

March 13, 1945.

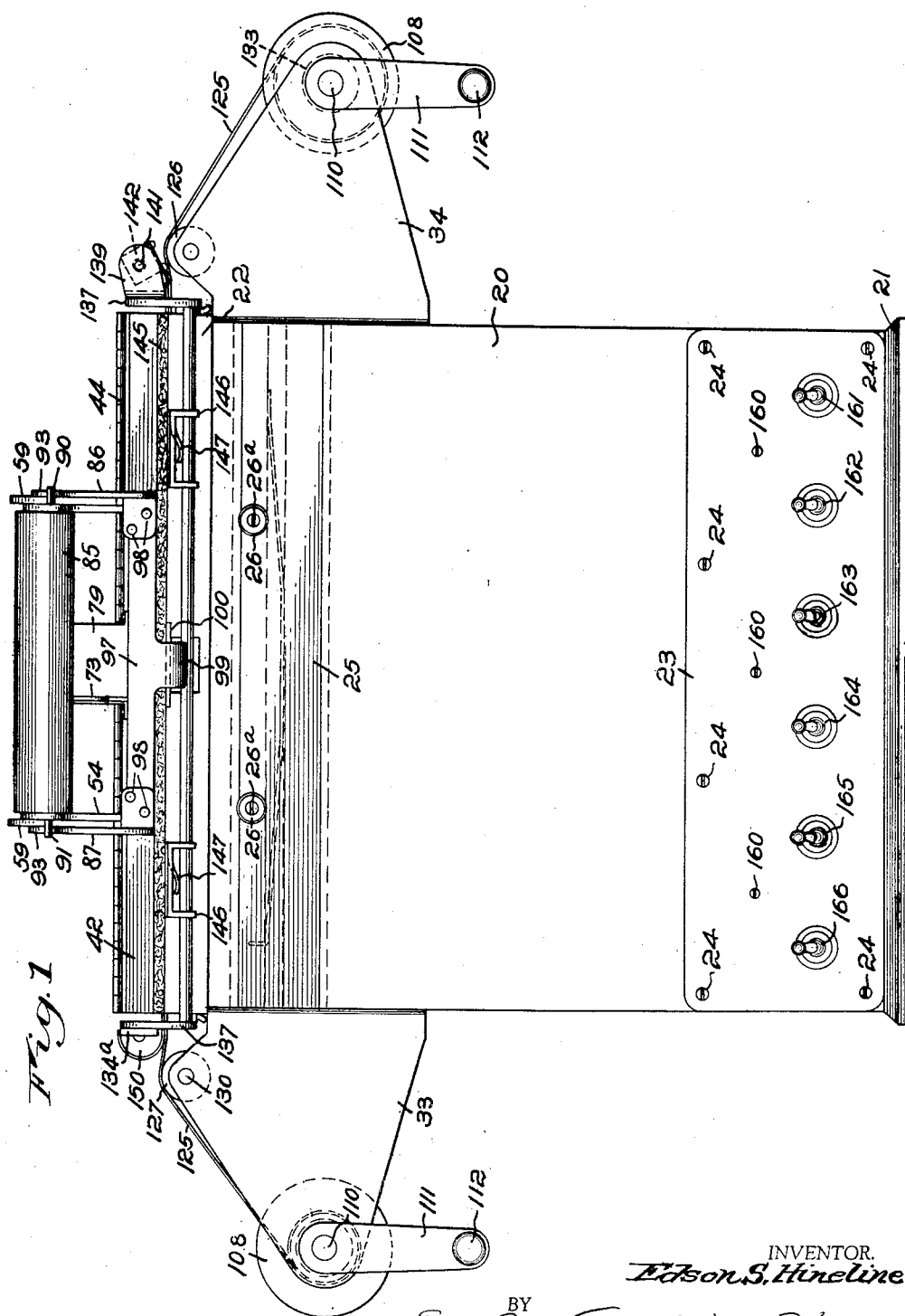
E. S. HINELINE

2,371,594

PHOTOGRAPHIC CONTACT PRINTER

Filed March 30, 1943

7 Sheets-Sheet 1



March 13, 1945.

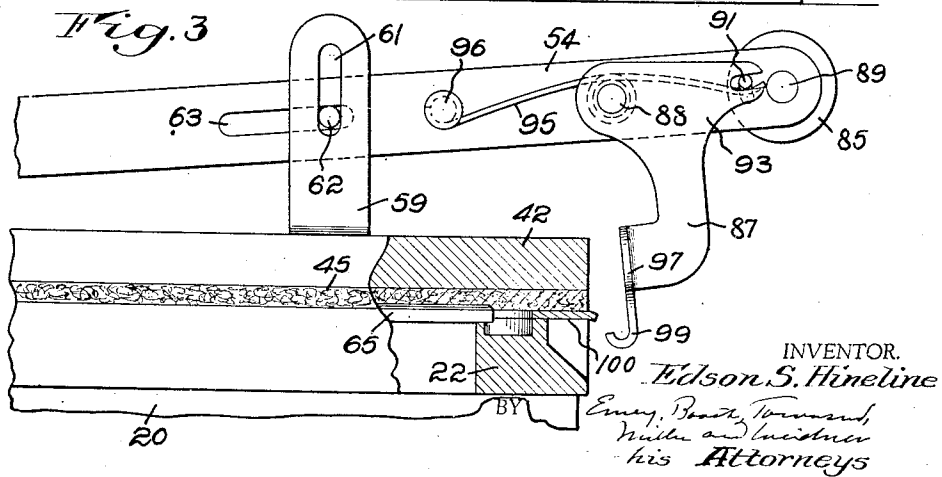
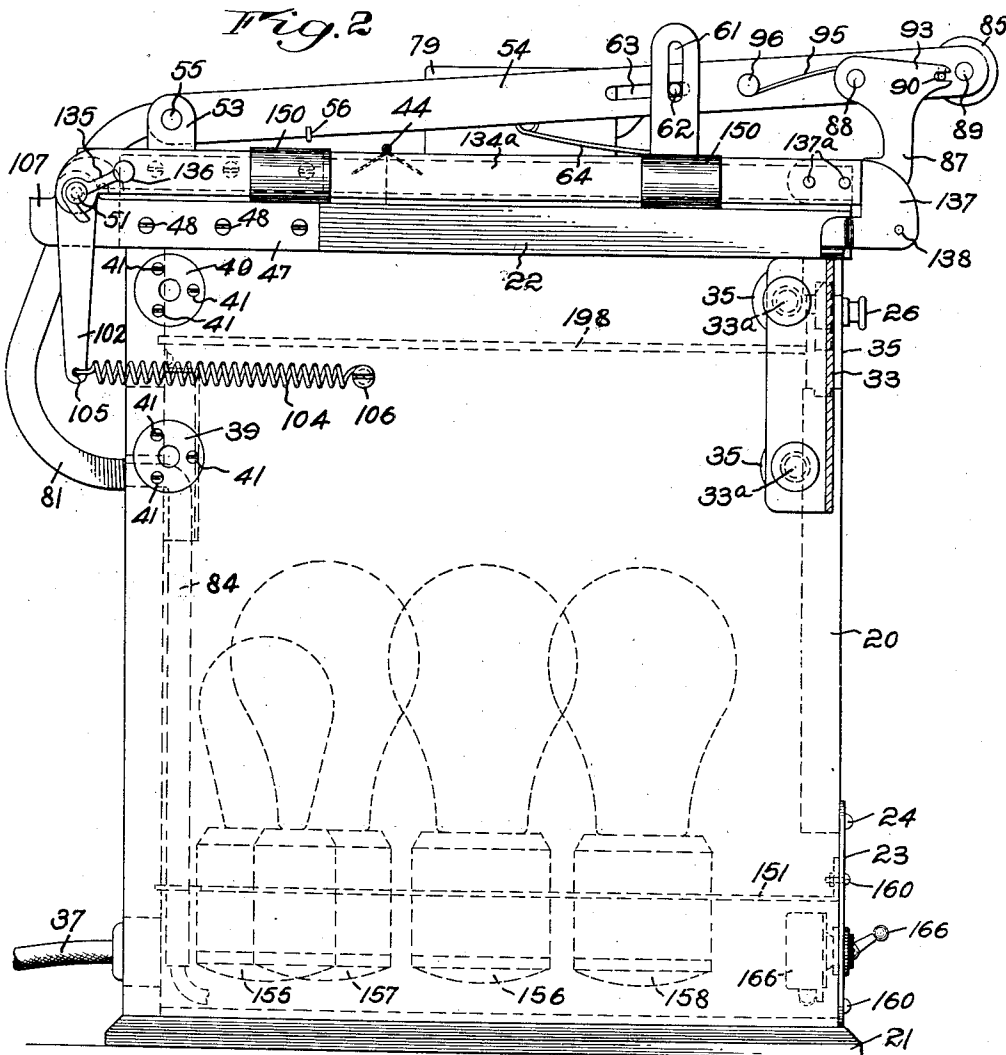
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PHOTOGRAPHIC CONTACT PRINTER

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7 Sheets-Sheet 2



March 13, 1945.

