

Sept. 4, 1945.

G. M. DYE

2,384,019

MACHINE FOR MAKING PRINTS

Original Filed Nov. 7, 1938

5 Sheets-Sheet 1

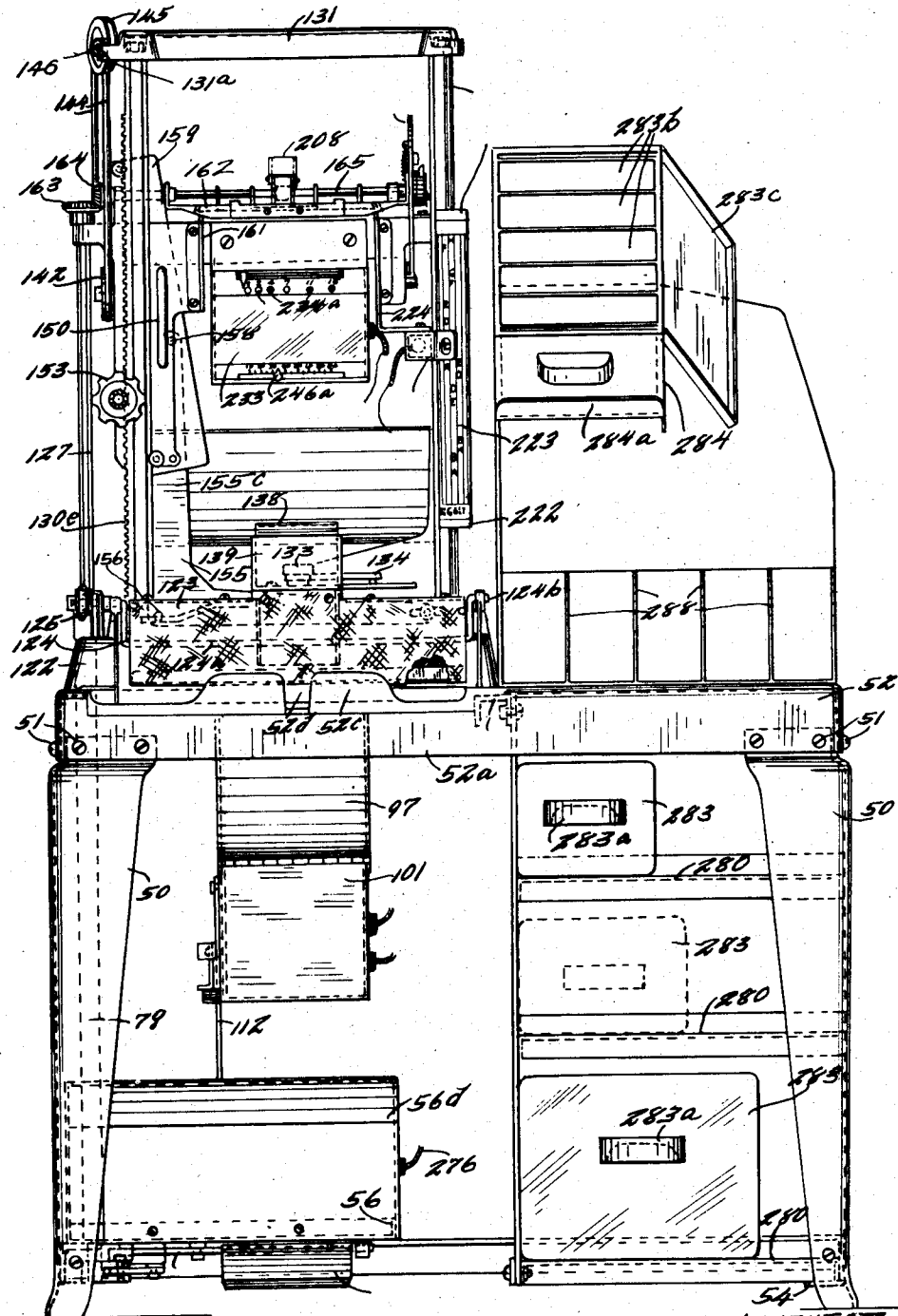


Fig. 1.

