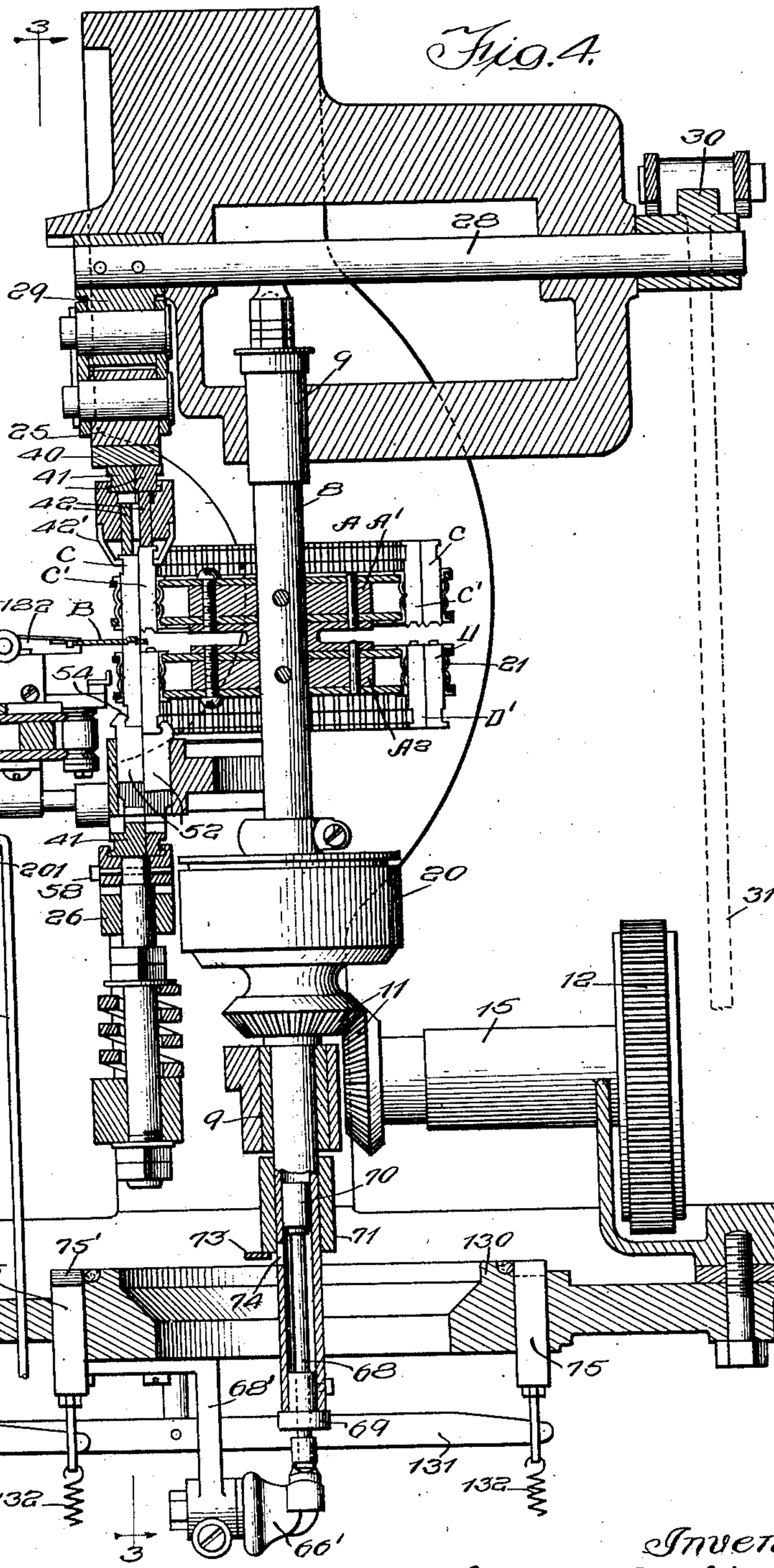
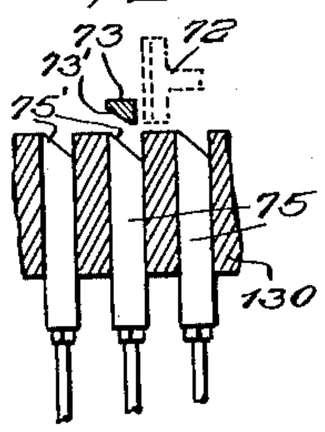


Fig. 4a.



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EMBOSSING MACHINE

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Fig. 5.

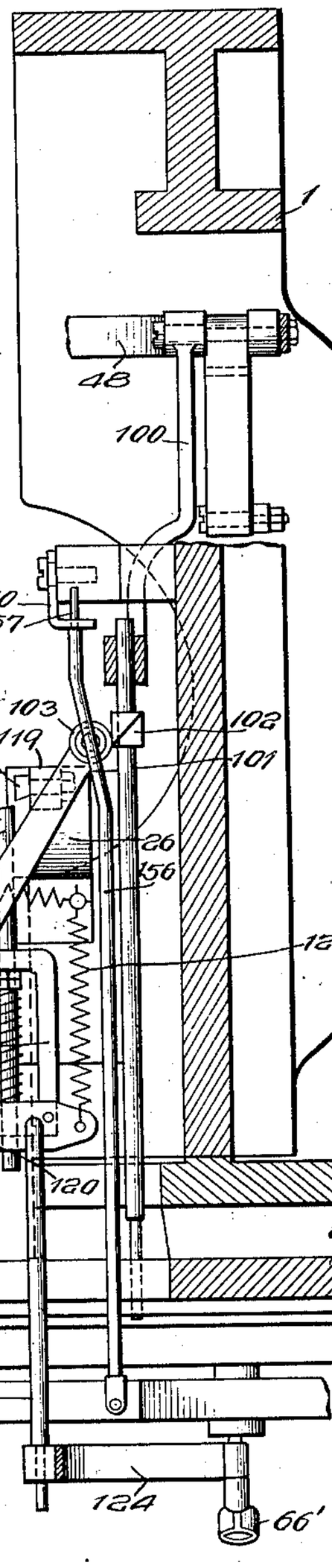


Fig. 5a.

