H. BLAIR.

POST CARD PRINTING MACHINE.

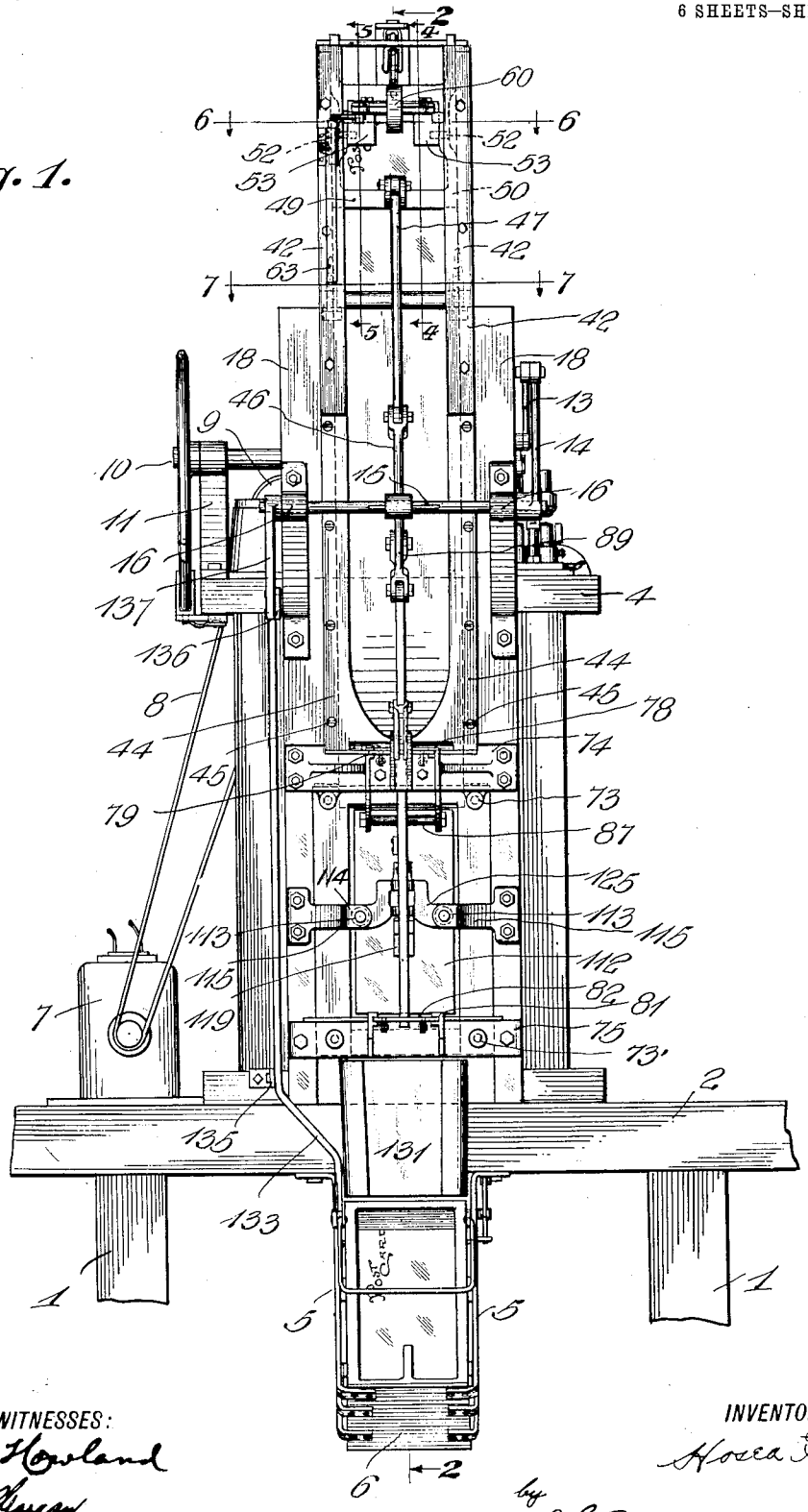
APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

F. B. Howland

INVENTOR

Hosea Blair

by

H. B. Wilson & Co

Attorneys

H. BLAIR.

POST CARD PRINTING MACHINE.

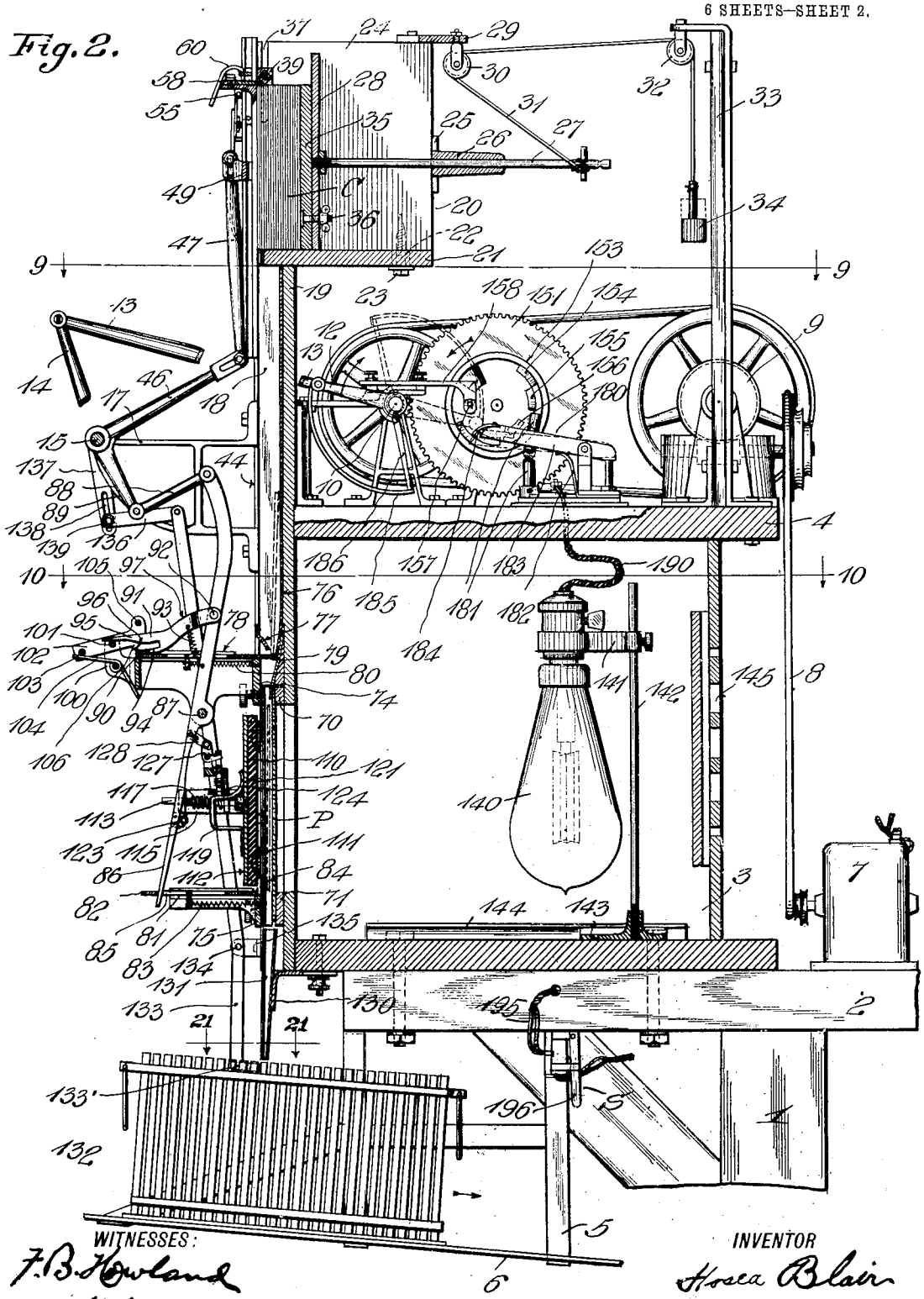
APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

F. B. Howland

INVENTOR

Hosea Blair

by F. B. Willson & Co

Attorneys

H. BLAIR.

POST CARD PRINTING MACHINE.

APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 3.

Fig. 3.

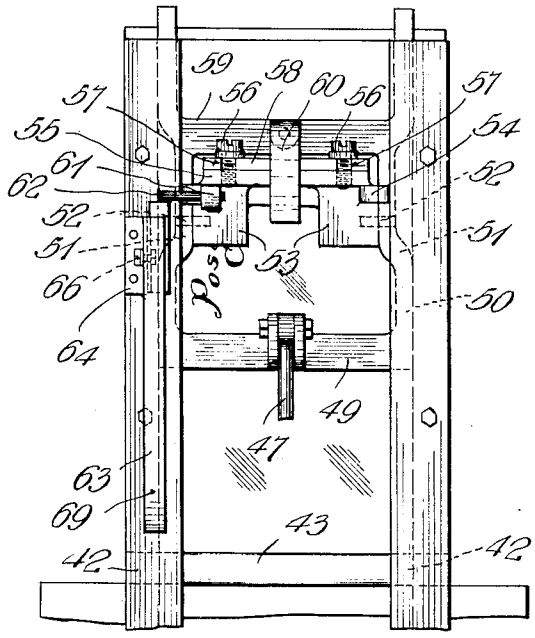


Fig. 4.

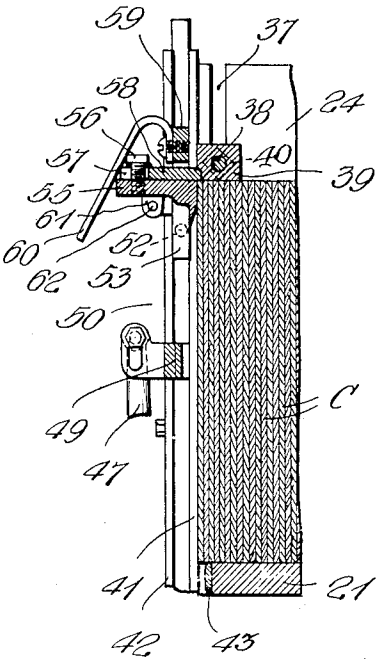


Fig. 5.

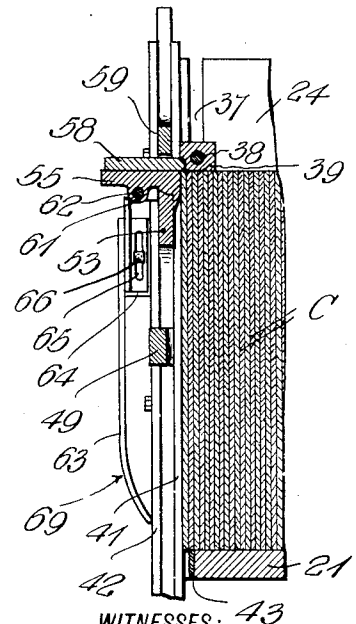
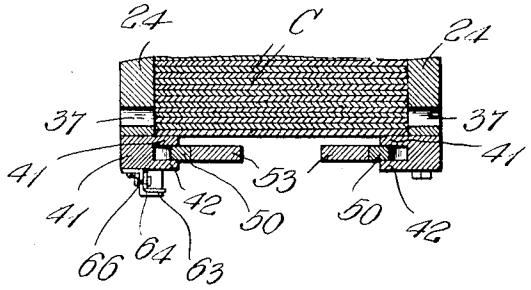


Fig. 6.



WITNESSES:

E. E. Clayton

INVENTOR

Hosea Blair

by H. B. Wilson & Co

Attorneys

H. BLAIR.

POST CARD PRINTING MACHINE.

APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 4.

Fig. 7.

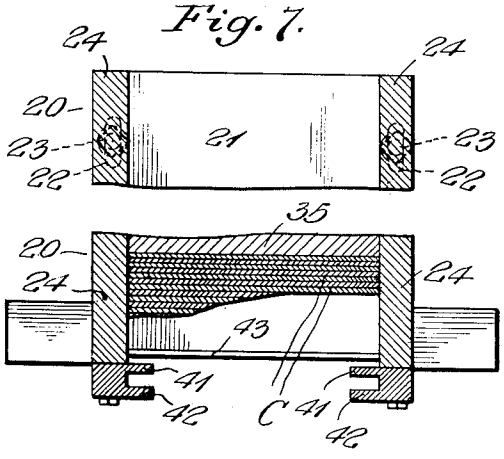


Fig. 8.

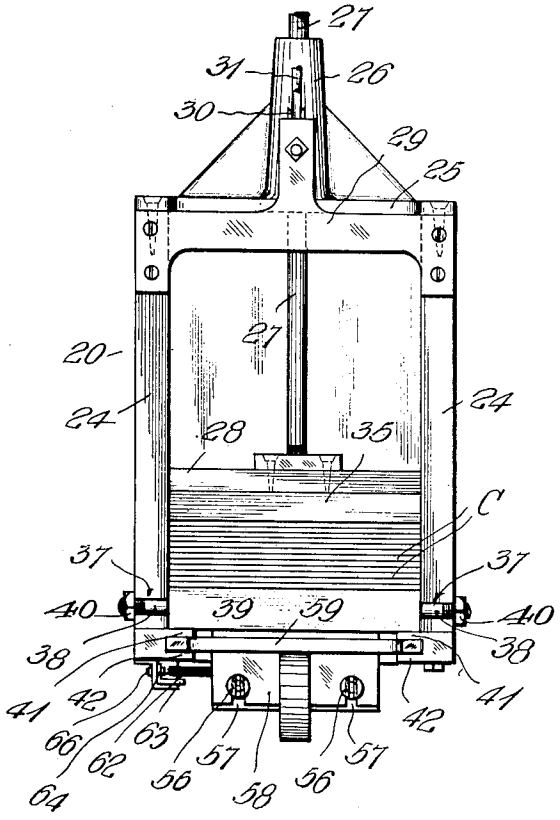
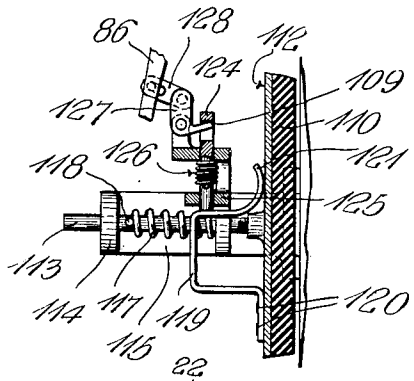


Fig. 22.



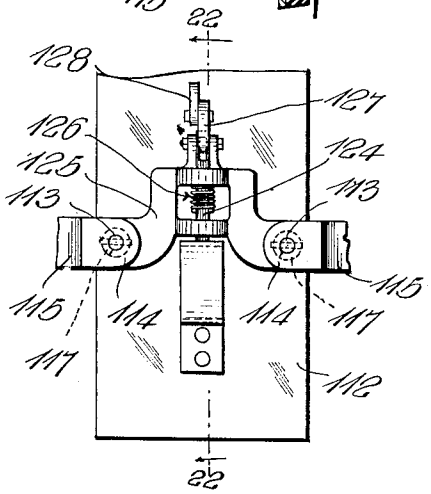


Fig. 23.

WITNESSES:

E. E. Clayton

INVENTOR

Hosea Blair

by H. B. Willson & Co

Attorneys

H. BLAIR.

POST CARD PRINTING MACHINE.

APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 5.

Fig. 9.