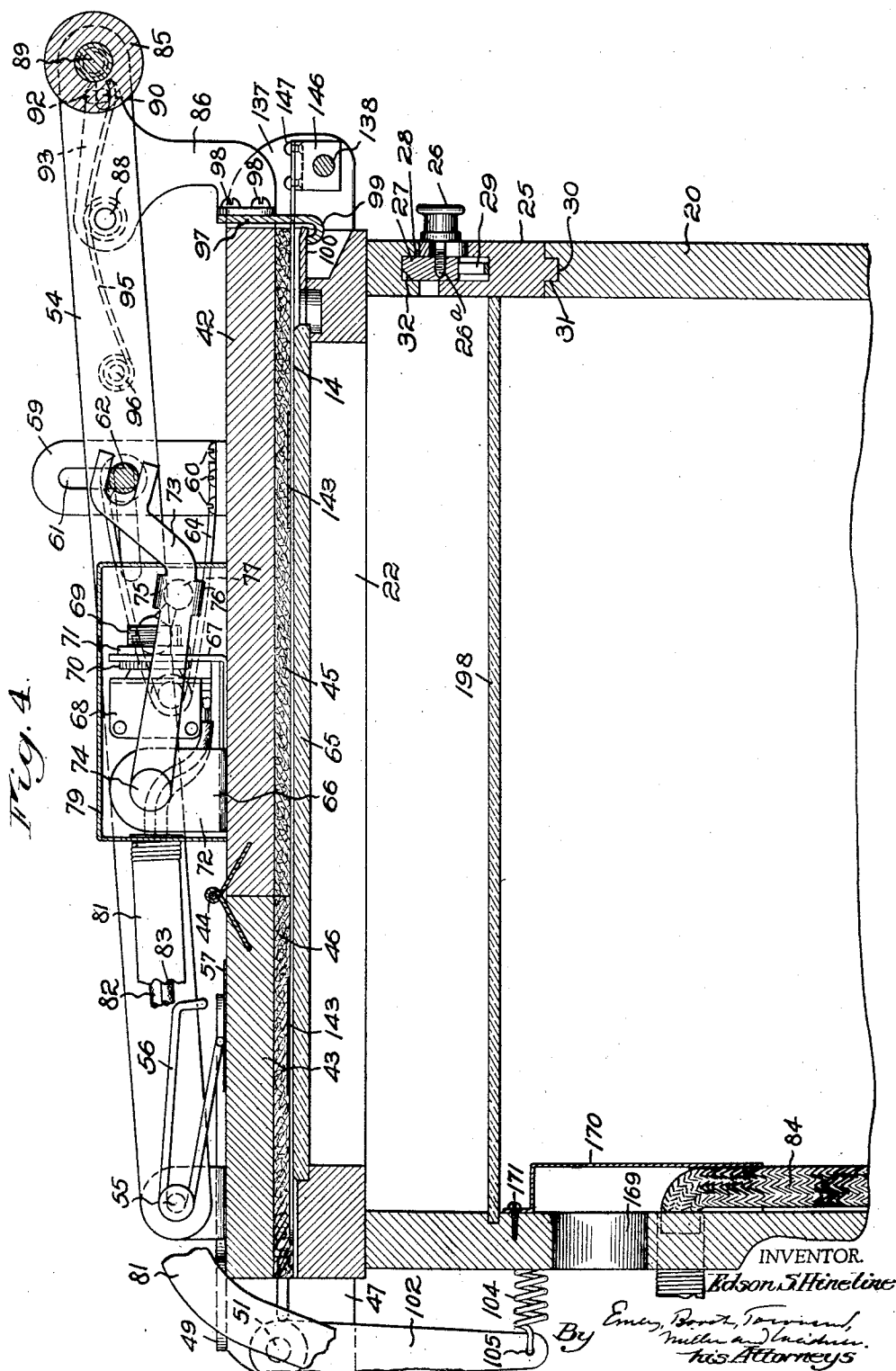
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PHOTOGRAPHIC CONTACT PRINTER

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7 Sheets-Sheet 3



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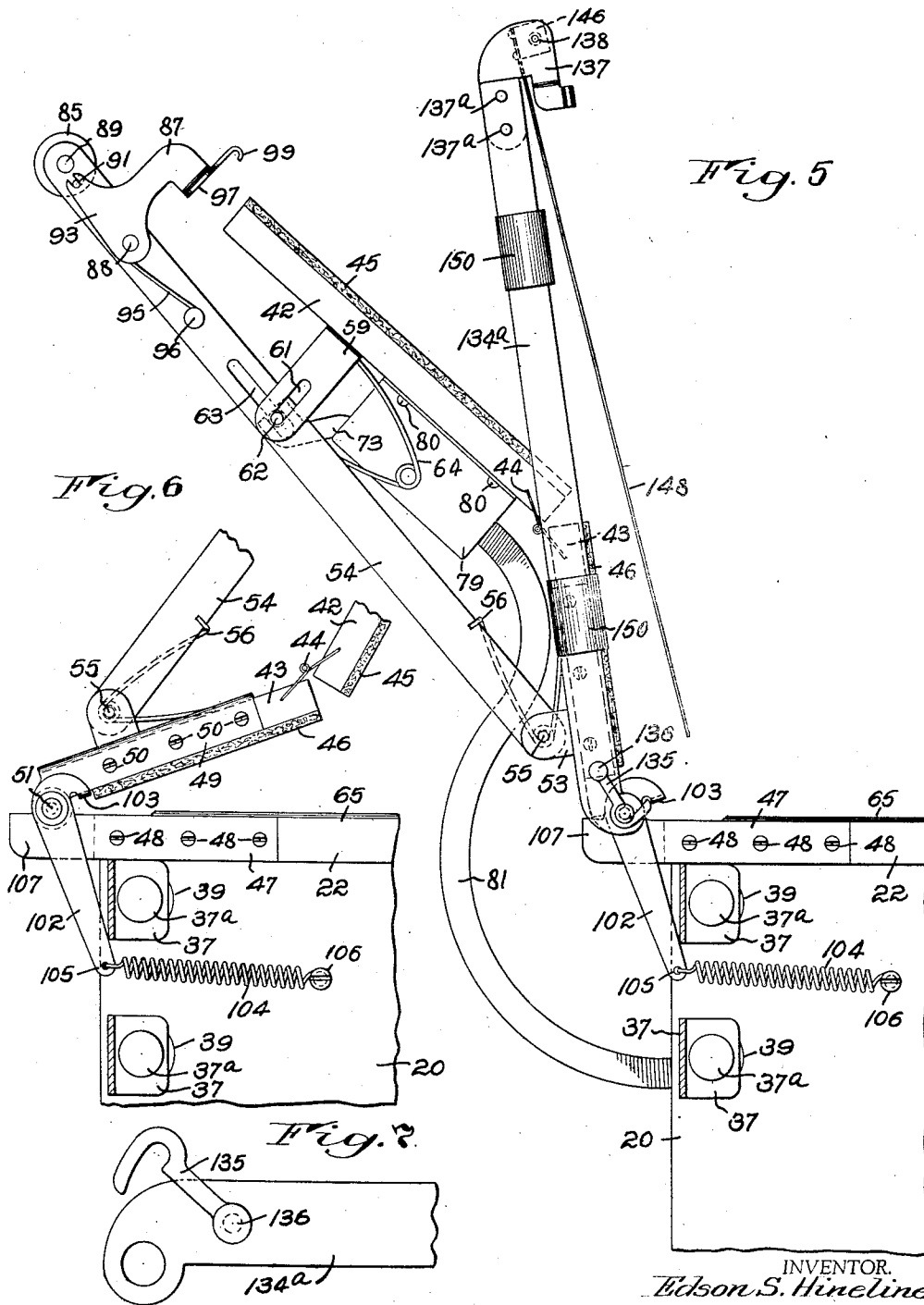
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PHOTOGRAPHIC CONTACT PRINTER