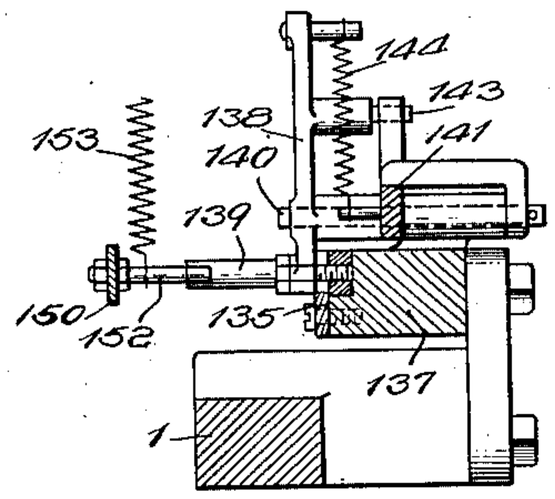
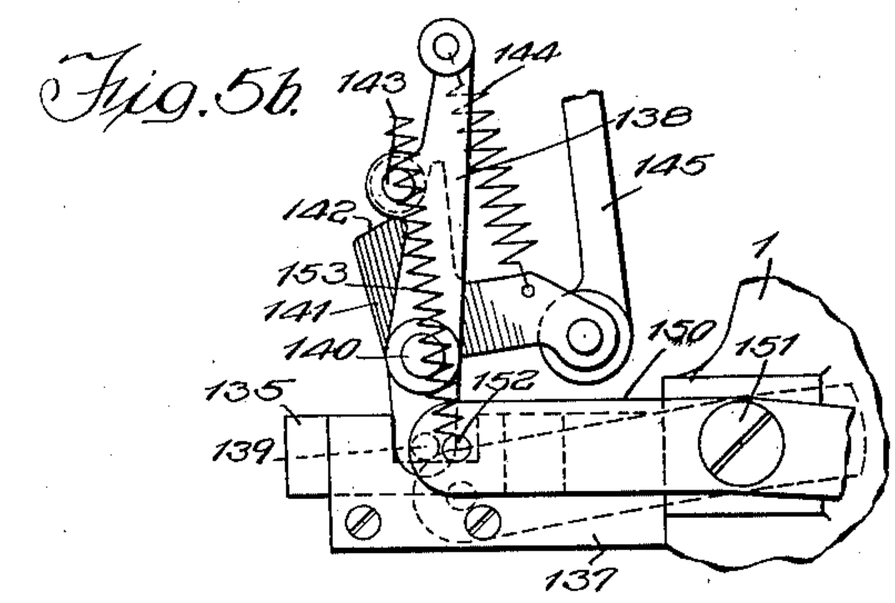


Fig. 5b.



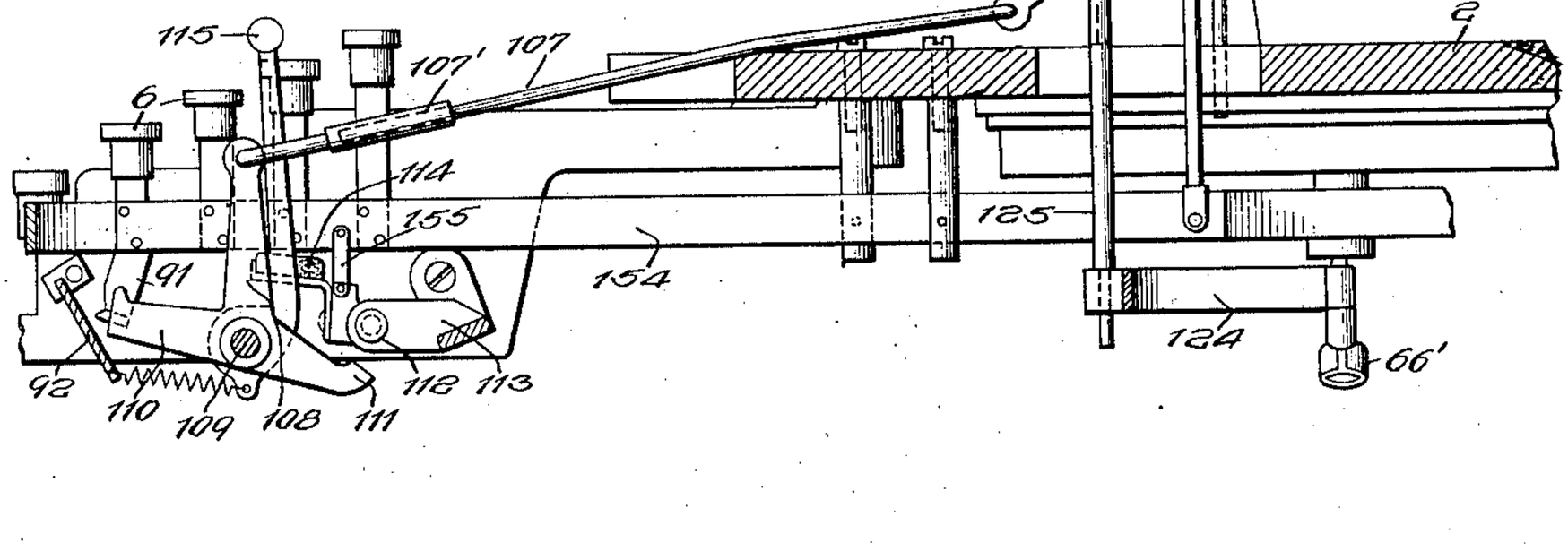


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Fig. 6a.

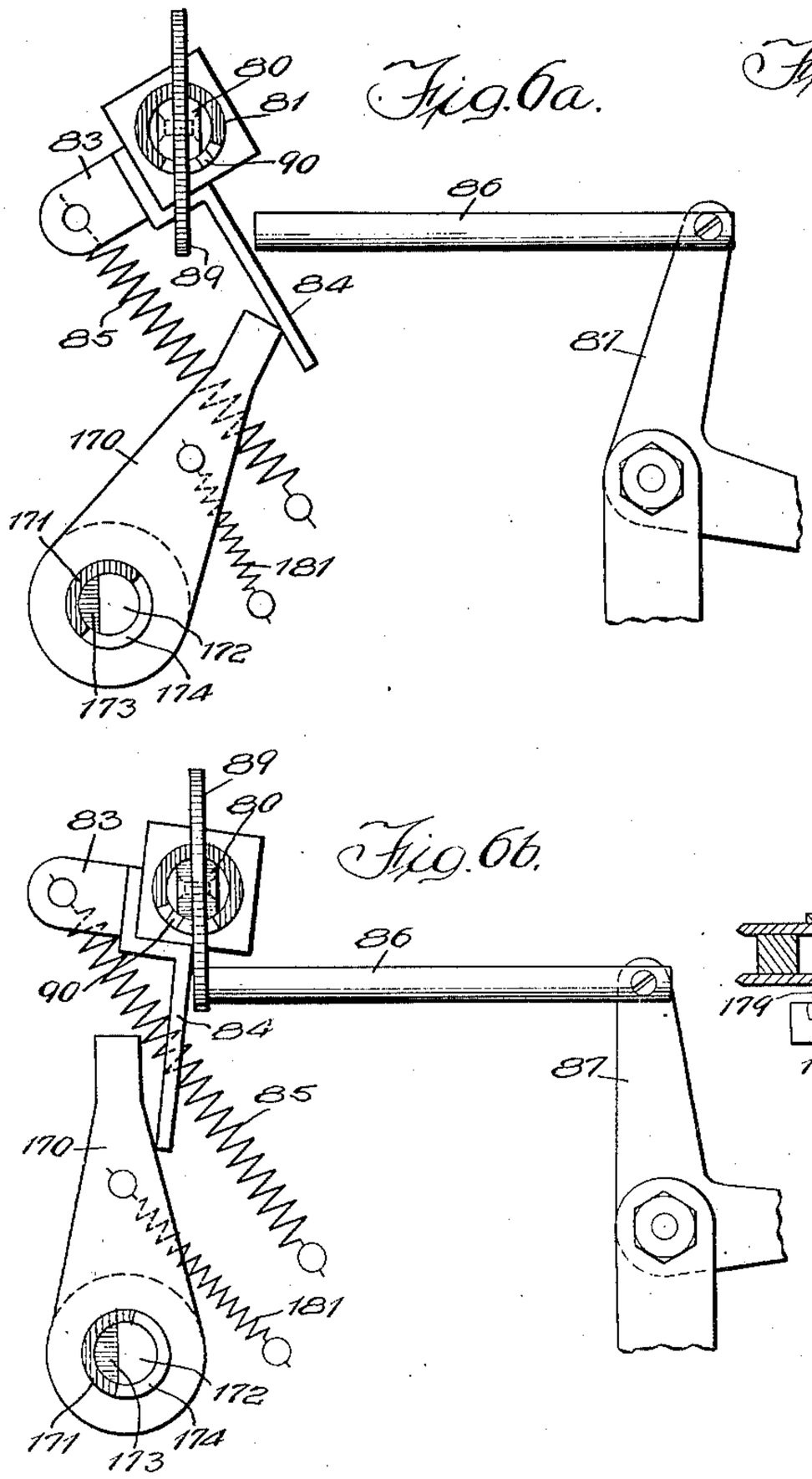


Fig. 6.