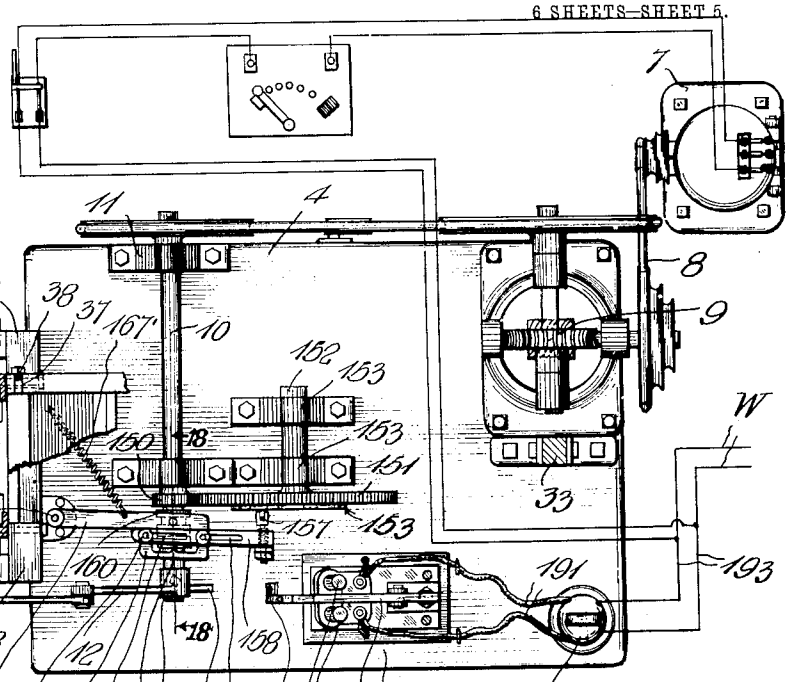


Fig. 19.

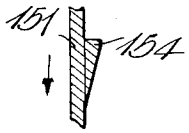


Fig. 10.

Fig. 13.

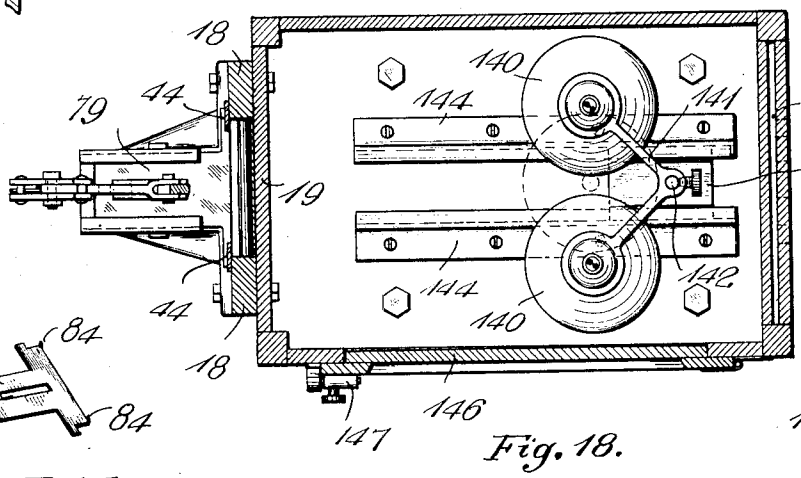


Fig. 18.

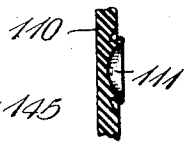
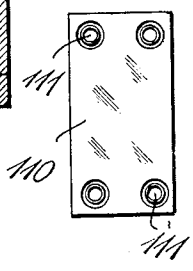


Fig. 12

Fig. 14.



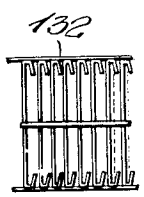
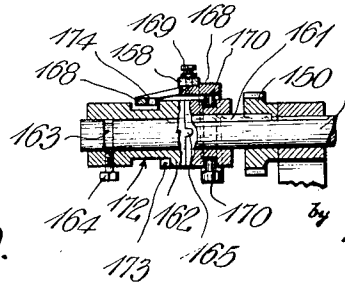


Fig. 20.



WITNESSES:

J. B. Howland

INVENTOR

Horace Blair

by A. G. Wilson & Co.

Attorneys

H. BLAIR.

POST CARD PRINTING MACHINE.

APPLICATION FILED FEB. 26, 1914.

1,131,657.

Patented Mar. 16, 1915.

6 SHEETS—SHEET 6.

Fig. 16.

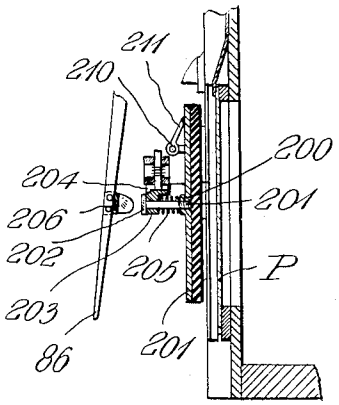


Fig. 15.

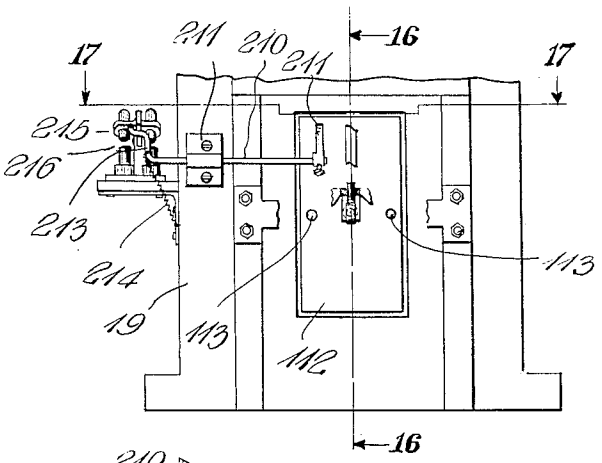
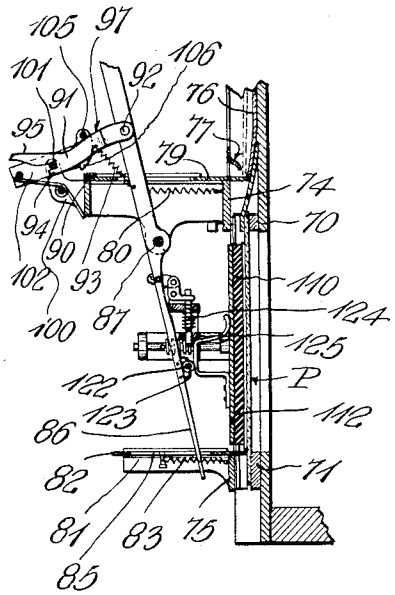


Fig. 11.



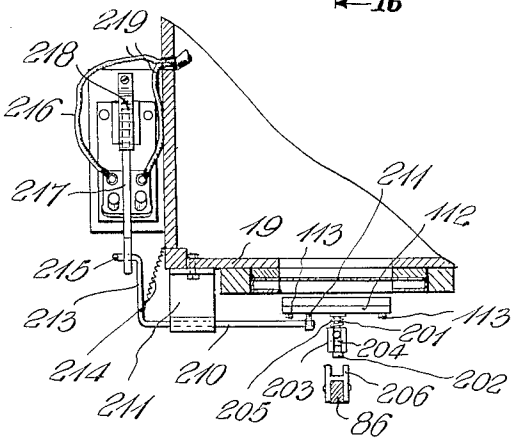


Fig. 17.

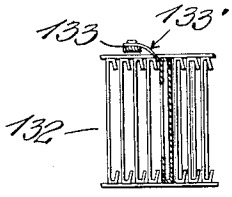


Fig. 21.

WITNESSES:

F. B. Howland

INVENTOR

Hosea Blair

by H. B. Wilson & Co

Attorneys

UNITED STATES PATENT OFFICE.

HOSEA BLAIR, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO W. R. GROGAN, OF SAN FRANCISCO, CALIFORNIA.

POST-CARD-PRINTING MACHINE.

1,131,657. Specification of Letters Patent. Patented Mar. 16, 1915.

Application filed February 26, 1914. Serial No. 821,235.

To all whom it may concern:

Be it known that I, HOSEA BLAIR, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Post-Card-Printing Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to photography, and more especially to printing; and the object of the same is to produce a machine for printing post cards rapidly.