Filed March 30, 1943

7 Sheets-Sheet 4



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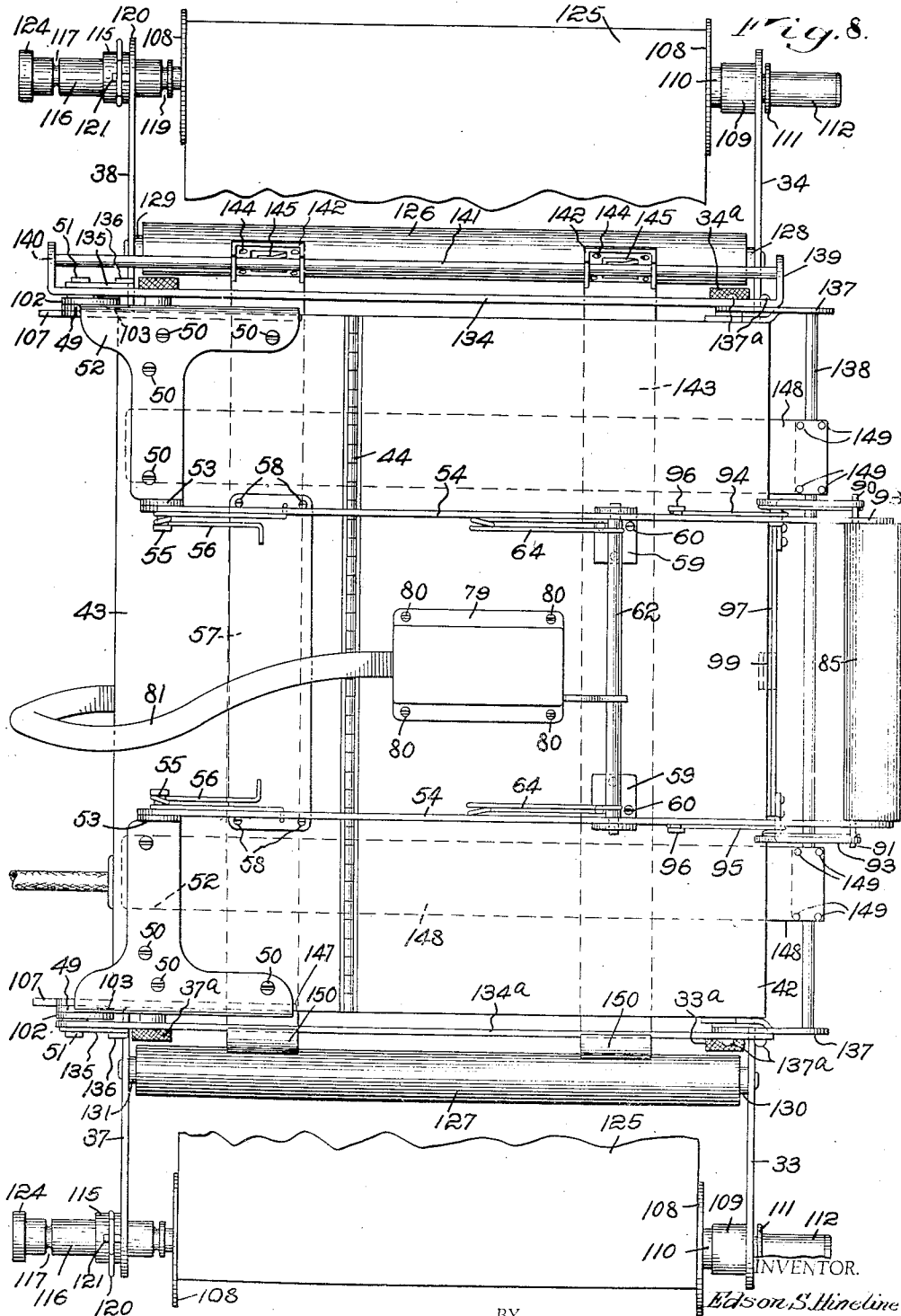
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2,371,594

PHOTOGRAPHIC CONTACT PRINTER

Filed March 30, 1943

7 Sheets-Sheet 5



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2,371,594

PHOTOGRAPHIC CONTACT PRINTER

Filed March 30, 1943

7 Sheets-Sheet 6

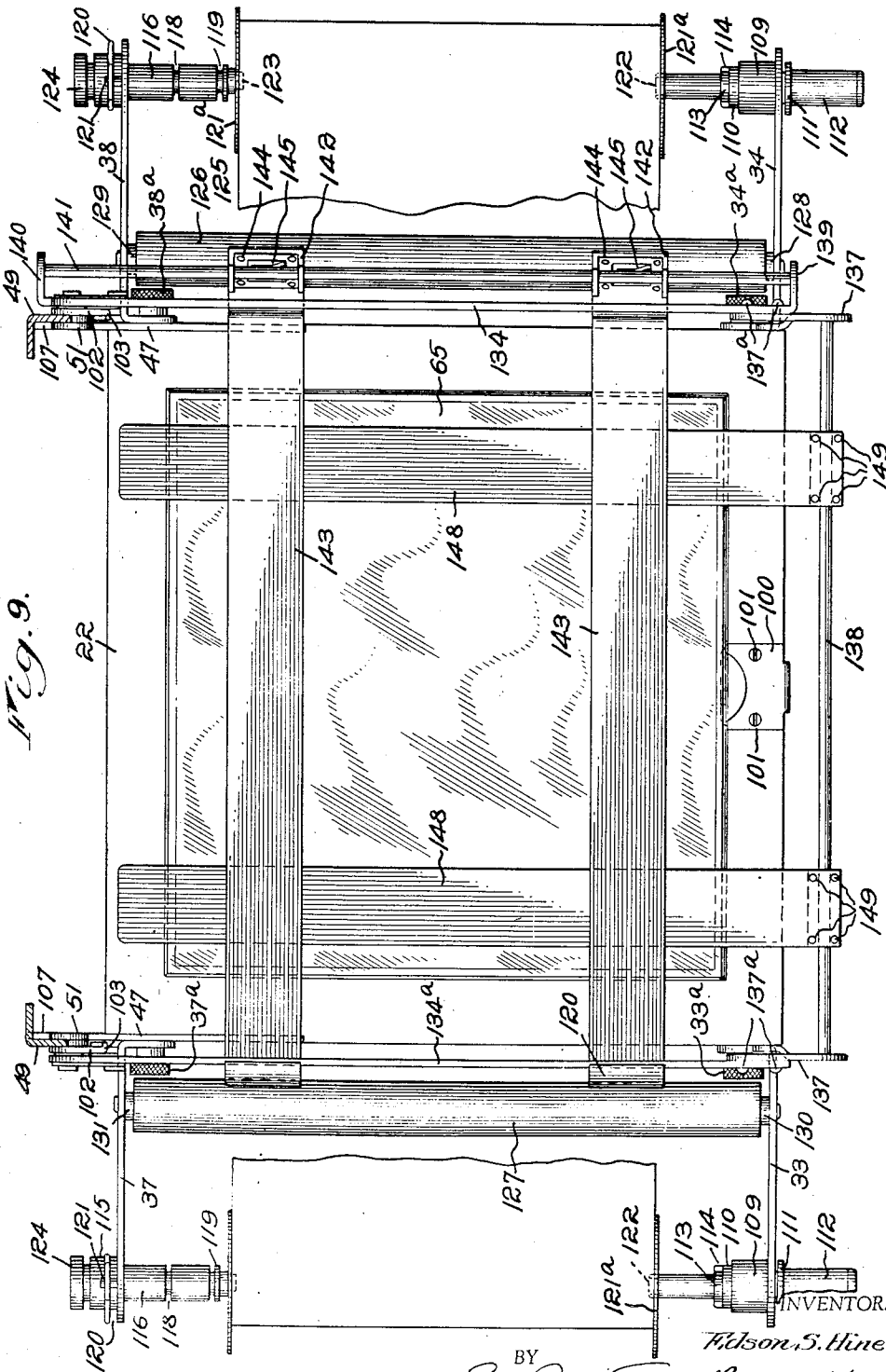


Fig. 9.

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2,371,594

PHOTOGRAPHIC CONTACT PRINTER

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Fig. 10

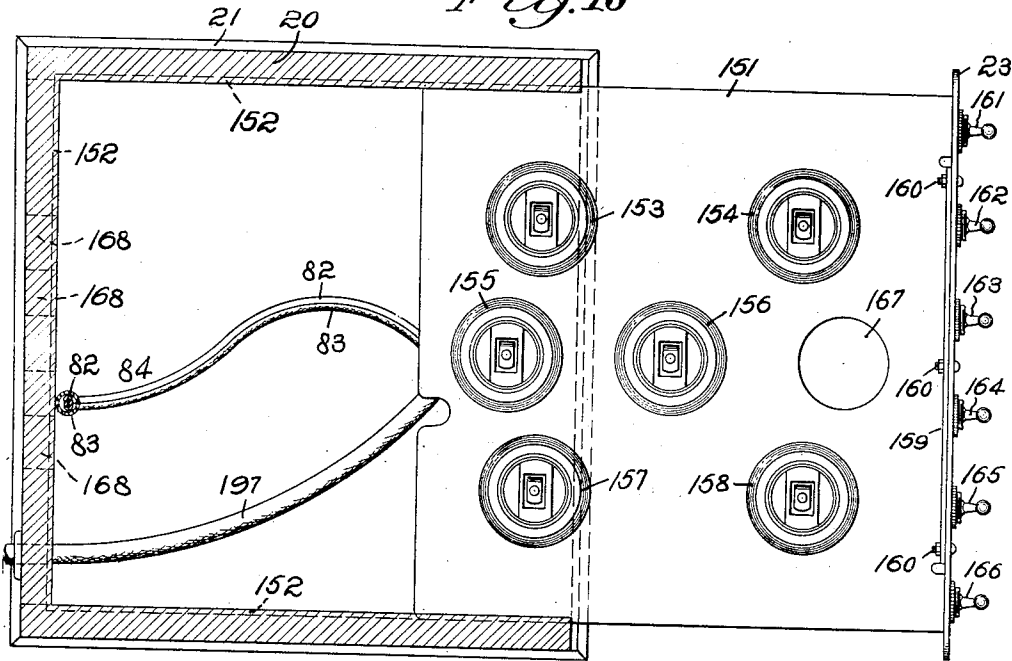
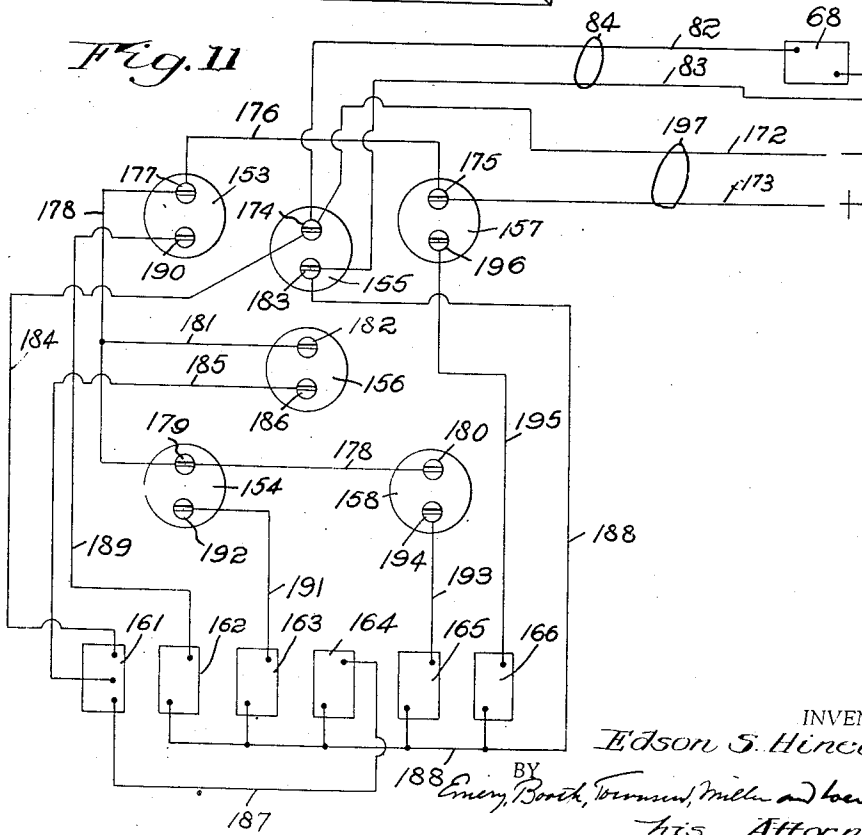