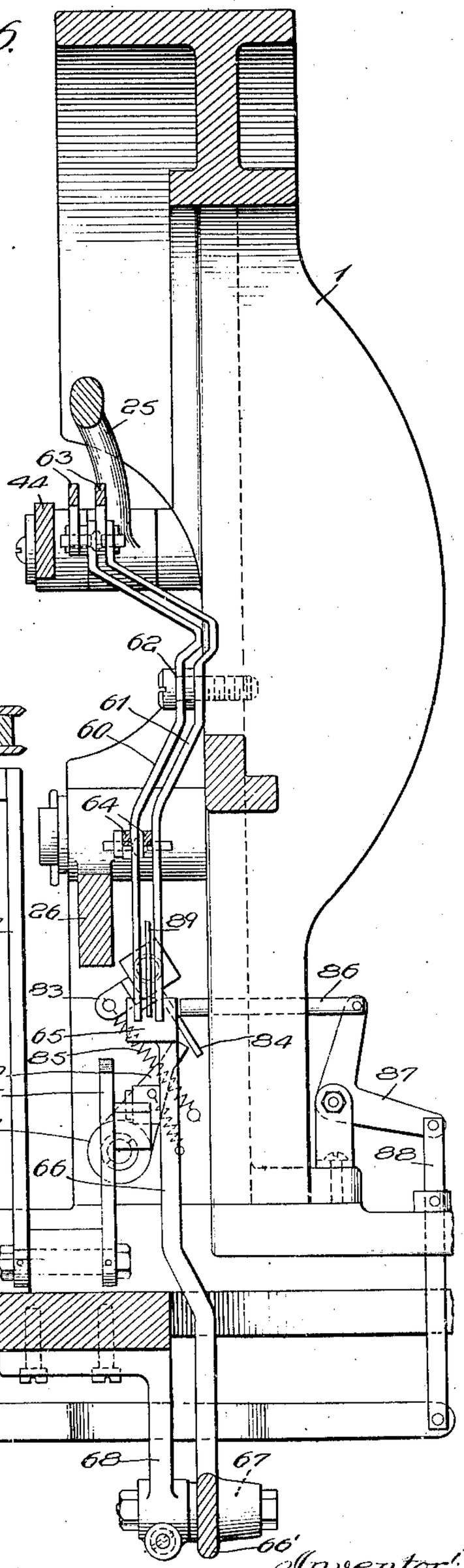


Fig. 6b.

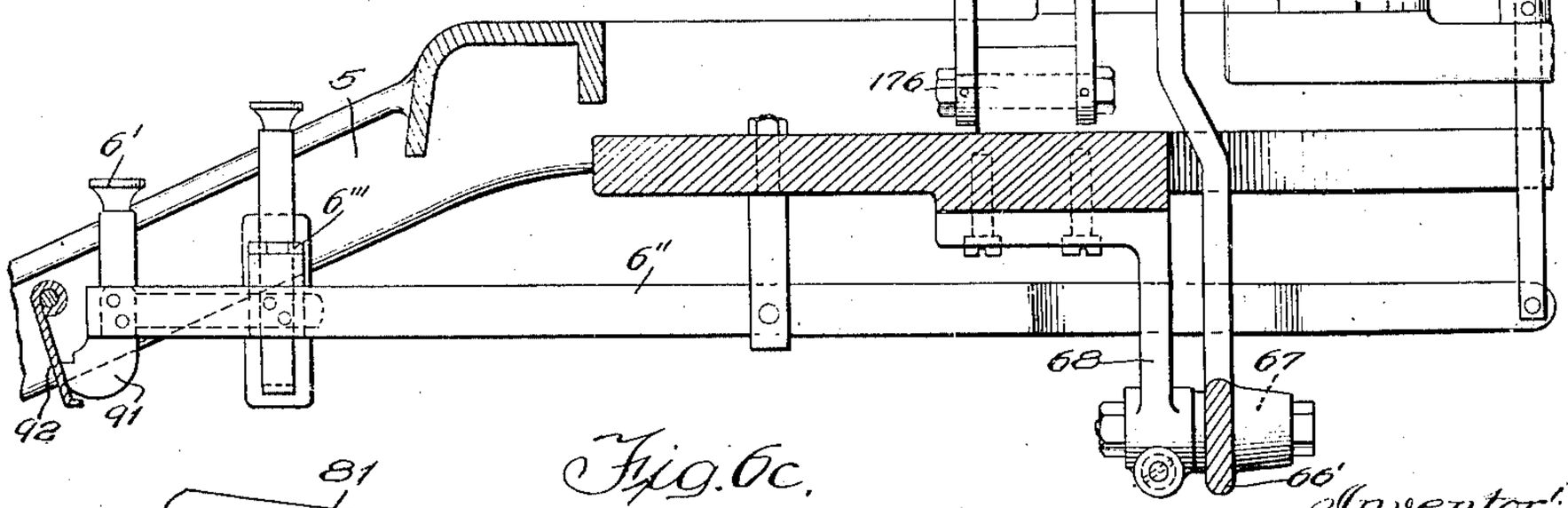
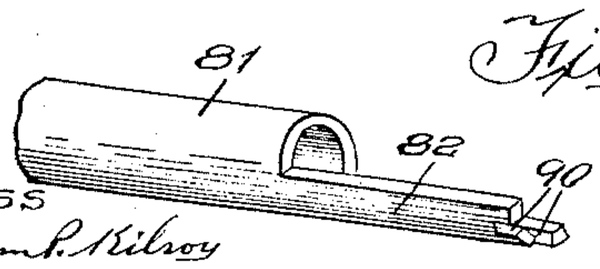


Fig. 6c.



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Patented June 5, 1934 1,961,156

UNITED STATES PATENT OFFICE

1,961,156

EMBOSSING MACHINE

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Original application July 10, 1929, Serial No. 377,248. Divided and this application February 12, 1931, Serial No. 515,290

24 Claims. (Cl. 197—6.6)

This application is a division of my application, Serial No. 377,248, filed July 10, 1929, Patent No. 1,893,463, patented January 3, 1933.

This invention relates to embossing machines and more particularly to machines of the character employed to emboss type characters on the printing plates or printing devices.

One of the objects of my invention is to provide a novel embossing machine wherein the embossing devices will be supported in a normally stationary member which may be rotated to position selected embossed characters in embossing position upon operation of a selected one of the control members.

Another object is to provide an embossing machine wherein certain portions of the mechanism may be shifted relative to the embossing devices.

A further object is to provide different sets of embossing devices whereby a device of either set may be positioned to operate on a printing plate as determined by the operating members of the machine.