Broadly speaking, the machine comprises a magazine for the cards, mechanism for taking them one by one from the magazine and delivering them to a printing frame, a pad by which they are held momentarily over a light-opening at the front side of a box, mechanism for automatically turning on a light within said box to produce an exposure, means for regulating the length of the exposure, and mechanism for dropping the card from the printing frame into a rack which is automatically advanced step by step until it is full, after which it may be taken to a remote point and the cards "fixed" in a proper bath.

Specifically the invention comprises improvements in the various details of the steps of the machine, all as hereinafter more fully described and claimed, and as shown in the drawings wherein—

Figure 1 is a front elevation of this machine complete, and Fig. 2 is a central vertical sectional view thereof on the line 2—2 of Fig. 1. Fig. 3 is an enlarged front elevation showing the mechanism at the forward end of the magazine, and Figs. 4, 5, 6, and 7 are sectional views on the lines 4—4, 5—5, 6—6 and 7—7 respectively of Fig. 1. Fig. 8 is a plan view, and Figs. 9 and 10 are cross sections on the lines 9—9 and 10—10 respectively of Fig. 2. Fig. 11 is a vertical section of the printing mechanism as shown at the lower portion of Fig. 2, but the parts in this view are in different positions. Fig. 12 is a detail in elevation showing the face of the pad or cushion which enters the printing frame, and Fig. 13 is an enlarged sectional detail showing one of its "suckers." Fig. 14 is a perspective detail of the lower gate; Fig. 15 is a front elevation of a modified form of mechanism for pressing the pad into the printing frame, and Figs. 16 and 17 are sections thereof on the lines 16—16 and 17—17 respectively; Fig. 18 is an enlarged sectional detail through the clutch mechanism, taken on the line 18—18 of Fig. 9; and Fig. 19 is a still further enlarged sectional detail through one of the timing cams; Fig. 20 is a bottom plan view of a portion of the fixing rack, and Fig. 21 is a sectional detail on the line 21—21 of Fig. 2; Fig. 22 is a vertical section, taken on the line 22—22 of Fig. 23; Fig. 23 is an enlarged detail front elevation of the pad.

The framework of this machine comprises suitable uprights or legs 1 supporting a table top 2 on which is mounted a light box 3 whose top 4 carries the driving mechanism for the devices yet to be described. In the preferred embodiment of my machine the table 2 carries a hanger 5 which supports a track 6 that is preferably inclined slightly to the rear as best seen in Fig. 2, and whose purpose is to carry the fixing rack yet to be described. However, it is quite possible that this fixing rack may be omitted and the printed cards delivered onto a shelf or suitable receptacle carried by said hanger or track, and carried manually in said receptacle to the bath in which the prints are "fixed." The power in the present instance is electrical, although any other suitable power might be employed; and with this reservation the motor 7 shown in the present embodiment may rest on the table top 2 and be belted as at 8—possibly through a worm gear and worm mechanism 9—to the main shaft 10 which is mounted in suitable bearings 11 on the top 4 of the light box. By this means or by any suitable and equivalent means the main shaft will be rotated constantly and steadily, and its speed of rotation may be regulated if the worm gear mechanism is employed, by shifting the belt 8 to larger or smaller pulleys as will be clear from an inspection of Fig. 9; or if the power is an electric motor, the speed may be regulated by speeding up the motor—it being essential only that the main shaft shall rotate steadily, whatever its speed. Said shaft carries a crank 12 which is connected by a rod 13 with an arm 14 projecting rigidly from a rock shaft 15 which is

journaled in suitable bearings 16 at the forward ends of two brackets 17, the latter in turn being mounted on uprights 18 which are carried by the front board 19 of the machine, which board forms the face plate of the light box 3 as best seen in Fig. 2 and extends above its top 4 as shown. In this manner power is communicated from the main shaft 10 to the rock shaft 15, and it will be shown below that the oscillation of the latter drives the several mechanisms which constitute this machine.

The magazine in which the sheets or cards of sensitized paper are placed is broadly designated by the reference numeral 20. Its bottom board 21 slides over the upper end of the front board 19 and is provided with slots 22 through which pass set screws 23 taking into the lower edge of the side boards 24 and which latter are carried rigidly by the upper end of said front board 19. Thus the bottom board is rendered adjustable.

The side boards are connected across their rear edges by a cross bar 25 carrying a tubular guide 26 in which moves a plunger rod 27, and the forward end of said rod carries a follower which consists of an upright board 28 standing within the box-body. The side boards 24 are also connected at their upper ends by a cross bar 29 carrying at its midlength a pulley 30, and a cord 31 connected with the rear end of the plunger 27 leads over said pulley and thence over another pulley 32 carried at the upper end of a standard 33, and downward to a weight 34. The normal tendency of this weight through the cord is to move the plunger 27 and follower 28 inward, the plunger sliding through the guide 26 in a manner which will be clearly understood by an inspection of Fig. 2. On the forward side of the follower 28 is a pad 35 detachably secured to said follower by a screw and thumb nut as indicated at 36 or in any suitable manner, and forward of this pad in turn are the cards designated by the letter C. These cards rest on the bottom 21 of the magazine, between its side boards 24, and they are borne normally forward within the magazine by means of the follower 28 which is faced with the pad 35, the latter by preference being of the same size as the cards although the follower rises to nearly or quite the height of the side boards 24. When taller or smaller cards are to be employed, the pad will be replaced by another which will correspond with the size of the cards, but the follower need not be changed. In the upper edges of the side boards 24 are cut deep notches or slots 37 through which project screws 38 at the ends of a cross bar 39 which forms the top of the chamber forward of the follower and in which the cards C are stored; and thumb nuts 40 are adjusted on said screws against the outer faces of the side boards 24 after the cross bar has been set at the proper height. Obviously the pad 35 must be as short as the height of the cards so that it may pass under this cross bar 39 when the follower has fed the stack of cards forward. If larger or smaller cards are employed than shown in Fig. 2, the cross bar will be adjusted as will be clearly understood.

The uprights 18 carry guides or tracks 41 and 42 arranged in pairs opposing each other, and against the rails of the innermost track 41 the foremost card of the stack is pressed. The front end of the bottom board 21 carries a steel plate 43 which must be very accurately spaced from the inner faces of the innermost track-rails 41, and by properly setting the bottom board by means of said screws and slots, this can be effected. By this means sheets or cards of varying thicknesses may be handled by the machine, as it is intended of course that the feed mechanism shall take one card at a time from the stack within the magazine and expose it to the light within the box 3. The feed mechanism comprises those parts of the machine which take the cards singly from the face of the stack in the magazine and drop them through a runway to the printing mechanism. Said runway is formed by securing a substantially U-shaped plate 44 to the face of the uprights 18 as by means of screws 45, and the upper end of this runway communicates with the space behind the rearmost track 41 between which and the steel plate 43 the cards are drawn off the stack by the feed mechanism. Reciprocating vertically on said tracks is a carriage 50 whose cross head 49 is connected by a rod 47 with an arm 46 projecting from the rock shaft 15, and therefore when the latter is oscillated by the means above mentioned the entire carriage 50 rises and falls. The sides 51 of the carriage have inwardly projecting pins 52 on which is pivotally supported the lower leaf 53 of a bracket of inverted L-shaped cross section, the edges of this leaf at higher points than the pins having laterally projecting studs 54 which travel in the space between the rails of the two tracks 41 and 42 in order to limit the outward and inward movement of this leaf. The upper leaf 55 of the bracket extends forward away from the magazine and projects between the two pairs of rails, and in its upper face are seated set screws 56. The latter loosely engage slots 57 in what I will call a "knife" 58 which is a plate overlying said upper leaf 57 and projecting rearward between the rails and to a certain extent beyond the angle formed by the two leaves 53 and 55. The projecting edge of this knife is intended to overlie the cards C within the stack, and therefore when the carriage is moved downward this knife carries or forces one card

along with the carriage. The set screws and slots are obviously for the purpose of adjusting the knife to the thickness of the cards. A tie 59 standing above the carriage 50 connecting the rails carries a finger 60 whose shape is best shown in Fig. 2, its forwardly inclined lower end standing in position to be struck by the outer edge of the outer leaf 50 of the bracket when the carriage rises, and thereby the bracket is thrown rearward on its pivots 52 so that the projecting rear edge of the knife 58 is passed under the cross bar 39 if the same be employed. Continued rotation of the main shaft 10, through the crank arm 12 and connecting rod 13, now causes the rock shaft 15 to oscillate, and the arm 46 on the rock shaft through the connecting rod 47 causes the descent of the carriage with the front card C in the stack. When this card has been fed downward past the steel plate 43, it drops of its own weight through the runway to the printing mechanism described below. The rock shaft 15 now oscillates in the opposite direction and the carriage rises, and in order that the projecting rear edge of the knife 58 may not strike beneath the forward card in the stack I make use of the following mechanism.