Fig. 11



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UNITED STATES PATENT OFFICE

2,371,594

PHOTOGRAPHIC CONTACT PRINTER

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Application March 30, 1943, Serial No. 481,067

22 Claims. (Cl. 95—75)

This invention relates to photographic contact printers, particularly adapted for making contact prints as distinguished from enlargements, either from separate negatives or from a large roll or other package of negatives.

In order that the principle of the invention may be readily understood, I have disclosed a single embodiment in the accompanying drawings, wherein

Fig. 1 is a front elevation of the photographic contact printer with the platen in the contact position and showing the film spools carrying a roll of negatives;

Fig. 2 is a left-hand side elevation of Fig. 1 with one of the film brackets removed and the other cut away more clearly to show the structure of the platen suspension;

Fig. 3 is an enlarged detail of Fig. 2, partially in section but showing the platen handle in the unlocked condition;

Fig. 4 is a vertical, longitudinal section through the platen with the lower part broken away more clearly to show the construction of the photographic contact printer and particularly of the platen structure and the switch operating mechanism;

Fig. 5 is a fragmentary left-hand elevation of the photographic contact printer with the top platen in the full open condition and the masking device raised from the printer platen;

Fig. 6 is a view similar to Fig. 5, but with the platen raised only to its normal position by the platen support springs, the masking device having been removed;

Fig. 7 is a fragmentary detail of one of the arms of the masking device;

Fig. 8 is a top plan view of the photographic contact printer with a film strip in place but broken away so as to show the film guide rollers, the masking device being in place and the top platen being in the locked condition;

Fig. 9 is a top plan view of the photographic contact printer with the top platen removed so as to show clearly the mounting of the masking device;

Fig. 10 is a horizontal, longitudinal section through the contact printer, the lamp and switch carrying unit being partially removed from the printer; and

Fig. 11 is a wiring diagram of the electrical circuit, showing the connection of the lamp sockets and the several switches.

Among the objects of this invention are: to provide a photographic contact printer that will readily accept either single-sheet negatives or

negative in strip form and wound on the usual rolls; to provide a photographic contact printer having a simple masking device that can readily be adjusted for any size negative within the capacity of the printer; to provide a photographic contact printer having a masking device that is readily removable from the printer when it is desirable to make prints not using the masking device; to provide a photographic printer having a platen suspension device that will insure an even contact pressure over all the printing area; to provide a platen locking device that is simple to operate, and that will not lock unless it is the desire of the operator to have the platen in the locked condition; to provide a photographic contact printer having removable film support members and adjustable means for carrying film spools of different widths; to provide a photographic contact printer having a number of lamps that can be controlled in such a manner as to provide just the illumination required for a particular negative; to provide a photographic contact printer having at least one of the lamps separately controlled so that it can be illuminated, even though the platen switch is not operated; and to provide a photographic contact printer having such features but nevertheless of simple construction and low cost of manufacturing. This is made possible particularly because the structure for supporting the lamps and the switches for controlling the lamps are built as a separate unit wherein all electrical wiring can be carried out before the lamp carrying unit is assembled in the printer.

Reference is now more particularly made to the drawings disclosing the preferred embodiment of the invention.

Referring first to Figs. 1 to 4, the box or body portion of the contact printer is indicated at 20, it being usually constructed of wood, but any other suitable material may be employed. To the said box 20 is attached a base 21, the top member 22 and a switch plate 23, the latter being attached by screws 24, 24. Fitted to the front of the box 20 is a removable door 25 having knobs 26, 26 held by screws 26a and, as shown in Fig. 4, having a locking member 27 fitted into a slot 28 of the door and caused to be moved upward by a spring 29 and downward to open the door by the knobs 26 secured to the locking member 27 by said screws 26a, 26a. The door 25 is provided with a tongue 30 to engage a rabbit 31 of the box 20, the locking member 27 engaging the rabbit 32 of the printer box 20.

As shown in Fig. 1, attached to both sides of the

box 20 are film spool support brackets 33, 34 secured by means of knurled head screws 33a, 33a, respectively, shown in detail in Figs. 2 and 8, and which are threaded into suitable sockets provided therefor and indicated in Fig. 2 at 35, 35.

At the rear of the box 20 is attached at the said sides thereof a second set of film support brackets 37, 38, shown at the left in Fig. 8 and attached by knurled head screws 37a, 38a (Figs. 5, 6 and 8) threaded into suitable plates 39, 40, most clearly shown in Fig. 2, which are held to the box 20 by wood screws 41, 41, shown only as applied to the plates 39 (Fig. 2), though all of said parts are secured in a similar manner.

Hinged to the printer box 20 in a manner to be subsequently more fully described (best shown in Fig. 4) is a platen top structure made up mainly of two members 42, 43 connected together by hinge 44 (Figs. 4 and 8), the two members 42, 43 thereof being provided with felt facings 45, 46 respectively. As shown most clearly in Figs. 6 and 8, the said platen top structure is hinged to the top member 22 by hinges, one of which is shown in Figs. 2, 5 and 6, and each consisting of a plate or member 47 secured by screws 48, 48 to the top member 22. As best shown in Figs. 4 and 8, secured to each of said hinge plates or members 47 is a platen top plate 49 attached to the member 43 of the platen top structure by screws 50, 50. The hinged plates or members 47 and the top plates 49 are pivoted on shoulder rivets 51, one of which is shown in Figs. 5 and 6, and both of which are shown in Fig. 8. Each platen top plate 49 is provided (as shown in Fig. 8) with an arm 52 having an upturned end 53 to which said two platen top plates are pivoted to long, parallel, platen handle arms 54 by means of shoulder rivets 55, both the right and left-hand portions of the printer box 20 (viewing the same from the front, Fig. 1) being thus similarly provided with the described parts, as is clearly evident from Fig. 8.

Still referring to Figs. 4 and 8, in order to cause each of the platen handle arms 54 to be swung together in a contraclockwise direction and as indicated also in Figs. 5 and 6, there is provided therefor a spring wire 56 fitted around the shoulder rivet 55, one end of each such spring wire being hooked to the under side of its platen handle arm 54, the opposite end of each wire resting on a buffer plate 57 attached to the platen top member 43 by screws 58, 58, as shown in Fig. 8. Attached to the platen top member 42 (as shown in Fig. 8) are a pair of right-angle brackets 59, 59 by screws 60, 60, shown also in Fig. 4. Each right-angle bracket 59 is provided with a slot 61 riding in both of which is a lengthwise-extending switch-arm operating rod or bar 62 provided with reduced diameter ends for that purpose. The parallel platen handle arms 54 are also each provided with a slot or opening indicated at 63 in Figs. 3 and 5, through which the said switch-arm operating rod or bar 62 also passes. As will be seen from Fig. 8, the two platen handle arms 54 are operatively connected together by the switch-arm operating rod or bar 62.

In order to cause downward movement of the platen top member 42 with respect to the switch-arm operating rod or bar 62, there are provided, as shown in Figs. 2 and 8, springs 64 of hairpin shape and each having on one end a knob fitted around and in a groove in the said switch-arm operating rod or bar 62, the other end of each said spring resting on the horizontal portion of the corresponding right-angle bracket 59.

Therefore when the platen handle arms 54 are in the position shown in Fig. 4, the platen top member 43 is held in contact with the platen glass 65, Figs. 3 and 4, by the springs 56 and the platen top member 42 will be held in contact with the said platen glass 65 by the springs 64.

As shown in Fig. 4, attached to the platen top member 42 is a switch bracket 66 with an upstanding member 67 having attached thereto a switch 68 herein termed the platen switch, and which is preferably a standard toggle switch, and which is provided with a threaded cylindrical neck 69 held to the upstanding member 67 by lock nuts 70, 71. The said switch bracket 66 is provided with a second upstanding member 72 to which there is pivoted (as best shown in Fig. 4) a switch-operating arm 73 by rivets 74, said pivoted switch-operating arm 73 being provided with two inwardly extending members 75, 76 for engaging the ball 77 of the said switch. When the said pivoted switch operating arm 73 is in the position shown in Fig. 4, the switch is closed and when the said pivoted switch operating arm 73 is in the position shown in Fig. 5, the switch is in the open circuit or off position.