In the selected embodiment of the invention, illustrated in the accompanying drawings,

Fig. 1 is a view in elevation of the front of a printing plate embossing and replacing mechanism embodying the invention;

Fig. 1*a* is a transverse sectional view taken substantially on the line 1*a*—1*a* on Fig. 2;

Fig. 2 is a plan view showing the general arrangement of the parts and mechanisms of Fig. 1;

Fig. 2*a* is a detail section of the safety connection between the power shaft and the mechanism;

Fig. 3 is an enlarged front elevation of the embossing mechanism, the plate carriage mechanism having been removed and the frame table being shown in section substantially as indicated by the line 3—3 of Fig. 4;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3, showing the plate carriage in embossing position;

Fig. 4*a* is a detail section on the line 4*a*—4*a* of Fig. 3;

Fig. 5 is a detail section on the staggered line 5—5 of Fig. 3;

Fig. 5*a* is a detail vertical section on the line 5*a*—5*a* of Fig. 3;

Fig. 5*b* is an enlarged detail of the die carrier holding mechanism shown in Fig. 5*a*;

Fig. 6 is a vertical section of the staggered line 6—6 of Fig. 3;

Figs. 6*a* and 6*b* are enlarged details of the key operated parts of the case shifting mechanism; and

Fig. 6*c* is a detail perspective of the case shift locking key.

The machine shown in the drawings Figs. 1, 2, 3, 4, 5 and 6 has an upstanding arch shaped frame 1 mounted upon a table 2 which is supported by suitable legs 3. The front portion 4 of the table is inclined downwardly and has an opening 5 for the bank of operating keys 6 forming the key board. The die head or carrier A, which carries the embossing dies, is positioned in the central portion of the arch shaped frame (Figs. 1, 2, 3 and 4) and is mounted on a vertical spindle 8 to rotate in a horizontal plane. The spindle is journaled in suitable upper and lower bearings 9 in the frame and is driven by means of the beveled gears 11 and the spur gears 12 and 13 from the belt driven pulley 14 (Figs. 1, 2 and 4). One of the beveled gears 11 and the spur gear 12 are mounted on a short shaft journaled in suitable bearings 15 on the frame. The pinion gear 13 is mounted on the main shaft 16 journaled in the frame, and this shaft carries the pulley 14 which is driven by the belt 17 from a suitable driving motor 18 attached to the legs of the frame beneath the table.

A clutch 20 forms a driving connection between the beveled gears 11 and the spindle 8. This clutch may be of any suitable type for the purpose and needs no further description except that it is preferably so constructed that when the die carrier is not restrained against rotation, as hereinafter described, the clutch will drive the spindle and die carrier at uniform speed. However, when the die carrier is restrained against rotation the clutch members will simply slip relatively to each other thus permitting the power shaft to run continuously.

The die carrier A is comprised of two cage members A′ and A² (Figs. 3 and 4) keyed to the spindle to rotate in unison therewith. They are spaced apart one above the other to permit the printing plate blank B to be positioned therebetween. The upper cage member A′ carries the dies C and C′ and the lower cage member carries the complementary punches or dies D and D′. These die members are arranged in two annular concentric series in their respective cages and are mounted to slide vertically in radially disposed slots, with the dies C and C′ in the upper cage vertically aligned with the corresponding punches D and D′ in the lower cage, and each die member is provided with a small notch which is yieldingly engaged by a small spring 21 (Fig. 4) to yieldingly

hold the die members in their upper or withdrawn position. In the present structure I provide the two series of pairs or sets of die members, one for embossing lower case letters or characters and the other for embossing upper case or capital letters. The outer series, comprising the dies C and D, constitute the sets for embossing the lower case letters, while the inner series, comprising the dies C' and D', constitute the sets for embossing the upper case or capital letters. The printing plate blank B, which is being embossed, is shifted radially with respect to the inner and outer series, as hereinafter described, for the purpose of embossing upper or lower case letters.

The die members are operated by power driven rocker arms 25 and 26 (Fig. 3). The upper rocker arm is pivoted at 27 to one side of the frame and its inner end is connected to the rock shaft 28 by the toggle links 29. The rock shaft 28 is journaled in the upper portion of the arch frame and extends to the rear side thereof (Fig. 4) where it is connected by another toggle mechanism 30 and the link 31 to an eccentric 32 (Fig. 2) on the main shaft 16. The lower rocker arm 26 is pivoted at 34 to one side of the frame and extends across beneath the die carrier where it is connected by a short link 35 to a crank 36 on the forward end of the main shaft 16 giving a short intermittent stroke in time with the upper rocker arm. The upper rocker arm is timed slightly in advance of the lower rocker arm 26 so that the upper die will be in position against the printing plate blank in time to receive the lower die member or punch. The rocker arm 26 has an integral depending yoke portion 26' and the lower end of this yoke and also the rocker arm has bearings for the pressure rod 37 which transmits pressure to the punches. This pressure rod is longitudinally movable in said bearings, and a heavy coil spring 38 surrounds the pressure rod and is positioned between the collar nuts 39 on the rod and the yoke 26'. This compression spring constitutes a safety device which will transmit the required operating pressure to the die members, but which will yield in the event that the dies become jammed by some abnormal condition, thereby preventing damage to the dies. The end of the upper rocker arm 25 carries an anvil 40 which bears upon either one or the other of two shuttles 41, depending upon which one of these shuttles is positioned in line with the anvil on the downward stroke thereof. There are two of these shuttles (Figs. 3 and 4) one for the dies of each series. The pressure on the shuttles is transmitted to the corresponding die members by means of the fingers 42, which are aligned with the respective shuttles and dies.

The fingers are pivotally mounted at 43 (Fig. 3) on the shuttle arm 44 and are acted on by springs 45 which swing the fingers upwardly clear of the dies after each embossing operation. The shuttle arm 44 is pivotally mounted at one end on the same pivotal axis 27 as the rocker arm 25 so it will swing about said pivot to follow the movement of the rocker arm and maintain the shuttles and fingers in operating relation to the anvil. The arm 44 has an extension 46 carrying a screw 47 which engages the frame and serves as an adjustable stop to limit the upward movement of said arm. The shuttle arm 44 also has another extension 48 reaching to the other side of the frame and a spring 49 is connected to this arm and to the frame for swinging the arm 44 upwarly after each embossing stroke. The shuttles 41 slide horizontally in suitable guideways on the arm 44, to move them into and out of position with respect to the anvil. Springs 51 are connected to the arm extension 48 and to the shuttles to move them into position beneath the anvil 40. The dies are retracted into normal position after each embossing operation by means of the hooks 42' carried by the lower edge of the arm 44 (Fig. 4). The ends of these hooks engage elongated notches in the sides of the dies which allow the dies to move freely downwardly but which engage the ends of the notches and retract dies on the up stroke of the rocker arm.

In the case of the lower series of punches the anvils 52 slide vertically in suitable guideways in a cross member 53 of the frame (Figs. 3 and 4) and the upper ends of these anvils engage elongated notches 54 in the edges of the die members for withdrawing the die members after each embossing operation. These anvils are withdrawn by finger 55 which pivots at 56 on the rocker arm 26 (Fig. 3) and is actuated by spring 57. The guide 58 (Fig. 3) for the lower shuttles 41 is mounted on the end of the pressure rod 37, hereinbefore described, and is itself guided in a slot 59 in the rocker arm 26. At one side of the arch frame is a pair of rock levers 60 and 61 which are pivotally mounted at 62 on the frame and intermediate their ends. The upper ends of these levers are connected by the links 63 to the upper shuttles. Below their pivots the rock levers are connected by links 64 to the lower shuttles, so that the swinging of these levers 60 and 61 about their pivot operates to slide the upper and lower shuttles out of engagement with the anvils. The lower ends of rock levers 60 and 61 are normally held against movement by the end 65 (Fig. 3) of a bell crank 66 which is pivoted at 67 on the end of a depending arm 68' on the under side of the frame table. The end 65 of the bell crank normally holds the rock levers 60 and 61 in the position in which the lever 61 is shown in Fig. 3; that is, in a position to maintain the shuttles out of line with respect to the anvils. Thus the rocker arms may oscillate or vibrate without operating the dies. When the bell crank is operated to retract its end 65 the levers 60 or 61 will be operated by the springs 51, hereinbefore described, to move the shuttles into operating relation to their respective anvils. The lower arm 66' of the bell crank extends to a point beneath the lower end of the vertical spindle 8, and its end is connected to the projecting end of a stem 68 which is vertically movable in the lower tubular end portion of the spindle 8.