Beneath the upper leaf 55 at one edge is formed a boss 61 in which is secured a pin 62 projecting laterally from this leaf and in front of the foremost track-rail 42 at this side of the machine.

The numeral 63 designates a long spring strip or tongue having its upper end bent laterally into an ear 64 provided with an upright slot 65, and a screw 66 passes through this slot and into a lug 67 projecting forward from the left hand upright 18, by means of which the tongue is held in proper position to be engaged by said pin. When the carriage descends this pin passes behind the tongue until just before the carriage reaches its lower limit of movement when the pin slips out from under the tongue, and as the carriage ascends the pin travels over the lower end of the tongue which is bowed outward as shown at 69, the result being that the bracket is caused to tilt forward on its pivot pins 52, and therefore the knife will not contact with the lower edge of the foremost card in the stack. Just as the pin slips off the upper end of the tongue 63, the front edge of the upper leaf 55 is engaged by the inclined finger 60 with the resultant action above described. Thus it will be seen that it is the finger which swings the bracket rearward and forces the knife over the front card, but as soon as the carriage starts downward and the bracket moves out of contact with said finger the knife is held in its engagement with said card by the pin traveling behind the tongue 63.

The negative or plate P is clamped between the two parts 70 and 71 of a frame which parts are hingedly connected at their upper ends as at 72, and the frame as a whole is held against the front board 19 by means of set screws 73 and 73′ passing through upper and lower yokes 74 and 75. The upper yoke is arched over the lower end of the runway and the latter has a plate 76 leading forward and directing the falling cards into the open upper end of the frame, whereas the lower end of the U-shaped plate 44 has a lip 77 inclined to the rear as best seen in Fig. 2 and directing the forward card to the rear against a plate 76. The upper yoke has guides 78 in which is slidably mounted an upper gate 79, the same being adapted to pass beneath the lip 77 and against the front of the plate 76 when it is thrown inward as shown in Fig. 2. A spring 80 moves this gate normally into such position where it checks the card at about the lower end of the runway and prevents it from dropping in front of the plate holder. The lower yoke 75 also has guides 81 in which is slidably mounted the lower gate 82, the same being borne normally inward by a spring 83 by means of which its inner end is projected through the opening in the plate-frame and in direct contact with the glass or plate P—the purpose of this gate being to check the descent of the card at a time when it has reached a position exactly opposite the negative and ready for printing. This gate is best seen in Fig. 14 and, like the upper gate, it is substantially T-shaped in plan view, although it is provided with tongues 84 behind which the card drops for a purpose yet to appear. This view also shows that said gates are longitudinally slotted as at 85, and within these slots move loosely the arms of a rock-lever 86 which is pivoted between its ends at 87 in the upper yoke and has its upper extremity connected by a link 88 with an arm 89 depending from the rock shaft 15. The slot in the lower gate is of such length and the action of the lower arm of the lever 86 is such that when drawn outward as seen in Fig. 2 it retracts the gate against the tension of its spring 83 so that the card may fall out of position against the plate-frame. The slot in the upper gate, however, is sufficiently long to permit it to act irrespective of the movements of the lever 86; and this gate is retracted in the following manner: Across the outer end of the gate is a raised shoulder 90 adapted to be engaged by the outer end of a pawl 91 which is pivoted at 92 to the rock lever 86 and drawn normally downward by a spring 93. Said outer end of the pawl is forked, and the lowermost finger 94 performs this function whereas the uppermost finger 95 is somewhat longer than the lowermost and provided on its lower edge with

a cam 96 as shown. The shank of the pawl between its fork and its pivot 92 is also provided on its upper edge with a cam 97 whose function will be explained. Projecting outward from the upper yoke 74 is a pair of brackets 100 connected by a cross pin 101 which serves as a fulcrum for a pair of spaced catches 102 whose outer ends are connected by a cross pin 103 borne normally upward by a spring 104. The inner ends of these catches are also connected by a cross pin 105, and their lower edges are beveled or rounded into twin hooks 106 adapted to drop over the shoulder 90. The upper finger 95 of the pawl 91 passes between these catches under the pin 105 and rests constantly on the pivot pin 101. All the parts just described are shown in two positions in Figs. 2 and 11 and in the former position the upper gate is closed. When now the rock lever 86 is moved to the position in the last-named view, the pawl 91 travels outward and its lower finger 94 pushes against the shoulder 90 so as to open the gate. Meanwhile its upper finger 95 slides over the pivot rod or pin 101 until the cam 96 causes this finger and therefore the outer end of the pawl to rise. This disengages the lower finger 94 from the shoulder, but not until after the hooks 106 of the catches have dropped into engagement with said shoulder. Further outward movement of the pawl finally brings the cam 97 on its shank beneath the cross pin 105 so that the inner ends or heads of the catches are raised and the hooks 106 are disengaged from the shoulder 90. The upper gate being now free, it is immediately moved to closed position by means of the spring 89, the slot in its body sliding freely over the upper arm of the rock lever 86. The movement of the lower gate need not be so quick. It is obviously opened or drawn outward when the lever moves to the position shown in Fig. 2, and permitted to close by reason of its spring 83 when the lever moves to the position shown in Fig. 11. The result is that these gates open and close oppositely with respect to each other, although the upper gate closes quickly when released by the catches.

The opening in the frame is closed by a cushion or pad 110 which is by preference composed of rubber having sockets or "suckers" 111 in its face at intervals as best seen in Fig. 13, and this pad is mounted on a back plate 112 which in the present embodiment of my invention has pins 113 projecting outwardly through guides or eyes 114 in the arms 115 of an intermediate yoke which stands between the other yokes 74 and 75; and connecting said plate with points 118 within said arms are contractile springs 117 which preferably surround the pins and whose function is to draw the pad normally away from the plate frame so that the cards dropping through the runway may fall into the space between them. These pins moreover serve as guides for the pad, and the lower edge of the latter may slide upon the guides 81 of the lower yoke. At the transverse center of the pad a bowed spring 119 has its lower end secured at the point 120 to the back plate and its upper end 121 sliding freely against said back plate, its bowed center projecting outward from the back plate and standing between the two pins and the springs 117 which surround them. The lower arm of the rock lever 86 carries a stud 122 (herein shown as provided with an antifriction roller 123) which is disposed opposite the bowed center of said spring 119; and when this lever is swung to the position shown in Fig. 11 said stud (or its roller) contacts with the spring so that the entire pad is pushed into the opening within the plate-frame against the contractile tendency of the springs 117, and the bowed spring 119 is flattened out slightly as shown. For locking the pad in this position temporarily I provide an upright bolt 124 mounted in guides or eyes in a bridge 125 which connects the two arms 115 and really forms the center of the intermediate yoke, and this pin is projected normally downward by a spring 126 as best seen in Fig. 2. Therefore when the pad is pressed inward as seen in Fig. 11 the tip of the pin is moved downward behind the bowed center of the spring 119 and holds the parts in this position until the pin is raised. For raising the pin I provide a bell-crank lever 127 pivoted on said bridge and connected by a link 128 with the lower arm of the rock lever 86, and the horizontal member of this bell-cranked lever engages the head of the pin at the point 129. It follows that when the rock lever is moved to the position shown in Fig. 2 the link causes the swinging of the bell-crank lever and the rise of the pin, and as soon as the tip of the latter frees the bowed center of the spring 119 the contractile force of the two springs 117 causes the sudden withdrawal of the pad from its position within the plate frame just at a time when the lower gate has been opened. Hence the printed card is now free to drop out of the way for the next card which is at that moment within the runway resting on the upper gate, the latter being closed as shown in Fig. 2.