As shown in Fig. 4, the switch bracket 66 and the switch 68 are enclosed by a switch cover 79 held to the platen top member 42 by screws 80, 80, shown in Fig. 5. Attached to the said switch cover 79 is a flexible metallic conduit 81 through which passes conductors 82, 83 connected to the said switch 68. The said metallic conductor conduit 81 is attached to the back wall of the contact printer box 20 as shown in Figs. 2 and 5, and the conductors 82, 83 (as shown in Fig. 10) pass through the conduit 81 and through a second fireproof conduit 84 to the lamp circuit to be subsequently described.

The platen top structure made up mainly of the platen members 42, 43 is held in contact with the platen glass 65 by the parallel platen handle arms 54 and springs 56 and 64 when the handle 85 (shown in Figs. 2 and 4) is held in down position, as indicated in said figures. When the said handle 85 is moved in a downward direction, carrying with it the switch-arm operating rod or bar 62, the springs 56 and 64 will be tensioned, thus causing the said platen top members 42, 43 to be moved into and held in contact with the platen glass 65, and after such contact is made, the handle 85 will be moved still further downward, bearing with it the said switch-arm operating rod or bar 62 until it reaches the limit of the slots 61 in the angle brackets 59. The said pivoted switch operating arm 73 (Fig. 4) will also be moved downward by the switch-arm operating arm 73 (Fig. 4) will also be moved downward by the switch-arm operating rod or bar 62, and the said pivoted switch operating arm 73 will be turned in a clockwise direction because of the engage of the ball 77 (Fig. 4) by the said inwardly extending members 75, 76.

In order to hold the platen top structure in the described condition at the limit of its downward movement for contact printing, there is provided locking means, herein consisting of parallel crank members 86, 87 (Fig. 1) pivoted respectively to the said parallel platen handle arms 54 by shoulder rivets 88 (Figs. 2 to 5), and, as will be evident from the ensuing description, the platen top structure normally does not lock when down; that is, it does not lock automatically, but the lock is caused to function by the operator when it is desired to make a long printing exposure, and then pressure on the handle 85 auto-

matically releases the lock. This permits a faster use of the contact printer.

The handle 85 (Figs. 2, 3 and 4) is pivoted on a handle pin 88 provided with reduced diameter ends fitting into holes in the said parallel platen handle arms 54, 54 and riveted thereto. As shown in Figs. 2, 3 and 4, the said handle 85 is provided with two eccentrically positioned pins 90, 91 passing through slots 92, 92 of the said two platen handle arms 54, as indicated in dotted lines in Fig. 4. The said crank members 86, 87 are provided, as shown in Figs. 2 and 3, with arms 93, 93, each having a slot for engaging the eccentrically positioned pins 90, 91 acted upon by springs 94, 95, shown in Figs. 2, 3, 4, 5 and 8 as pivoted on shoulder rivets 88, one of which is shown in Figs. 4 and 5. The left-hand end of the spring 95, viewing Fig. 4, is anchored on a second shoulder rivet 96, and the opposite end of said spring 95 engages the pin 90 of the handle 85, causing the latter to tend to rotate on its own axis in a clockwise direction. The spring 94 is mounted in a similar manner on the other platen handle arm 54.

Attached to the lower end of said crank members 86, 87 is a long latch bar 97 (Fig. 8) by means of screws 98, 98 (Fig. 4). The latch bar 97 is provided about midlength with a hook-shaped part 99 for engaging a latch plate 100 (best shown in Figs. 3 and 9) which is attached to the printer box top member 22 by screws 101, 101. When the handle 85 is released by the operator, the springs 94, 95 cause said handle 85 to be rotated on its own axis in a clockwise direction, thus turning the crank members 86, 87 in a counterclockwise direction, thereby withdrawing the hook-shaped part 99 of the lock from the latch plate 100, and so allowing the platen handle arms 54 to be moved upward under the counterbalancing influence of springs 56, 64, as already described, and causing the switch-arm operating rod or bar 62 to be moved in an upward direction, carrying with it the pivoted switch operating arm 73, thus operating the switch 68. The further movement of the handle 85 in an upward direction will lift the platen top members 42 and 43 from the platen glass 65.

In order to cause the platen top structure including its members 42, 43 and the operating mechanism therefor to be moved in an upward direction to the position shown in Figs. 5 and 6, there are provided bell crank levers 102, 102 pivoted on the shoulder rivets 51, 51 (Fig. 8), each such lever having a hooked part 103 engaging the lower face of the corresponding platen top plates 49.

As shown in Figs. 4, 5 and 6, on the opposite end of each bell crank lever 102 is hooked a spring 104, one end thereof being received in the hole 105 of such lever and the opposite end being secured to a screw 106 threaded into the printer box 20. The movement of each bell crank lever 102 is limited respectively by brackets 37, 38 when turning in a counterclockwise direction to lift the platen top structure as indicated most clearly in Fig. 6. At times it is desirable to move the platen top structure to the position shown in Fig. 5, so as completely to clear the platen glass 65 for cleaning or when using the printer as a retouching stand. This is done by the operator swinging the handle 85 in a counterclockwise direction, viewing Fig. 5, until the platen top plates 49 are stopped by the ends 107 of the two hinge plates or members 47, as indicated in Fig. 5.

As already stated, the herein disclosed contact

printer is adapted to accept negative material in rolls, usually mounted on a spool, as well as separated or single-sheet negatives. To that end (as shown in Fig. 8) a supply spool 108 is carried by the brackets 33 and 37, and for the purpose of supporting the supply spool 108, there is provided on bracket 33 a bearing 109 into which is fitted a shaft 110 (most clearly shown in Fig. 9) provided with a crank arm 111 having a handle 112, and, as shown in Figs. 1 and 8, a crank arm 111 with handle 112 is provided on each shaft 110 supported respectively in the brackets 33 and 34 at the two ends of the contact printer structure. Each shaft 110 is provided with a cylindrical step 113 (Fig. 9) having a key 114, the supply spool 108 being engaged by said step and key, and to that end being provided with the usual keyway. As shown in Figs. 8 and 9, the bracket 37 is provided with a bushing 115 having a shaft 116 provided with circumferential notches 117, 118 and 119. The bushing 115 is provided with a spring clamp 120 fitted into a slot in the bushing 115 provided for that purpose, said spring clamp 120 being held in place by means of a pin 121 attached to the bracket 37 as shown at the extreme lower left-hand corner in Fig. 8.

It will be noted that when a large spool is in place (that is, a spool having a length substantially that shown in Fig. 8), the circumferential notches 118 of the shafts 116 will be engaged by the corresponding spring clamp 120, and the right-hand spool flange 108 will be engaged by the circumferential shoulder 113 of the appropriate shaft 110, as best shown in Fig. 9. When, however, a spool of a shorter length is used, as shown, for example, in Fig. 9, the right-hand flange 121a will be engaged by a reduced diameter step on the shaft 110, such reduced diameter being also provided with a key for engaging a slot in the flange 121a, shown in dotted lines at 122. The shaft 116 is provided with a reduced diameter indicated at 123 for receiving the left-hand spool flange 123, the shaft 116 being moved in the direction of the spool and the notch being engaged by the spring clamp 120.

In order to remove the spool it is only necessary to disengage the spring clamp 120 from the notch 117 and to move the shaft 116 by the knob 124, until the notch 119 is engaged by the said spring clamp 120, whereupon the spool can then be removed from the shaft 110. On the opposite end or side of the contact printer, the brackets 34 and 38 are equipped in a manner similar to the brackets 33 and 37 respectively, and the same reference numerals are used for the corresponding parts.

In order to provide guides for the unrolling film 125 in its passage over the platen glass 65, as best shown in Figs. 8 and 9, there are provided near the opposite ends of the contact printer guide rolls 126, 127. The guide roll 126 is supported on pivots 128 and 129, the pivot 128 being attached to bracket 34, and the pivot 129 to the bracket 38. The guide roll 127 is similarly provided with pivots 130 and 131, the pivot 130 being attached to the bracket 33 and pivot 131 to the bracket 37. The path of the film 125 is most clearly shown in Fig. 1, where it is indicated as passing from the film supply spool 108 over the guide roll 127, over the platen glass 65, over the guide roll 126 and onto the receiving spool 133. The film 125 can be moved in either direction by means of the two crank arms and handles 111, 112 so as to be, if desired, unwound more or less from the receiving spool 133 and rewound onto the supply

spool 108 if the printing exigencies require. The structure herein disclosed permitting the use of two different lengths of film spools is an important feature of the invention. The brackets themselves that support the film rolls can be readily removed and packed inside the printer for transportation, thus making a small, compact package of the entire contact printer.