The operation of this stem is controlled by the keys 6 in the keyboard, as will be presently described. The stem 68 is slidable in a bushing 69 in the lower end of the spindle and the upper end of the stem has an enlarged head 70 which slidingly fits in the tubular portion of the spindle. The spindle has a hub 71 carrying a radial striker arm 72 which carries a trigger 73 pivotally mounted at 72' on said arm and having one end extending through an opening 74 in the side of the spindle (Fig. 4). This end of the trigger is normally held in the path of the head 70 of the stem and engages the end of the head to prevent the stem from sliding upwardly in the spindle. The radial striker arm 72 carried by the spindle sweeps around with the rotation of the spindle above an annular series of key stops 75 which are normally held retracted or out of the path of the arm. When, however, a stop is projected upwardly into the path of the striker arm, the outer

end of the trigger reaches the stop slightly in advance of the striker arm and is rotated on the pivot to release the head 70, allowing the stem to slide upwardly in the tubular spindle. This permits the bell crank to swing on its pivot and retract its upper end 65 which in turn allows one of the rock levers 60 and 61 to operate as hereinbefore described. The striker arm comes to a stop against the projected key stop and, as hereinafter described, a register stop engages the die carrier and holds the die carrier against rotation until another key is depressed. In the meantime, however, the key stop is restored at the end of the embossing cycle. In order to enable the same character to be repeated, even though the die carrier is held in the position corresponding to said character, I provide the end 73' of the trigger and the upper ends 75' of the key stop (Figs. 4 and 4*a*) with beveled faces. Upon a second or repeated depression of the same key, these beveled faces act to rotate the trigger 73 about its pivot and again release the stem 70 whereupon the second embossing cycle of the same character is brought about in the same manner as brought about by the depression of any other key.

It is obvious that both of the levers 60 and 61 should not be operated at the same time because they would bring both sets of shuttles into position and cause the simultaneous embossing of the upper and lower case letters. For this reason I provide a case shift mechanism controlled by a shift key 6' in the keyboard (Figs. 6, 6*a*, 6*b* and 6*c*). A stud 80 is fastened to the frame and extends horizontally between the lower ends of the rock levers 60 and 61. Its outer end portion has parallel flat faces on both sides. A sleeve 81 is rotatably mounted on this stud and its end is cut away for most of its circumference so as to provide a segmental extension 82 (Fig. 6*c*) which is positioned to engage the ends of the levers 60 and 61 and prevent their movement even though the end 65 of the bell crank has been retracted. The end of this segmental extension is not wide enough, however, to engage and hold both of the rock levers 60 and 61 at the same time. It is normally in position, however, to hold the upper case rock lever 61 from operating, and to permit the operation of the lower case lever 60 upon the retraction of the end 65 of the bell crank. Thus each time the bell crank is operated the lower case lever 60 will operate to bring about the operation of the lower case dies. When an upper case letter is to be embossed the sleeve is rotated to the position shown in Fig. 6*b* by the operation of the shift key 6'. When thus rotated the end of the segmental extension 82 is removed from the path of the lever 61 and moved into the path of the lever 60, thus permitting the lever 61 to operate upon the retraction of the bell crank end 65 and prevent the operation of the lower case lever 60. The sleeve 81 has two arms 83 and 84. The arm 83 is connected to a spring 85 which is anchored to the frame, and which normally holds the sleeve in the position shown in Fig. 6*a*, thus permitting the normal operation of the rock lever 60. The other arm 84 is actuated by a rod 86 to rotate the sleeve to the position shown in Fig. 6*b* when the shift key is depressed. This push rod 86 is connected to one arm of a bell crank 87 pivoted on the frame and having its other arm connected by a link 88 to the end of the shift key lever 6'' (Fig. 6).

The end of the stud 80 projects beyond the segmental extension 82 of the sleeve 81 and has a pivoted spring actuated latch 89 (Fig. 3) which engages either one of the two notches 90 (Figs. 6*a*, 6*b* and 6*c*) to lock the sleeve in its normal position or its rotated position. The end of this latch extends downwardly in position to be engaged by the end 65 of the bell crank 66. The end 65 of the bell crank normally holds the latch out of engagement with either of the notches 90 but when the bell crank retracts its end 65 in response to the operation of the key, as hereinbefore described, the latch enters one of the notches 90 and locks the sleeve 81 against rotation. Upon the restoration of the bell crank to normal position its end 65 engages the latch and releases it from the notch 90. If the sleeve 81 had been previously rotated by the operation of the shift key 6', the release of the latch 89 permits the sleeve 81 to return to its normal position (Fig. 6*a*).

All of the key levers including the shift key levers 6'', extend forwardly the same distance and each lever carries a hook 91 which engages the edge of a spring actuated locking bar 92 (Figs. 5 and 6) to hold the key and its lever down until the locking bar is actuated to release said depressed key. The shift key may be maintained in depressed position independent of the locking bar 92 by means of the usual shift key lock 6''' for repeating the embossing of upper case characters.

The extension 48 of the arm 44 (Figs. 1, 3 and 5) has a downwardly extending arm 100, the lower end of which is turned laterally and fastened to the upper end of a vertical push rod 101, so that the push rod is reciprocated constantly by the vibration of the arm. The lower end of this push rod is guided in a suitable bearing in the frame table (Fig. 5). This rod 101 carries a cam 102 which is engaged by a roller 103 on the lever 104 pivoted on the shaft 105 on the frame. The roller end of this lever 104 is normally maintained in operative relation to the cam 102 by means of the spring 106 which is anchored at one end to the frame and at the other end of a short arm on said lever (Fig. 5). An arm 120' of lever 120 which is pivoted on shaft 105 extends downwardly and is connected to one end of a link 107. The other end of the link 107 is connected to the upright one of a three-arm releasing device including shaft 109 mounted below the keyboard. The arm 110 of this three-arm device extends to a point adjacent the lock bar 92 in position to actuate the lock bar and release any of the depressed keys held thereby. The arm 111 of the three-arm device engages a roller 112 on the pivoted arm 113 of the restoring bar 114. The restoring bar 114 extends transversely of the keyboard the entire width thereof and is positioned beneath all of the key levers so that whenever a key lever is depressed it will actuate said bar. This bar 114 controls the restoration of the die carrier registering and holding stop as hereinafter described. However, it will be seen that whenever the three-arm device is rocked about its pivot, the arm 111 acting on the roller 112 will raise the bar 114 upwardly, returning the bar to normal position and restoring the key lever which depressed said bar. The three-arm lever may also be operated independently of the arm 120' by means of the hand lever 115 which is pivoted at its lower end on shaft 109 and which has its upper end positioned in engagement with the upright arm of the three-arm device. The link 107 has a telescoping portion 107' forming the slip joint

which permits the three-arm device to be operated independently of the link.