Carried on a suitable bracket 130 which may be detachably connected with the bottom of the light box or with the table top 2 as described, is a chute 131 whose open upper end stands immediately beneath the space between the frame and the pad and whose lower end stands above a fixing rack 132 which latter is slidably mounted on the track 6 beneath the table top 2. This rack has a number of compartments as best seen in Fig. 20, each compartment adapted to re-

ceive a card as it is delivered by said chute 131. For moving the rack along step by step upon the track 6 I provide a rock lever 133 pivoted at the point 134 to an ear 135 which ear is by preference carried by the bracket or the chute so that when this attachment is removed the rock lever is removed with it. The upper arm of this rock lever is connected by a link 136 with an arm 137 projecting from the rock shaft 15, and the connection is preferably by means of a slot 138 and pin 139 so that adjustments may be effected in the degree of movement of the rock lever. The lower end of the lower arm of said lever carries a finger 133′ (see Fig. 21) which engages the rack at each inward movement of this arm, and moves the rack in the direction of the arrow shown in Fig. 2. By properly adjusting the pin in the slot 138, the degree of movement may be made to correspond exactly with the pockets or compartments within the rack, and therefore as the cards are printed and dropped through the chute they fall into the compartments of the rack one by one, and after the rack is filled it may be carried to a suitable place where they can be "fixed" in a proper bath as usual. It is quite possible, however, to disconnect this device by detaching the bracket 130 from the box or table and disconnecting the pin 139 from the slot 138, after which the printed cards will be delivered past the edge of the table top into a suitable receptable which must then be provided and which may be laid upon the track 6. However, in rapid printing of post cards for commercial purposes, I prefer to employ the rack because the printed cards can be more successfully and rapidly handled by its use. If the compartments within each rack are known (as by making a rack, for instance, with twenty-five compartments) the volume of work done will be automatically counted because if the workman should desire to print one hundred copies from a certain negative he would then know that he would have to print four racks full. The obvious advantage of having the cards separated from each other within a rack which may be bodily immersed in the fixing bath, need not be amplified.

While the means of illumination within the light box 3 may be any which is sufficient, I prefer to employ electric bulbs 140 where the machine is driven by electricity. In that case probably two bulbs would be used as seen in Fig. 10 mounted on a yoke 141 which is supported by an upright pin 142 having a foot 143 mounted in a slotted guide 144 which is carried by the floor of the box so that the entire light may be adjusted forward and backward nearer to or farther from the plate P. The back of the box may be suitably ventilated as shown at 145. One side of the box may have a hinged door 146 held closed by a catch 147, so that access to its interior for adjusting the lamp-support and for other reasons, may readily be had. The wiring will be described below, but obviously the bulbs must be illuminated only while a card is held firmly against the plate P, and the bulbs must not be illuminated while a card is passing into position over the plate or dropping from the latter after it has been printed. For this reason I prefer electric lighting to other means, because the latter would require the use of a shutter whereas electric lights can be turned off and on by switches as will be described.

In commercial work the printing is done very rapidly, and post cards are sometimes turned out at the rate of from twenty to forty-five a minute; but the duration of the exposure will depend upon the plate and the character of the work being done, and obviously the feed mechanism must be synchronized with respect to the exposure.

In the illustrated embodiment of my invention, the timing at various speeds is effected without changing the speed of rotation of the motor as follows: On the main shaft 10 is a power gear 150 meshing with a large gear 151 having a stub shaft 152 mounted in bearings 153, and the face of this large gear is flat so that it will be referred to hereinafter as a disk. Around its axis said disk carries a ring 153, next inside said ring a series of four cams 154, next inside this series a second series of three cams 155, and next inside this series in turn a third series of two cams 156. Whatever contacts with the ring is held out of engagement with the face of the disk, if this object is moved slightly toward the axis of the disk it rests on the latter but is pushed away from it by the four cams 154 four times during a single revolution of the disk, and so on. Opposite said disk is disposed a stud 157 (preferably having a roller as seen in Fig. 9), and this stud is carried by an arm 158 having slots 159 in its body whereby it may be adjustably connected with a clutch mechanism (described below) so that the arm can be set longitudinally to bring the stud into engagement with the ring 153 or with any series of cams as above described.

While any suitable form of clutch mechanism may be employed between the main shaft 10 and the crank 12 whereby the former rotates constantly and the latter intermittently or constantly as desired, I prefer that best illustrated in Figs. 9 and 18. One clutch member 160 is splined at 161 on the shaft 10 just outside the gear 150, whereas the other clutch member 162 is secured to or integral with the inner end of the crank 12 but is loosely mounted on the shaft 10 as by means of a groove 163 therein and a set

screw 164 whose tip loosely engages said groove. The two clutch members are provided with teeth 165 at their contiguous ends, and when these are engaged the power of the shaft 10 is communicated directly to the crank 12 and the latter rotates with the shaft, the speed of rotation at this time, as controlled by the worm mechanism 9, being such that the main shaft 10 will make about forty-five revolutions a minute.

The numeral 166 designates a lever pivoted at 167 at one end and carrying a frame 168 at its other end which overlies the clutch mechanism, and the arm 158 overlies this frame which latter has set screws 169 engaging the slots 159 in this arm so that the arm can be adjusted as described above and as best seen from Fig. 9. Said frame has a pin 170 (or possibly it may carry a yoke with two such pins) and the same engages an annular groove in the movable clutch member 160; therefore when the arm 158 is moved by a cam against the tension of spring 167′ the frame moves with it and said pin or pins move the movable clutch member into engagement with the other clutch member 162 which carries the crank 12.

The last-named clutch member has an annular groove 172 provided in its inner wall at one point with a notch 173, and the corresponding side of the frame 168 carries a finger 174 standing opposite said notch. When now the lever 166 is swung on its pivot 167 by the movement of the arm 158 as above described, the frame not only disconnects the clutch members, but throws the finger 174 into engagement with the notch 173 and therefore checks or stops the rotation of the outer clutch member so that its momentum can carry it no farther. On the other hand, when a cam on the disk comes opposite the roller and the arm 158 is moved, the frame moves with it and the finger disengages the notch just as the clutch members reengage each other and the rotation of the crank 12 with the main shaft is resumed. Manifestly this occurs whichever set of cams is in action, and if the stud 157 is set over the ring 158 the clutch members are constantly engaged and the crank 12 rotates constantly with the shaft 10. The advantage of this type of clutch mechanism will be obvious, for if it was not for the stop device the rapid rotation of parts might carry the arm 12 too far when relieved by the clutch mechanism, with the result that the rock shaft 15 would be turned so that a card C might be pulled part way off the stack within the magazine.

The lighting of the bulbs within the light box is synchronized with the mechanism above described in the following manner: Mounted on the top 4 is an electric switch 180 preferably having two pairs of carbon contacts 181 thrown normally out of engagement with each other by a spring 182, and the movable pair mounted on a swinging arm 183. The free end of this arm carries a shoe 184, and the main shaft carries a sector 185 in position to strike this shoe and depress the arm 183 at each revolution of the crank. By preference this sector is attached to the crank 12 at one end and connected with the hub of the crank by a radial arm 186 as best seen in Fig. 2, and its position is such that it follows the crank as the latter rotates in the direction of the arrow. With the wiring as described below, at each revolution of the crank the sector contacts with the shoe and closes the switch so as to illuminate the bulbs 140, and as the sector moves over the shoe the switch is held closed for a time which of course depends upon the speed of rotation of the shaft 10. Therefore the exposure of the card to the light is automatically timed to occur just when a card is being pressed against the plate P, rather than when one is either falling into or out of such position.