Referring particularly to Figs. 5, 8 and 9, in order to provide, for the contact printer herein disclosed, a suitable masking device or unit that can be used equally well when employing cut film or when employing film negatives in a continuous roll, I have provided the following construction. On the shoulder rivets 51, 51 are pivoted masking-blade support arms 134, 134a at opposite ends or sides of the contact printer. Each shoulder rivet 51 is provided with a groove (not shown) into which a hook 135 (best shown in Fig. 7) is engaged when the masking arms are locked with the shoulder rivets 51, 51, as most clearly shown in Fig. 5. The hook 135 is pivoted to the support arm 134a by a shoulder rivet 136. By reference to Figs. 5 and 7, it will be seen that by turning the two hooks 135 contraclockwise (Fig. 7), the two blade support arms 134, 134a may be readily removed from the shoulder rivets 51, 51, thus permitting the entire masking unit or assembly to be lifted off the top of the printing apparatus. Fig. 6 shows that the masking unit has been removed, and among the objects of the invention is set forth that of the ready removability of the masking device or unit. U-shaped members 137, 137 are attached to the support arms 134, 134a by rivets 137a, 137a (best shown in Fig. 5). The said U-shaped members 137 serve as a support for a tie-rod 138 arranged at right angles to the support arms 134, 134a, as evident from Fig. 8, and each such U-shaped member 137 has a guide mark or the like to locate properly the masking device upon the printer top member 22, as best shown in Fig. 1. The said tie-rod 138 is riveted to both the right and the left-hand U-shaped members 137.

The masking-blade support arm 134 is provided, as shown in Fig. 8, with right-angle projections 139, 140, to which is fitted a masking-blade support rod 141 in parallelism with support arm 134 and securely attached to the projection 139, but provided with a free fit in a suitable hole in the projection 140. Fitted to the said blade support rod 141 are channel members 142, 142 (Figs. 8 and 9) and riveted to the channel members 142, 142 are lengthwise extending masking blades 143, 143 by means of rivets 144, 144. The channel members 142 are each provided with an integral spring member 145 (Figs. 1, 8 and 9) for imparting a frictional drag on the rod 141 in order to hold the channel members 142 and the lengthwise extending masking blades 143 in any selected position.

Fitted on the tie-rod 138 (shown in Fig. 1) are channel members 146, 146 having spring fingers 147, 147, and attached to said channel members 146, 146 are transversely extending masking blades 148, 148 by means of rivets 149 (shown in Figs. 4, 8 and 9). It will be noted that the masking blades 143, 143 and 148, 148, which are arranged in two pairs at right angles to each other, as best indicated in Fig. 9, can be positioned anywhere on the platen glass 65 within the limits of the space provided by the support arms 134, 134a and the tie-rod 138.

When loading strip film into the contact printer, the latter is placed in the condition

shown in Fig. 5 with the platen top structure swung all-the-way up and back and the entire masking device raised from the platen glass 65. In order to cause the longitudinally extending blades 143, 143 to follow the support arms 134, 134a, the said masking blades are provided (as shown in Figs. 2, 5, 8 and 9) with hook-shaped ends 150, 150 for engaging the support arm 134a. After the film has been loaded into place, the entire masking device can readily be brought down into contact with the film strip and adjusted to the proper size for the negative next to be used. Printing paper is then placed on top of the masking blades and the platen top structure is brought into contact with the printing paper in the manner previously described and again to be referred to in the résumé of the operation of the herein disclosed contact printer.

The contact printer illuminating means is shown in Figs. 1, 2, 10 and 11, and will next be described.

In Fig. 10 is shown a cross section of the contact printer box 20 with the horizontally positioned lamp support plate or member 151 partly withdrawn from the contact printer box 20, which is itself provided with suitable transversely extending grooves 152, 152 into which the said lamp support plate or member 151 is fitted. Attached to said plate or member is a group of lamp sockets 153, 154, 155, 156, 157, 158, preferably of the standard so-called sign-type of socket (indicated in dotted lines in Fig. 2). The said lamp support plate or member 151 is provided with a turned up edge 159 to which is attached the switch support plate 23 (Fig. 1) by means of screws 160, 160 (Figs. 1 and 10), and to said switch support plate 23 is attached a series of switches having operating handles 161, 162, 163, 164, 165, 166. These switches are provided to permit the operator to select any combination of lighting effect he may desire, as will be more fully explained in describing the circuit diagram Fig. 11. These switches are desirably of a standard toggle-switch construction, such as are available upon the open market. One of such switches is shown in dotted lines in Fig. 2 at 166, thus corresponding to the switch handle 166 therefor, shown in Figs. 2 and 10. The switches in the circuit diagram Fig. 11 are correspondingly marked, being given the same designation as the switch handles in Fig. 10.

The lamp support plate or member 151 is provided with an opening 167 (Fig. 10) to supply circulating air to the lamps when the printer is in operation. The contact printer box 20 is provided with a series of openings indicated in dotted lines in section at 168, 168, Fig. 10, and the said box 20 is also provided with a second set of openings 169, 169 to allow the hot air to pass out of the said box 20, one such opening being shown in Fig. 4. In order to prevent light entering through the openings 169, there is provided (as shown in Fig. 4) a light shield 170 attached to the contact printer box 20 by screws, one of which is shown at 171.

Fig. 11 is a wiring diagram as viewed from the bottom of the lamp support plate or member 151.

Referring to the said wiring diagram, it will be understood that electrical current is supplied to the herein disclosed contact printer through the main wires 172 and 173. The wire 172 is connected to the socket 155 by screw 174, and the wire 173 is connected to the socket 157 by screw 175. A second wire 176 is also connected to

the socket 157 by screw 178 and to the socket 153 by screw 177. A third wire 178 is connected to the screw 177 and connects with screw 179 and screw 180 of the sockets 154 and 158, respectively. Connected to the wire 178 is a wire 181 that is connected to screw 182 of the socket 156. To the switch 68 (Fig. 11) are connected the wires 82 and 83, the wire 82 being connected to screw 174 of the socket 155, and the wire 83 being connected to screw 183 of the socket 155. The switch 161 is provided with three connectors—i. e., (1) the wire 184 that connects to screw 174 of the socket 155, (2) the wire 185 that connects to screw 186 of the socket 156, and (3) the wire 187 that connects to one side of the switch 164. The switch 162 is connected to the common conductor 188, which is connected to the socket 155 by means of screw 183. The second conductor 189 of the switch 162 is connected to the socket 153 by means of a screw 190. One side of the switch 163 is connected to the common conductor 188, and the second conductor 191 is connected to the socket 154 by means of the screw 192. One side of the switch 164 is connected to the common conductor 188 and the other side is connected to the switch 161 by means of the conductor 187 previously referred to. One side of the switch 165 is connected to the common conductor 188 and the other side thereof is connected to the socket 158 by means of the conductor 193 and the screw 194. One side of the switch 166 is connected to the common conductor 188 and the other side thereof is connected to the socket 157 by means of the conductor 195 and the screw 196.

It will be understood from the foregoing description that the described circuit is so constructed and arranged that any one of the lamps carried by the sockets 153, 154, 156, 157 and 158 can be placed in circuit in series with the lamp in the socket 155, which is a red lamp, and since the platen switch 68 is in parallel with the red lamp in the socket 155, such red lamp will be short-circuited when said platen switch 68 is closed, and any or all of the lamps in circuit in the sockets just referred to will be illuminated. The lamp in the socket 156 can be separately controlled by means of the switch 161, either by placing the lamp in the socket 156 in series with the red lamp in the socket 155 or by bridging the lamp in the socket 155. When the switch is in position to cause the conductors 184 and 188 to be connected together, the lamp in the socket 156 will remain lighted regardless of the position of the contacts in the platen switch 68. This is very desirable for certain types of work, or when adjusting the masking device, or when it is desired to view a negative by transmitted light. Normally the switch 161 is in position to complete a circuit between the conductors 185 and 187. The lamp in the socket 156 will then be controlled by the switch 164.

A brief résumé of the operation of the herein disclosed contact printer is as follows:

The platen top structure is raised by lifting the handle 85 until the position is reached that is shown in Fig. 5. By the same movement, the masking device is also raised to the position shown in Fig. 5. This exposes the entire platen glass 65 of the contact printer. The said printer is connected to any suitable electrical circuit by means of the cable 197 (diagram Fig. 11) composed of the wires 172, 173, and if all of the switches 161, 162, 163, 164, 165 and 166 are in the open condition (that is, if all the switch handles shown are pushed downward), all the

lights will be extinguished. By moving any of the switch handles upward, the corresponding lamp will be connected in circuit through the red lamp that is fitted in the socket 155. Since the resistance of the red lamp fitted in the socket 155 is much higher than that of any of the printing lamps, the said red lamp will be illuminated. Convenient checking of all the lamps to make sure they are working satisfactorily and are not burned out is easily accomplished by moving the switch handles, one after the other, upward and then down again. Whenever any switch is moved upward, the red lamp in socket 155 will burn provided both lamps are in an operating condition (that is, the red lamp in socket 155 and the other lamp in the switch has been moved upward). After the lamps have been checked, the negative material is placed on the platen glass 65 and is viewed by moving the switch handle 161 in an upward direction, which will cause the lamp in socket 156 to be illuminated so that the negative can be inspected in due course after having been evenly exposed, it being evident that the lamp 156 is centrally arranged with respect to the negative. The other lamps, excluding the red lamp 155, are arranged to constitute a square, and therefore supply light to the four corners of each negative in turn.

All the lamps normally used for printing are connected into the circuit by moving the respective switches upward and returning the switch lever 161 downward. All the lamps will then be controlled by the platen switch 68. If, for instance, the negative has a very light exposed corner (say, the upper left-hand corner), the lamp in socket 153 would be left out of circuit by moving the switch handle of the switch 162 downward. Thus, it will be seen that it becomes a sample matter to control the illumination to the particular negative through which exposure is made. It will be noted that the centrally located lamp 156 is adapted to be controlled independently either by the platen switch 68 or by its special switch.