Each time the dies are operated, the rod 101 is moved downwardly, lowering the cam 102 and allowing the roller 103 to ride thereon. The lever 104 has a pin 116 (Fig. 5) which swings the upper end of a trip rod 117 into the path of a lug 118 carried on the end of a short arm extension 119 (Fig. 3) of the rocker arm 26, so that the trip rod 117 will be pushed downwardly by said lug. When thus pushed downwardly it actuates the lever 120 and restores the key through the medium of link 107 and the three-arm device just described. The trip rod is slidable in bearings in a U-shaped member 121 which is pivoted on the lever 120. A coil spring 122 surrounds the trip rod between the lower bearing of member 121 and a collar on the rod. The spring serves as a shock absorber to the blows on the rod by the lug 118. When the trip rod is released by the return of the lever 104, the trip rod will be removed from the path of the lug 118 by the spring 122 connected between the trip rod and the short arm on the lever 104, and the lever 120 will be returned to its normal position by the spring 123 connected to said lever and to the frame.

The lever 120 is pivoted on shaft 105 and operates, on downward stroke of push rod 117, a lever 124 through the medium of the link 125 which is connected to said lever 120 and extends downwardly into engagement with the lever 124. The lever 124 is positioned beneath the table and is pivoted at one end to the frame. Its other end 126 is connected to the end of the arm 66′ of the bell crank 66 (Fig. 3) so that the bell crank will be restored to normal position after each cycle of operation of the parts, as hereinbefore described. The restoration of the bell crank 66 retracts the stem 68 in the lower end of the spindle and restores the trigger 73, thus restoring the parts for the next embossing operation.

The radial arm 72, as hereinbefore mentioned, sweeps in a horizontal path above the ends of the key stops 75. These key stops (Figs. 3 and 4) are arranged in circular series and slide vertically in suitable guides in a guide member 130 mounted in the frame table. Each one of the key stops 75 is connected to a key lever 131 which carries a key 6 in the keyboard. The stops are normally held down in their guides by the springs 132 but are projected upwardly upon the depression of a key, into the path of the radial arm 72 so that they stop the rotation of the die carrier with the dies in embossing position corresponding to the depressed key.

In order to lock the die carrier against rotation and to register the dies while the embossing operation takes place, I provide a register stop 135 (Figs. 3, 5*a* and 5*b*). This stop is moved into engagement with register notches in the edge of a flange 136 around the periphery of the lower die cage A2. The register stop is slidable in a suitable guide block 137 on the frame. It is moved into and out of engagement with the register notches of the die carrier by a lever 138 to which it is pivoted by means of the pin 139 (Figs. 5*a* and 5*b*), the pivot pin extending beyond the lever. The lever 138 is pivoted on the shaft 140 and this shaft 140 carries a small bell crank 141. The end 142 of one arm of this bell crank engages a pin 143 on the lever 138 and when the bell crank is rotated it swings the lever 138 about its pivot and permits the register stop 135 to be projected into engagement with a die carrier notch by the spring 144 which is connected between the upper end of the lever 138 and the bell crank 141. The bell crank 141 is operated by the extension 48 of the upper arm 44 through the medium of a link 145. The link 145 has a pin and slot connection 145′ with the extension 48 which permits the arm 44 to vibrate without affecting the register stop 135 as will appear hereinafter. These parts are so proportioned that the register stop engages the die carrier slightly before the dies come together to emboss the printing plate. This can be done, of course, because the rotation of the die carrier will already have been stopped by the key stop 75 hereinbefore described. When the arm extension 48 moves upwardly after the embossing operation is completed, the spring 141, unless otherwise restrained as hereinafter described, will swing the bell crank into engagement with the pin 143 on lever 138 and operate lever 138 to withdraw the register stop 135. This would release the die carrier for rotation and the die carrier would then continue rotating until another key is depressed. In other words the depression of a key would stop the rotation of the die carrier for a period long enough to complete the embossing operation in response to said key, but the die carrier would be rotating idly during the periods between key operations. This is a disadvantage in machines of this character because it limits the speed at which the embossing operations can be performed. For instance if a character is to be embossed twice in succession, the second embossing operation must wait until the die carrier has made one complete revolution after its release from the first embossing operation of said character.

In the present machine I provide means for holding the die carrier against rotation during idle periods between embossing operations. In this machine the die carrier is released for rotation by the depression of a key, and when it reaches the stop corresponding to the depressed key the embossing operation takes place but the die carrier will be held stationary until the key is depressed. If the next key depressed happens to be the same key as the one last operated, for the purpose of repeating the same character, the die carrier will not rotate but instead will remain stationary through said second embossing cycle of the same character. The holding of the die carrier is accomplished by a locking lever 150 (Figs. 3, 5 and 5*a*) pivoted at 151 on the frame. At one end this locking lever has a lateral pin 152 which is moved by the lever 150 upwardly into position behind the pin 139 of the register lock 135 when said register lock is in engagement with the die carrier, this movement of lever 150 being brought about by the spring 153 which is connected between the pin end of said locking lever and the extension 48 of the arm 44. This holds the register lock 135 in engagement with the die carrier until it is released by the depression of the next key. The release of the register lock is accomplished by a lever 154 (Fig. 5) positioned at one side of the frame and extending into the keyboard and connected at its forward end by the link 155 to the restoring bar arm 113. The rear end of this lever 154 is pivotally connected to a link 156 which extends upwardly alongside the frame and has a shouldered end 157 which extends through a hole in the outer end of the locking lever 150 to provide a sliding connection which permits the locking lever to swing in the locking direction under the influence of spring 153 and independently of the link 156.

However, the depression of any one of the keys depresses the restoring bar 114 and operates lever 154 to lift the link 156 and actuate the locking lever 150 in a direction to release the register lock 135, and thereby release the die carrier for rotation. The die carrier will then rotate a portion of the revolution until it is stopped at a point corresponding to the depression of the last key, whereupon the embossing cycle of operation will be completed including the operation of the register lock to hold the die carrier. The die carrier now remains in non-rotating or idle condition until the next key is depressed.

The printing plate blanks B to be embossed are stacked in a supply magazine H positioned at the left side of the frame (Fig. 1). A long carriage guide member K extends horizontally across in front of the frame in position to support the printing plate carriage L in relative operating relation to the magazine H, the embossing dies, and the ejecting and inserting magazine J. The printing plate carriage L has a frame plate 160 (Fig. 1*a*), positioned above the guide bar K and on its inner side the carriage frame has grooved rollers 161 which engage the edges of the guide bar K to support the carriage on said guide bar. The carriage has a finger piece 162 by which the operator may conveniently shift the carriage on said guide bar throughout its range of movement. At the ends of the guide bar are reels, such as 163, and around which a belt or band 165 is stretched. The carriage is fastened at 164′ to the belt and the reel 163 is spring actuated in a well-known manner. In the present instance, the spring reel urges the carriage L to the right toward the ejecting mechanism J and the operator shifts the carriage to the left against the tension of the spring reel.