The wires 190 from the bulbs 140 are led up through the top 4 of the light box 3 to the switch 180, and thence they may lead as at 191 to a snap 192, and on as at 193 to a suitable source of power. Or the wires 193 could be led to the motor 7 so that the same current which supplied power could supply the light, although this arrangement is not necessary of illustration. The main feed wires W are led either to the motor direct or to a point beneath the table top 2 as diagrammatically shown in Fig. 2, and here the supply of current is controlled by any suitable form of switch S, beyond which the wires lead as at 195 to the motor 7 as seen in Fig. 2. If said switch be disposed at this point, I contemplate its location so that its handle 196 will stand in the path of the rack 132 when the latter is employed, and the position of the switch is such that the complete rack may stand on the track 6 but the front end of the rack will push on the handle 196 just as the rearmost compartment in the rack passes out from under the chute 131. If this detail of construction be followed, when the rack is filled it automatically cuts off power to the motor and stops the machine. If the rack be not employed and the prints allowed to fall on a receptacle placed on the track, of course the rack does not open the switch S and the machine continues to operate until the switch is opened by manual movement of its handle 196. However, as above suggested, the motive power may not be electrical although I would connect the wires 193 with a source of electricity so that the light may be bulbs 140 as suggested.

For making time exposures, or printing cards or other pictures wherein the sensi-

tized paper must be exposed to the light for a greater period of time than ordinarily used with work of this character, I make use of the detail of construction shown in Figs. 15, 16, and 17. The pad, its supports, and the pin for locking it when pressed into the plate-frame are substantially the same as above described. Between the guide pins 113, however, it carries a boss 200 in which is seated a screw 201 having a square head 202, and on this pin is slidably mounted a block 203 having a notch 204 in its outer corner adapted to be engaged by said locking pin when the pad is pressed inward, the block being separated from the boss by an expansive spring 205 coiled on the screw 201 between these elements. The lower arm of the rock lever 86 carries a fork 206 which, as best seen in Fig. 17, is adapted to pass astride the square head 202 of the screw and strike the block 203 when this arm of the lever swings inward; and the result is that the force of the lever is applied to the pad in a yielding manner as permitted by the spring 205. This detail takes the place of the bowed spring 119 illustrated in Fig. 2. A rock shaft 210 is mounted in bearings 211 on the front board 19 as best seen in Fig. 15, and the inner end of this rock shaft carries a finger 211 adapted to be struck by the pad or its backing plate 112 when the latter moves outward so that the shaft 210 will be rocked. The outer end of this shaft has a crank 213 borne normally downward by means of a spring 214 whose tendency is to force the finger into contact with the pad, and the tip of the crank is bent outward as at 215 so as to stand on a line parallel with the rock shaft. The numeral 216 designates a switch whose arm 217 is normally closed by means of a spring 218, and the tip 215 underlies the free end of this arm. The wires 219 from this switch lead to the light circuit in a manner which will not be necessary to illustrate. When now the pad is retracted the rock shaft turns in its bearings 211 and its crank 213 rises so that the tip 215 of the crank lifts the switch arm 217 and breaks the circuit to the bulbs which are therefore no longer illuminated. On the other hand, as the pad is pressed into the opening in the plate-frame the finger 212 follows it by reason of the tension of the spring 214, the tip 215 falls, and the switch is closed so that the bulbs are again illuminated; and the illumination continues as long as the pad stands within the plate-frame, or in other words, as long as the sensitized paper or card is held against the negative P. With this construction it will be obvious that whatever the speed of the machine which takes a card from the stack within the magazine and drops it through the runway, the bulbs are illuminated and extinguished synchronously with the inward and outward movements of the pad. When this modification is employed it is obvious that the timing mechanism above described may be omitted, and the speed of rotation of the main shaft 10 may be controlled in any suitable manner.

With a machine constructed as above described, the magazine is filled with sheets or cards C of sensitized paper, the parts thereof being adjusted to the size of the cards and the plunger and follower retracted as far as the size of the stack requires. The motor is then started and the main shaft 10 begins its revolutions, and at each revolution of the crank the rock shaft 15 is turned in its bearings with the following result: The arm 46 causes the descent of the carriage and the action of the mechanism which feeds one card by taking it from the front of the stack and passing it into the runway. Meanwhile the arm 89 through the link 88 causes the rocking of the lever 86 which retracts or opens the upper gate and projects or closes the lower gate, with the result that the card is dropped from the runway into a position between the plate P and the pad behind it. Simultaneously the arm 137 through the link 136 rocks the lever 133, and its finger 133′ advances the fixing rack 132 for the distance of one pocket. As soon as the card has dropped into position forward of the plate P, the inward movement of the lower arm of the rock lever closes the pad against the back of the card and presses the latter against the plate. Thereupon, with either mechanism described above, the bulbs 140 are illuminated and the picture is printed. On the continued revolution of the main shaft 10 the parts are restored to the position shown in Fig. 2 and the carriage ascends and its knife engages the foremost card C of the stack within the magazine, so that another card can be fed downward on the next revolution of said shaft.

The purpose of the various adjustments throughout this machine have been described in connection with the description of the construction thereof. The materials and proportions of parts are not essential, and various changes in details may be made without departing from the principle of my invention.

What is claimed as new is:

1. In a photograph printing machine, the combination with a box having a light opening, a plate frame mounted thereover, a runway leading to the space forward of said frame, means for passing cards from the runway one at a time into said space, and means for clamping them momentarily within the frame; of an electric bulk within said box, and means for illuminating the bulb only while a card is clamped in the frame.

2. In a photograph printing machine, the

combination with a box having a light opening, a plate frame mounted over the opening, means for passing cards one at a time across the frame, and means for clamping them momentarily within the frame; of an electric bulb within said box, a circuit closer controlling the current thereto, a power shaft actuating said card-clamping means, and devices actuated by said power shaft to close the circuit closer and illuminate the bulb only while a card is clamped in the frame.

3. In a photograph printing machine, the combination with a runway, mechanism for feeding cards one at a time to the runway, a box having a light opening, a plate holder over said opening and forward of which the runway delivers the cards, and devices for clamping the cards one at a time against the plate in said holder; of a rock shaft, connections between it and said feed mechanism, means also driven by said shaft for advancing and retracting the clamping devices, an electric bulb within said box, a circuit closer in the circuit for illuminating the bulb, a power shaft connected with said rock shaft, and a sector on the power shaft for closing the circuit closer while a card is clamped within the printing frame.

4. In a photograph printing machine, the combination with a magazine for containing a stack of cards, a runway leading downward therefrom, mechanism for feeding the cards one at a time from the magazine to the runway, a box having a light opening, a plate holder over said opening and forward of which the runway delivers the cards, and a pad for clamping the cards one at a time against the plate in said holder; of a rock shaft, connections between it and said feed mechanism, means also driven by said shaft for advancing and retracting the pad, an electric bulb within said box, a circuit closer in the circuit for illuminating the bulb, a power shaft connected with said rock shaft, and a sector on the power shaft for closing the circuit closer while a card is held within the printing frame.

5. In a photograph printing machine, the combination with the printing mechanism proper, means for feeding unprinted cards thereto one at a time, means for dropping the printed cards, an electric light, and a circuit closer in its feed wires; of a main shaft, a crank loose thereon and connected with said means, a sector carried by the crank for actuating said circuit closer, a normally open clutch between the crank and shaft, and means for closing the clutch at intervals.

6. In a photograph printing machine, the combination with the printing mechanism proper, means for feeding unprinted cards thereto one at a time, means for dropping the printed cards, an electric light, and a circuit closer in its feed wires; of a main shaft, a crank loose thereon and connected with said means, a sector carried by the crank for actuating said circuit closer, a normally open clutch between the crank and shaft, means for closing the clutch at intervals, and adjustable timing mechanism driven by said shaft for controlling the frequency of said intervals.