The described construction provides an illumination unit that can be manufactured and assembled entirely apart from the rest of the contact printer and at a minimum cost, and when completed, with the described wiring, it can then be readily slid into place in the grooves 152, 152 of the box or body portion 20 and secured in position by the screws 24 of the switch plate 23 (as shown in Fig. 1). The said illumination unit can be readily removed from the body portion or box 20 of the printer by removing the screws 24, for any purpose, and returned to position and again secured in place by the screws 24. The removal and the return to position of the illuminating unit is done without disconnecting any wires of the electrical wiring, as set forth among the objects of the invention, the wires of the circuit connections being sufficiently long to permit removal of the plate-like member 151 without disturbing the electrical wiring by disconnecting the same.

Referring to Figs. 10 and 11, it will be noted that the lamp sockets 153, 154, 157 and 158 are distributed in spaced relation about an area approximating in size, and being in general alignment with, that area which is occupied by the average size negative to be printed on said platen glass thereabove, the exact size of the picture, of course, varying with the size of the film and the arrangement of the masking blades. The said sockets are so arranged as to function in con-

nection with the four corners or quarters of the negative, and the lamp in socket 156 takes care of the center portion of the negative. The red lamp 155 is arranged at any convenient point on the plate 151.

The masking device is then brought into contact with the negative, and the masking blades thereof are adjusted to provide the proper border, and sensitized paper is laid on top of the masking blades with the sensitized surface in contact with the negative. The platen top structure is then brought into contact with the paper by means of the handle 85, which is moved downward to the limit of its motion, thus operating the switch 68, causing the pre-selected lamps to be illuminated. The handle 85 is held in this position for the proper length of exposure, after which it is released, and the said switch 68 is automatically opened, thus extinguishing all the lamps excepting the red one, 155, to complete the exposure. The platen top structure is then raised by the counterbalancing action of the springs 56 and 64 a sufficient distance to allow the operator to remove the exposed paper and to place an unexposed sheet in position for a second print.

In practice, this cycle can be carried out very rapidly, and it has been demonstrated that with this equipment and from a normal negative, it is a very simple matter to make some thirty to forty prints a minute.

It is sometimes desirable to have a further diffusion when making prints other than that to be obtained through the frosted lamps themselves. For this purpose, I have provided a diffusion glass 198 (Fig. 4) that is fitted in suitable slots or grooves provided in the contact printer box 20, and is accessible for quick removal or replacement through the door 25 thereof.

The contact-printer illuminating means herein disclosed is particularly adapted, and is constructed and arranged, for photographic printers and not for illumination generally, and when it is positioned in the printer, it becomes a fixed structure therein or part thereof. As already stated, an important purpose of my invention is to provide means whereby any one of the lamps 153, 154, 157 and 158 can be used with the red lamp 155 for photographic purposes only.

The herein described printer has proved highly satisfactory for making prints from all types of negatives including negatives made in aerial cameras for the armed forces of the United States. The entire apparatus is very small and compact so that it is readily installed in an airplane or on a ship and can quickly be set up for use anywhere. Because of the disclosed construction, this compact printer can be manufactured in quantities at a very low cost.

While I have described my invention as a photographic contact printer, a number of the described features of the invention may also be used in an enlarger, or a combined contact printer and enlarger, such as the locking device for the platen top structure, the locking means, the lamp support plate and the means for using either film roll or cut film.

Having thus described one illustrative embodiment of the invention, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

I claim:

1. Apparatus for printing for photographic purposes from negatives including, in combina-

tion, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to said platen glass, said platen top structure including at least one platen handle arm, a handle having a handle pin whereon it is axially pivoted and which pin is attached to said arm, and a lock for locking, when down, said platen top structure to said box-like body portion, a member pivoted to the handle arm and to which said lock is connected, said pivoted member having an operating connection to said axially pivoted handle to cause a rotative movement of said handle upon its pivot pin to move said pivoted member, thereby, when the platen top structure is in printing relation to the platen glass and the handle is rotated in one direction, to effect locking engagement of said lock with said box-like body portion, and when rotated in the opposite direction to effect disengagement from said box-like body portion.

2. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to said platen glass, said platen top structure including two parallel platen handle arms, a handle pivotally mounted in said arms for rotative movement upon its longitudinal axis and extending transversely thereto, lever members pivoted on said platen handle arms respectively, and having an operating connection to said handle, and a lock carried by said lever members, and moved by the opposite rotative movements of the handle upon its longitudinal axis, into and out of locking engagement with the box-like body portion when the platen top structure is down in functioning relation to the platen glass.

3. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, said platen top structure including two parallel platen handle arms, a handle mounted in said arms and extending transversely thereto, lever members pivoted on said platen handle arms respectively, said handle being rotatable upon its own axis and having eccentric connections to said lever members to move the same upon their pivots, and a lock member carried by said lever members and caused to function to lock the platen top structure to the box-like body portion when down, by rotative movement of said handle imparted to said lever members.

4. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, said platen top structure including two parallel platen handle arms, a handle mounted in said arms and extending transversely thereto, two lever members pivoted on said platen handle arms respectively, said handle being mounted in said platen handle arms for rotation on its own axis and having eccentrically arranged connections at its ends to said lever arms, spring means on said platen handle

arms tending to swing said lever members in one direction, and a lock member carried by said lever members and caused to function to lock when down the platen top structure to said body portion, said lock member being caused to function by rotative movement of said handle on its own axis in one direction.

5. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member, a platen top structure pivotally mounted by hinges including projecting rivets 51, 51 on said body portion for swinging movement down into and up out of functioning relation to the said platen transparent member, and a masking unit useable either when employing cut film or film negatives in a continuous roll, such masking unit including two masking-blade support arms 134, 134a pivoted substantially at the supporting hinges of the top platen structure, hooks 135 pivoted on said support arms 134, 134a adapted to engage said rivets 51, 51 and upon opposite movement of said hooks to be disengaged from said rivets 51, 51, so that the said support arms 134, 134a may be readily removed from said rivets 51, 51, whereupon the entire said masking unit may be lifted off the top of the printing apparatus, a tie rod 138 carried at the outer ends of and connecting the said arms 134, 134a, a support rod 141 supported upon said arm 134 in parallelism therewith, a pair of masking blades 143, 143 carried on the support rod 141 and a pair of masking blades 148, 148 carried upon said tie rod 138 at right angles to the masking blades 143, 143, the construction being such that such entire masking unit may be readily swung upward from the platen transparent member independently of the upward swinging movement of the platen top structure.

6. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, supporting means at opposite ends of the said top of the body portion to support a film supporting spool and a film receiving spool respectively, and means for readily accommodating film support spools and film supply spools of different lengths in said supporting means, whereby the apparatus is adapted readily to accommodate different widths of film rolls, the said last mentioned means and said supporting means including bracket arms 33, 37 and 34, 38 extending endwise from the opposite ends of the body portion, bearings 109 on said bracket arms 33, 34 and having shafts 110 fitted thereon to receive one end of said spools, bushings 115 carried by the bracket arms 37, 38 and having shafts 116 therein to receive the opposite end of said spools, said bushings having disengageable clamps 120, said several shafts having surface formations spaced apart therealong and extending in directions about said shafts for receiving said disengageable clamps 120 on said bushings in accordance with the length of substituted film support and supply spools.

7. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member and a platen top structure pivotally mounted on said body for swinging movement into and out

of printing relation to the said platen transparent member and having operating handle means including a handle 85 extending transversely of the apparatus and mounted for rotative movement in either direction upon its own longitudinal axis, a lock member carried by said platen top structure and adapted to be co-operatively engaged with the box-like body portion to lock said platen top structure in its said printing relation to the box-like body portion, and means operatively connected to said lock member on the platen top structure and to said handle 85 of said handle means to cause said lock member, by manual rotative movement of said handle 85 in one direction, to move into locking engagement with the box-like body after the platen top structure has been swung fully downward into its printing position.

8. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to the said platen transparent member and having operating handle means, a lock member carried by said platen top structure and adapted to be co-operatively engaged with the box-like body portion to lock said platen top structure in its said printing relation to the box-like body portion, said platen top structure having a handle for swinging said structure into and out of printing position, said handle being mounted for rocking movement upon its axis, and means connecting said handle to said locking member to cause said locking member to function by engaging the box-like body portion after the platen top structure has been moved fully into printing position, such means being controlled by said rocking movement of the handle on its axis.

9. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to the said platen transparent member and having operating handle means, a lock member carried by said platen top structure and adapted to be co-operatively engaged with the box-like portion to lock said platen top structure in its said printing relation to the box-like body portion, a handle on said platen top structure for swinging it into and out of printing position, said handle being mounted to receive a rotative manual movement after the platen top structure has been swung down into printing position, and means caused by such rotative manual movement to move said lock member to engage the box-like body so as to lock the platen top structure in its printing position.

10. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to the said platen transparent member and having operating handle means, a lock member carried by said platen top structure and adapted to be co-operatively engaged with the box-like body portion to lock said platen top structure in its said printing relation to the box-like body portion, a handle on said platen top

structure for swinging it into and out of printing position, said handle being mounted to receive a rotative manual movement after the platen top structure has been swung down into printing position, and means caused by such rotative manual movement to move said lock member to engage the box-like body so as to lock the platen top structure in its printing position, and means for automatically unlocking said lock member.

11. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member and a platen top structure pivotally mounted on said body for swinging movement into and out of printing relation to the said platen transparent member and having operating handle means, a lock member carried by said platen top structure and adapted to be cooperatively engaged with the box-like body portion to lock said platen top structure in its printing relation to the box-like body portion, a handle on said platen top structure for swinging it into and out of printing position, said handle being mounted to receive a rotative manual movement after the platen top structure has been swung down into printing position, and means caused by said rotative manual movement to move said lock member to engage the box-like body so as to lock the platen top structure in its printing position, the said construction permitting the platen top structure to be unlocked by application of pressure to said handle in conjunction with a rotative movement of said handle.

12. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, said platen top structure including at least one platen handle arm, a handle attached to said arm and capable of being rotated, and a lock for locking, when down, said platen top structure to said box-like body portion, said lock being carried by such handle arm and supported so as not normally to function to lock when the platen top structure is swung down into printing position, but caused to lock and to unlock by rotating movement of said handle.

13. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, said platen top structure including two parallel platen handle arms, a rotatable handle mounted in said arms and extending transversely thereto, and locking means carried by said platen handle arms and connected for operation to said handle and controlled by a rotary movement of said handle, whereby said locking means functions to lock only when said rotating handle movement is made.

14. Apparatus for printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass, and a platen top structure pivotally mounted on said body for swinging movement into and out of functioning relation to said platen glass, said platen top structure including two parallel platen handle

arms, a rotatable handle mounted in said arms and extending transversely thereto, lever members pivoted on said platen handle arms respectively, and having an operating connection to said handle, and a lock carried by said lever members, and caused to function by a rotary movement of said handle acting through said rotating operating connection.

15. Apparatus for contact printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass; a platen top structure pivotally mounted on said body portion for swinging movement down into and up out of functioning relation to said platen glass, said platen top structure having an electric platen switch 68 and switch operating arm 73 actuated by movement of said platen top structure to close and to open said switch; electric circuit wiring leading from a source of potential to said platen switch; said printing apparatus having in the body portion thereof below the said platen glass, a plate-like member supported in the said body portion, the latter for that purpose having in its walls guiding formations receiving edges of said plate-like member and supporting the said member removably in horizontal position; said plate-like member having thereon a plurality of sockets for electric light lamps including a centrally positioned lamp 156, a red lamp 155 and a series of lamps at substantially the four corner portions or quarters of the said plate-like member, so as to function particularly with respect to the four quarters of the negative to be printed from, there being circuit wiring connecting each of said lamps to the said platen switch, thereby to control said lamps, the said centrally positioned lamp and the said other lamps each having in the circuit wiring in its own independent switch carried by the said plate-like member, said electric wiring being such that said centrally positioned lamp may be controlled independently, either by the platen switch or by its own special switch, the said plate-like member being removable from its supported position in the body portion while maintaining the circuit connections to the said switches and lamps, said circuit connections being sufficiently long to permit removal of the plate-like member without disturbing said connections thereto.

16. A photographic printing apparatus in accordance with claim 15, but wherein said plate-like member is provided at its front with a switch plate directly secured thereto and arranged at substantially right angles to the said member and carrying the several switches for each of the lamp sockets, the said switch plate, when the switch plate member is in position in the body portion of the printer, constituting the lower part only of the front wall of the said body portion and being removable with the said plate-like member from the body portion of the printing apparatus as a unit without necessarily disconnecting any wires of the circuit wiring, or disturbing the front wall of the printer box positioned above said switch plate.

17. Apparatus for contact printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass; a platen top structure pivotally mounted on said body portion for swinging movement down into and up out of functioning relation to said platen glass, said platen top structure having an electric platen switch 68 and switch operating arm 73

actuated by movement of said platen top structure to close and to open said switch; electric circuit wiring leading from a source of potential to said platen switch; said printing apparatus having, in the body portion thereof below the said platen glass, a plate-like member supported in the said body portion, the latter for that purpose having in its walls guiding formations receiving edges of said plate-like member and supporting the said member removably in horizontal position; said plate-like member having thereon a plurality of sockets for electric light lamps including a centrally positioned lamp 156, a red lamp 155 and a series of lamps at substantially the four corner portions or quarters of the said plate-like member, so as to function particularly with respect to the four quarters of the negative to be printed from, there being circuit wiring permitting any one of said four corner lamps and said centrally positioned lamp 156 to be placed in series with the red lamp, the latter being in parallel with the platen switch 68 so as to be short-circuited when said platen switch is closed, and whereby any or all of the said four corner lamps and the centrally positioned lamp will be illuminated, the said plate-like member being removable from its supported position in the body portion while maintaining the circuit connections to the said switches and lamps, said circuit connections being sufficiently long to permit removal of the plate-like member without disturbing said connections thereto.

18. Apparatus for contact printing for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen glass; a platen top structure pivotally mounted on said body portion for swinging movement down into and up out of functioning relation to said platen glass, said platen top structure having an electric platen switch 68 and switch operating arm 73 actuated by movement of said platen top structure to close and to open said switch; electric circuit wiring leading from a source of potential to said platen switch; said printing apparatus having, in the body portion thereof below the said platen glass, a plate-like member supported in the said body portion, the latter for that purpose having in its walls guiding formations receiving edges of said plate-like member and supporting the said member removably in horizontal position; said plate-like member having thereon a plurality of sockets for electric light lamps including a centrally positioned lamp 156, a red lamp 155 and a series of lamps at substantially the four corner portions or quarters of the said plate-like member, so as to function particularly with respect to the four quarters of the negative to be printed from, there being circuit wiring connecting each of said lamps to the said platen switch, thereby to control said lamps, said centrally positioned lamp also having an independent switch and circuit wiring, so that said centrally positioned lamp will remain lighted regardless of the position of the contacts in the platen switch 68, the said plate-like member being removable from its supported position in the body portion while maintaining the circuit connections to the said switches and lamps, said circuit connections being sufficiently long to permit removal of the plate-like member without disturbing said connections thereto.

19. A printing apparatus for photographic purposes from negatives including, in combination, a box-like portion having at its top a negative-re-

ceiving platen transparent member, a platen top structure pivotally mounted by hinges on said body portion for swinging movement down into and up out of functioning relation to the said platen transparent member, and a masking unit useable either when employing cut film or film negatives in a continuous roll, such masking unit including two masking-blade support arms 134, 134a pivoted substantially at the supporting hinges of the top platen structure, a tie rod 138 carried at the outer ends of and connecting the said arms 134, 134a, a support rod 141 supported upon said arm 134 in parallelism therewith, a pair of masking blades 143, 143 carried on the support rod 141 and a pair of masking blades 148, 148 carried upon said tie rod 138 at right angles to the masking blades 143, 143, the construction being such that such entire masking unit may be readily swung upward from the platen transparent member independently of the upward swinging movement of the platen top structure, the said support arms 134, 134a being provided with hook-shaped members 137, 137 wherein the tie rod 138 is mounted, the said masking blade support arm 134 being provided with upturned ends 139, 140 wherein the support rod 141 is mounted.

20. A printing apparatus for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member, a platen top structure pivotally mounted by hinges on said body portion for swinging movement down into and up out of functioning relation to the said platen transparent member, and a masking unit useable either when employing cut film or film negatives in a continuous roll, such masking unit including two masking-blade support arms 134, 134a pivoted substantially at the supporting hinges of the top platen structure, a tie rod 138 carried at the outer ends of and connecting the said arms 134, 134a, a support rod 141 supported upon said arm 134 in parallelism therewith, a pair of masking blades 143, 143 carried on the support rod 141 and a pair of masking blades 148, 148 carried upon said tie rod 138 at right angles to the masking blades 143, 143, the construction being such that such entire masking unit may be readily swung upward from the platen transparent member independently of the upward swinging movement of the platen top structure, the said support rod 141 being provided with movable channel members 142, 142 whereon said masking blades 143, 143 are carried, the said tie rod 138 carrying movable channel members 146, 146 themselves carrying the said masking blades 148, 148.

21. A printing apparatus for photographic purposes from negatives including, in combination, a box-like body portion having at its top a negative-receiving platen transparent member, a platen top structure pivotally mounted by hinges on said body portion for swinging movement down into and up out of functioning relation to the said platen transparent member, and a masking unit useable either when employing cut film or film negatives in a continuous roll, such masking unit including two masking-blade support arms 134, 134a pivoted substantially at the supporting hinges of the top platen structure, a tie rod 138 carried at the outer ends of and connecting the said arms 134, 134a, a support rod 141 supported upon said arm 134 in parallelism therewith, a pair of masking blades 143, 143 carried on the support rod 141 and a pair of masking blades 148, 148 carried upon said tie rod 138

at right angles to the masking blades 143, 143, the construction being such that such entire masking unit may be readily swung upward from the platen transparent member independently of the upward swinging movement of the platen top structure, the said rod 141 being provided with movable channel members 142, 142 whereon the said masking blades 143, 143 are carried, the said tie rod 138 carrying movable members 146, 146 themselves carrying masking blades 148, 148, the said masking blades 143, 143 having at their free ends hooks 150, 150 to engage said support arms 134a.

22. A printing apparatus in accordance with claim 5, but wherein the said box-like body por-

tion at its upper end at opposite sides thereof has attached thereto lengthwise extending sheet-like supporting bracket arms 33, 37 and 34, 38, and having bearings 109 for respectively supporting a film support spool and a film receiving spool, shafts 110, 116 mounted in said bearings, said shafts 116 having circumferentially extending grooves spaced apart therealong and bushings 115 on said bracket arms 37, 38 and provided with spring clamps 120 engageable in said circumferentially extending grooves in accordance with the length of substituted film support spool and film receiving spool.

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