The guide bar K supports on its upper side a shift bar 166 which has a plurality of headed bolts 166′ (Fig. 2) extending through and operating in the diagonal slots 167 in the guide bar K so that when the shift bar is moved longitudinally the diagonal slots cause it to also move laterally. The printing plate carriage frame 160 has a sub-frame 168 having sliding movement in guideways in the frame 160 to shift the printing plate blank relative to the embossing dies to position the blank for upper or lower case letters and this shifting movement is radial with respect to the die carrier. The sub-frame has rollers 169′ which extend through clearance slots 169 and engage the edges of the shift bar 166 so that said bar 166 shifts the sub-frame when operated. Thus, although the shift bar 166 has a diagonal movement due to the slots 167, the resultant movement of the sub-frame 168 is in a direction transverse to the longitudinal axes of the guide bar K and is therefore radial to the die carrier.

The printing plate blank is normally held in position to receive the lower case letters but when the shift key 6′ is depressed it swings the arm 84 from the position shown in Fig. 6*a* into that shown in Fig. 6*b*. The arm 184 when so moved swings an arm 170 and rotates the sleeve 171 on which it is carried. The sleeve 171 is mounted on a stud 172 having a flattened end portion 173. The sleeve 171 has a segmental extension 174 which normally holds another lever 175 against rotation. When the sleeve 171 is rotated, its segmental end portion 173 releases the lever 175 and this lever rotates the shaft 176 on which it is mounted. Rotation of shaft 176 swings an arm 177 having a lateral projection 178 at its upper end and engaging a pin 179 on the shift bar 166. Arm 177 normally holds the shift bar 166 against the tension of spring 180 (Fig. 2) in position for lower case letters but when the arm 177 is swung it permits the shift bar to move to the inner ends of the diagonal slots 167. Upon retraction of the parts, the springs 85 and 181 (Figs. 6*a* and 6*b*), the arm 170 is restored and this swings the arm 177 and restores the shift bar to the outer ends of the slot 167 thereby withdrawing the printing plate blank from position to receive upper case letters back into position to receive lower case letters. The pin 179 has an anti-friction roller and the lateral end 178 of the arm 177 is sufficiently long to adapt it to the diagonal movement of the shift bar and still maintain contact between the pin 179 and lever 177.

The printing plate blanks B are gripped at one edge by a vise 182 (Fig. 1*b*) which is mounted on the line shift plate 183 that is slidably mounted in suitable guideways in the sub-frame 168 to enable the operator to shift the printing plate blank relatively to the embossing dies for line spacing of the characters. A spring 184 normally holds the line shift plate in position to receive the first line to be embossed on the printing plate. By pressing on the finger piece 185, the operator can shift the blank into position to receive the second, third, or other subsequent lines of characters. The line shift plate is held in its different positions by the spring catch 186 engaging notches 187 on the underside of the line shift plate corresponding to the line spacing. The vise 182 comprises two members, the upper of which is made of spring material and has a sharp knife-like gripping edge. This vise yieldingly grips the edge of the printing plate blank and the vise is pivoted at 188 whereby it can be swung upwardly should the operator desire to remove a blank. The printing plate blanks are thin, flat, rectangular strips of metal and, as stated, they are stacked in the magazine H from which they are withdrawn and disposed with the forward edge in the path of the vise so that when the operator shifts the plate carriage to the left the vise engages the edge of the blank plate and slides along in gripping engagement with the blank until the carriage reaches the limit of its movement in this direction. When the carriage moves in the opposite direction, the blank is extracted from the magazine and moved into position to be embossed. In embossing position the toothed rack 201 engages an escapement mechanism 202 (Figs. 1*a* and 4) which may be of any suitable type for the purpose and need not be further described except that it is controlled by the keys through the link connection 203 for the purpose of shifting the carriage to space the characters in line on the blank being embossed.

After finishing the embossing operations, the operator releases the carriage from the escapement mechanism and the spring reel shifts the carriage to the right to position the embossed blank with respect to the ejecting and inserting mechanism J whereupon this mechanism is operated in the manner described in the application of which this application is a division and the newly embossed plate is inserted into a frame.

While I have illustrated and described a selected embodiment of my invention it is to be understood that this is 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 a printing plate embossing machine, the combination of a rotatable die carrier having a series of sets of complementary embossing dies, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping the rotation of the die carrier, means operable when any one of said keys is depressed for holding the die carrier against rotation, and means operable when the next key is depressed for releasing the die carrier from said holding means.

2. In a machine for embossing printing plates, the combination of a rotary die carrier having two concentric series of complementary sets of dies, means for rotating the die carrier, a plurality of keys and means controlled thereby for stopping rotation of the die carrier, means common to said keys for holding the die carrier against rotation between successive actuations of said keys, a mechanism for operating the dies in one series, a mechanism for operating the dies in the other series, means for effecting operation of either of said die operating mechanisms and controlled by the keys, and a shift key and means operated thereby for rendering operative one or the other of said die operating mechanisms.

3. In a machine for embossing printing plates, the combination of a rotatable die carrier having an annular series of sets of complementary embossing dies, means for rotating said die carrier, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop the rotation of the die carrier with the dies in embossing position corresponding to the actuated key, means common to said keys for holding the die carrier against rotation in the intervals between successive actuations of the keys, and means operable when the next key is depressed for releasing the die carrier from said holding means.

4. In a machine for embossing printing plates, the combination of a rotary die carrier having a plurality of embossing dies, means for rotating said die carrier, key controlled means for stopping the die carrier in position corresponding to the depressed key, means for operating the dies in said position, a register stop for engaging the die carrier to hold the die carrier against rotation, a locking device for preventing the release of the die carrier from the register stop until the succeeding key is actuated, and means common to all of the keys for actuating the locking device to release the die carrier from the register stop when said succeeding key is operated.

5. In a machine for embossing printing plates, the combination of a rotary die carrier having a plurality of embossing dies, key controlled mechanism for stopping the rotation of said die carrier, restoring mechanism for restoring a key controlled stop after each stopping operation thereof, a holding device responsive to the depressed key for holding the die carrier against rotation after having been stopped by said key controlled stopping mechanism, and means for releasing the die carrier from said holding device upon the succeeding depression of a key to render the rotation of the die carrier subject to the stop mechanism controlled by said succeeding key.

6. In a machine for embossing printing plates, the combination of a rotary die carrier having two concentric series of sets of complementary dies representing upper and lower case characters, mechanism for operating the dies in one series, mechanism for operating the dies in the other series, operating keys for controlling the operation of either of said die operating mechanisms, and a shift key and means operated thereby for shifting the control of said keys from one to the other of said die operating mechanisms.

7. In a machine of the class described, the combination of a die carrier having two annular series of embossing dies representing upper and lower case characters, operating mechanism for dies of these series, key operating mechanism for controlling said die operating mechanisms, shift key mechanism for shifting the control of said keys from one to the other of said die operating mechanisms, a carriage for the printing plate to be embossed, and means responsive to said shift key for shifting the carriage relatively to said dies to position the printing plate for upper or lower case characters.

8. The combination of a rotatable die carrier having concentric series of dies representing upper and lower case characters, key operating mechanism for controlling the operation of the dies in either of the series, a shift key for determining which of the series of die shall be operated, a carriage for holding the printing plate in position to be embossed by said dies, and means responsive to the shift key for shifting the carriage for positioning the printing plate relatively to the upper or lower case dies.

9. In a machine of the class described, the combination of a rotatable die carrier having upper and lower case character embossing dies arranged in concentric series, a carriage for the printing plate movable relatively to the die carrier, means on said carriage for shifting the printing plate radially to the die carrier to position the plate for either series of embossing dies, a shift key and means responsive thereto for operating said plate shifting means in the carriage.