7. In a photograph printing machine, the combination with the printing mechanism proper, means for feeding unprinted cards thereto one at a time, means for dropping the printed cards, an electric light, and a circuit closer in its feed wires; of a main shaft, a crank whose hub is loose thereon, the crank being connected with both said means, a sector carried by the crank for actuating said circuit closer, a normally open clutch between the crank and shaft, means for closing the clutch at intervals, and a stop mechanism for checking the rotation of the crank-hub while the clutch is open.

8. In a photograph printing machine, the combination with the printing mechanism proper, means for feeding unprinted cards thereto one at a time, means for dropping the printed cards, an electric light, and a circuit closer in its feed wires; of a main shaft, a crank whose hub is loose thereon, the crank being connected with both said means, a sector carried by the crank for actuating said circuit closer, a clutch between the crank-hub and shaft, a spring throwing the clutch normally open, means for closing the clutch at intervals, timing mechanism driven by said shaft for controlling the frequency of said intervals, and a stop mechanism driven by said shaft for checking the rotation of the crank hub while the clutch is open.

9. In a photograph printing machine, the combination with the light box whose front upright board has an opening, yokes secured to the face of said board and extending across said opening, set screws in the uppermost and lowermost yokes, means for feeding unprinted cards under the uppermost yoke, and means for dropping printed cards through the lowermost yoke; of a plate-holding frame overlying the front board around the opening therein and standing behind said set screws, and means for clamping a card against the plate within the frame and for flashing light thereon from the interior of the box.

10. In a photograph printing machine, the combination with the light box whose front upright board has an opening, yokes secured to the face of said board and extending across said opening, set screws in the uppermost and lowermost yokes, means for feeding unprinted cards under the uppermost yoke, and means for dropping printed cards through the lowermost yoke;

of a plate holding frame overlying the front board around the opening therein and standing behind said set screws, guides carried by the intermediate yoke, a pad standing opposite the space in the plate-frame and having pins projecting through said guides, means for advancing said pad to clamp a card against the plate, and means for retracting the pad after the card has been printed.

11. In a photograph printing machine, the combination with the light box whose front upright board has an opening, yokes secured to the face of said board and extending across said opening, guides on these yokes, gates mounted in said guides, and means for opening and closing said gates oppositely; of means for holding a plate opposite said light-opening, means for clamping an unprinted card against said plate and releasing it after it has been printed, and means for flashing a light through the plate while it is so clamped.

12. In a photograph printing machine, the combination with the light box whose front upright board has an opening, yokes secured to the face of said board and extending across said opening, guides on these yokes, gates mounted in said guides, and means for opening and closing said gates oppositely; of means for holding a plate opposite said light-opening, a pad movably mounted between said yokes and adapted to clamp an unprinted card against said plate, means for advancing and retracting said pad in timed relation to the action of said gates and means for flashing a light through the plate while the card is so clamped.

13. In a photograph printing machine, the combination with the light box whose front upright board has an opening, yokes secured to the face of said board and extending across said opening, guides on the upper and lower yokes, gates mounted in said guides, and means for opening and closing said gates oppositely; of means for holding a plate opposite said light-opening, a pad movably mounted in the intermediate yoke, a bridge on the latter, a pad-lock carried by said bridge and adapted to hold the pad in engagement with the card when the latter rests against the plate, means for advancing said pad and for releasing the lock and retracting the pad in timed relation to the action of said gates, and means for flashing a light through the plate while the card is engaged by the pad.

14. In a photograph printing machine, the combination with the light box whose front upright board has an opening, three yokes secured to the face of said board and extending across said opening, guides on the upper and lower yokes, gates mounted in said guides, and means for opening and closing said gates oppositely; of means for holding a plate opposite said light-opening, a pad movably mounted in the intermediate yoke, a lock for holding the pad in engagement with the card when the latter rests against the plate, a lever for actuating said gates, a projection on the lever for projecting the pad when the lever swings inward, connections between the lever and lock for releasing the latter when the former swings outward, and means for flashing a light through the plate while the card is so clamped.

15. In a photograph printing machine, the combination with the light box whose front upright board has an opening, three yokes secured to the face of said board and extending across said opening, guides on two of the yokes, gates mounted in said guides, and means for opening and closing said gates oppositely; of means for holding a plate opposite said light-opening, a pad movably mounted in the intermediate yoke, a bridge across the last-named yoke, an upright spring-actuated bolt carried by said bridge and adapted when projected to hold the pad in position to clasp the card against the plate, a rock lever pivoted between said gates and with its arms engaging them, its lower arm projecting said pad when this arm swings inward, a bell-crank lever engaging the head of said bolt, and connections between this lever and the rock lever for retracting the bolt when the lower arm of the rock lever swings outward.

16. In a photograph printing machine, the combination with an upright runway, a light box having an opening in its front wall past which said runway leads, a plate holder removably held over said opening, a plate in the runway adapted to direct the falling cards in front of said plate-holder, a lip in the runway directing the falling cards against said plate, and a light in the box; of an upper sliding gate adapted to pass under said lip and against said plate, a lower sliding gate adapted to be pressed against the plate within the holder, means for actuating said gates in opposition, a pad adapted to be passed into the holder and hold a card against said plate, and pad actuating mechanism connected with said means.

17. In a photograph printing machine, the combination with an upright runway, a light box having an opening in its front wall past which said runway leads, a plate holder removably held over said opening, a plate in the runway adapted to direct the falling cards in front of said plate-holder, a lip in the runway directing the falling cards against said plate, and a light in the box; of an upper sliding gate adapted to pass under said lip and against said plate, a lower sliding gate adapted to be pressed against the plate within the holder, means for actuating said gates in opposition, a chute into which the lower

gate delivers the printed cards when this gate is retracted, a pad for holding the card momentarily against the plate within said frame, and means for actuating said pad.

18. In a photograph printing machine, the combination with an upright runway, a light box having an opening in its front wall past which said runway leads, a plate holder removably held over said opening, a plate in the runway adapted to direct the falling cards in front of said plate-holder, a lip in the runway directing the falling cards against said plate, and a light in the box; of an upper sliding gate adapted to pass under said lip and against said plate, a lower sliding gate adapted to be passed into the holder and pressed against the plate therein, means for actuating said gates in opposition, a chute into which the retracted lower gate delivers the printed cards, a movable rack to which said chute delivers, a pad for clamping the card against the plate within said holder, and synchronized means for actuating said gates, advancing and retracting the pad, and feeding the rack forward after the dropping of each printed card thereinto.

19. In a photograph printing machine, the combination with an upright runway, a light box having an opening in its front wall past which said runway leads, a plate holder removably held over said opening, a light in the box, an upper sliding gate adapted to pass across the runway above said light opening, a lower sliding gate, springs for normally closing said gates, and means for opening the gates oppositely; of a chute into which the lower gate delivers the printed cards, a movable rack to which said chute delivers, a pad for clamping the card within the holder, and synchronized means for retracting said gates, advancing and retracting the pad, and feeding the rack forward after the dropping of each printed card thereinto.

20. In a photograph printing machine, the combination with a light box having an opening in its front, a plate-holder standing over said opening, a pad, means for advancing and for retracting the pad, card-feeding and -delivering mechanism, a bulb within the box, and a circuit for illuminating the bulb; of a circuit breaker within said circuit, and means for automatically opening said circuit breaker by the retraction of said pad.

21. In a photograph printing machine, the combination with a light box having an opening in its front, a plate-holder standing over said opening, a pad, means for pressing it into the plate-holder for holding a card against the plate and for retracting the pad, card-feeding and -delivering mechanism, and a bulb within the box; of a circuit breaker within the wires leading to said bulb, a rock shaft having a projection standing under the circuit-breaker arm, and a finger on said rock shaft standing behind the pad whereby the retraction of the latter actuates the circuit breaker, for the purpose set forth.

22. The combination with a photographic printing frame adapted to contain a plate; of a cushion for coactive use with said frame, the cushion having a rubber pad provided with sockets in that face which contacts with the print, for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HOSEA BLAIR.

Witnesses:
W. R. GUGER,
M. TURNIDGE.