10. In a machine of the class described, the combination of a rotatable die carrier having upper and lower case character embossing dies arranged in concentric series, a carriage supporting frame positioned adjacent said die carrier, a printing plate carriage movable along said supporting member, means on the carriage for shifting the plate relatively to the series of dies for upper or lower case embossing operations, an operating bar on the supporting frame for operating said plate shifting means in any position which the carriage occupies on said supporting frame, and key controlled means for operating said bar.

11. In a machine for embossing printing plates, the combination of a rotary die carrier having a series of sets of embossing dies, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping the rotation of the die carrier, operable means for performing an embossing operation and for retracting the dies after said operation and operable upon stopping of the rotation of the die carrier by the means controlled by the keys, means operated by the actuation of a key for holding the die carrier against rotation between successive actuations of said keys, and means for effecting an embossing operation without causing rotation of the die head and operated by depression of the same upon successive operations of the machine.

12. In a machine for embossing printing plates, the combination of a rotary die carrier having a series of sets of embossing dies, means for rotat-

ing said die carrier, a plurality of keys and means controlled thereby for stopping the rotation of the die carrier, operable means for performing an embossing operation and for retracting the dies after said operation and operable upon stopping of the rotation of the die carrier by the means controlled by the keys, means common to said keys for holding the die carrier against rotation between successive actuations of said keys, and means for operating said operable means without rotating said die carrier when the same key is depressed upon successive operations.

13. In a printing plate embossing machine, the combination of a rotatable die carrier having a series of sets of complementary embossing dies, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping the rotation of the die carrier, means operable when any one of said keys is depressed for holding the die carrier against rotation, releasing means operable when the next key is depressed for releasing the die carrier from said holding means, and means for effecting an embossing operation without causing rotation of the die head when the same key is depressed upon successive operations.

14. In a printing plate embossing machine, the combination of a rotatable die carrier having a series of sets of complementary embossing dies, operating means for actuating said dies to perform an embossing operation, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping rotation of the die carrier, means operable when any one of said keys is depressed for holding the die carrier against rotation, means for actuating said operating means when movement of the die carrier is interrupted by the means controlled by the keys, means operable when the next key is depressed for releasing the die carrier from said holding means, and means actuated by said operating means for restoring a depressed key.

15. In a printing plate embossing machine, the combination of a rotatable die carrier having a series of sets of complementary embosing dies, operating means for actuating said dies to perform an embossing operation, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping rotation of the die carrier, means operable when any one of said keys is depressed for holding the die carrier against rotation, means for actuating said operating means when movement of the die carrier is interrupted by the means controlled by the keys, means operable when the next key is depressed for releasing the die carrier from said holding means, means actuated by said operating means for restoring a depressed key, and means for actuating said operating means when the same key is depressed on successive operations without rotating said die carrier.

16. In a machine for embossing printing plates, the combination of a rotary die carrier having a series of sets of embossing dies, means for rotating said die carrier, a plurality of keys and means controlled thereby for stopping the rotation of the die carrier, means common to said keys for holding the die carrier against rotation between successive actuations of said keys, operating means for operating said dies to perform an embossing operation and controlled by said keys, and means controlled by said keys for rendering said operating means operative without an intervening rotation of the die carrier when the same key is depressed upon successive operations.

17. In a machine for embossing printing plates, the combination of a rotatable die carrier including a spindle and having an annular series of sets of complementary embossing dies, means for rotating the spindle of the die carrier, a clutch for directly connecting the spindle to the rotating means, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop the rotation of the die carrier with the dies in embossing position corresponding to the actuated key, means common to said keys for holding the die carrier against rotation to render said clutch inoperative in the intervals between successive actuations of the keys, means for retracting said key actuated stops when said die carrier is held against rotation in the intervals between successive actuations of the keys.

18. In a machine for embossing printing plates, the combination of a rotatable die carrier having an annular series of sets of complementary embossing dies, means for rotating said die carrier, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop the rotation of the die carrier with the dies in embossing position corresponding to the actuated key, means common to said keys for holding the die carrier against rotation in the intervals between successive actuations of the keys, means for retracting said key actuated stops when said die carrier is held against rotation in the intervals between successive actuations of the keys, and means actuated by operated parts in the machine during the time the die carrier is held against rotation in the intervals between successive actuations of the keys for repositioning an operated key subsequent to actuation thereof.

19. In a machine for embossing printing plates, the combination of a rotatable die carrier having an annular series of sets of complementary embossing dies, means for rotating said die carrier, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop the rotation of the die carrier with the dies in embossing position corresponding to the actuated key, means common to said keys for holding the die carrier against rotation in the intervals between successive actuations of the keys, means for repositioning an operated key after actuation thereof, and means actuated by operated parts in the machine during the time the die carrier is held against rotation in the intervals between successive actuations of the keys for operating the repositioning means.

20. In a machine for embossing printing plates, the combination of a rotary die carrier having two concentric series of sets of complementary dies representing upper and lower case characters, mechanism for operating the dies in one series, mechanism for operating the dies in the other series, operating keys for controlling the operation of either of said die operating mechanisms, a shift key and means operated thereby for shifting the control of said keys from one to the other of said die operating mechanisms, and means for locking the means operated by the shift key in position to cause operation of the dies in one of said concentric series and adapted to be unlocked upon actuation of said shift key.

21. In a machine of the class described, the combination of a die carrier having two annular series of embossing dies adapted to form embossages on a blank, supporting means for the blank, an operating mechanism for operating the

dies, a key actuated mechanism for controlling the operating mechanism, selecting means for imparting movement from the operating mechanism to the dies, means normally positioning said selecting mechanism to operate the dies of one of said series, means for shifting the selecting means into position to cause operation of the dies of the other series, and means for shifting the supporting means for the blank upon shifting of the selecting means to thereby align the proper portion of the blank with the dies to be operated.

22. In a machine for embossing printing plates, the combination of a spindle, a rotatable die carrier fast to the spindle and having an annular series of sets of complementary embossing dies, means for rotating said spindle, a slip clutch connecting the spindle to the rotating means, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop rotation of the die carrier with the dies in embossing position corresponding to the actuated key, said slip clutch permitting operation of the rotating means when the die carrier is held against rotation, operating means rendered operative upon the positioning of dies in embossing position for operating said dies to perform an embossing operation, and means common to said keys for holding the die carrier against rotation in the intervals between successive actuations of the keys, said slip clutch reconnecting the rotating means to the spindle when the means common to the keys is rendered inoperative upon the succeeding operation of the machine.

23. In a machine for embossing printing plates, the combination of a rotatable die carrier having an annular series of sets of complementary embossing dies, means for rotating said die carrier, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop rotation of the die carrier with the dies in embossing position corresponding to the actuated key, operating means rendered operative upon the positioning of dies in embossing position for operating said dies to perform an embossing operation, and means for rendering said operating means operative without an intervening rotation of the die carrier when the same key is depressed upon successive operations.

24. In a machine for embossing printing plates, the combination of a rotatable die carrier having an annular series of sets of complementary embossing dies, means for rotating said die carrier, a stop arm rotatable with said die carrier, a plurality of key actuated stops for engaging the stop arm to stop rotation of the die carrier with the dies in embossing position corresponding to the actuated key, operating means rendered operative upon the positioning of dies in embossing position for operating said dies to perform an embossing operation, means common to said keys for holding the die carrier against rotation in the intervals between successive actuations of the keys, and means for rendering said operating means operative without an intervening rotation of the die carrier when the same key is depressed upon successive operations.

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