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5 Sheets-Sheet 2

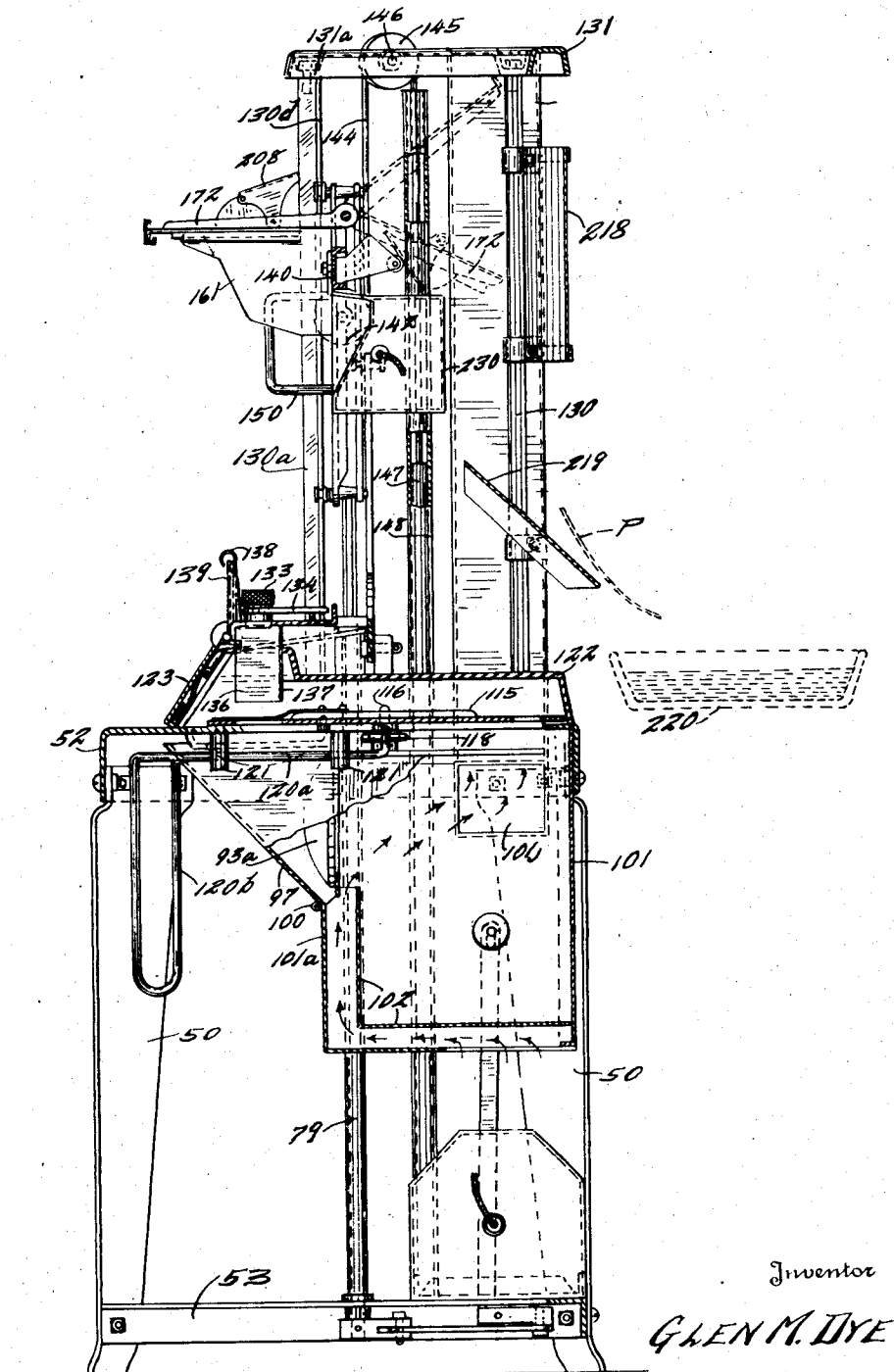


Fig. 2.

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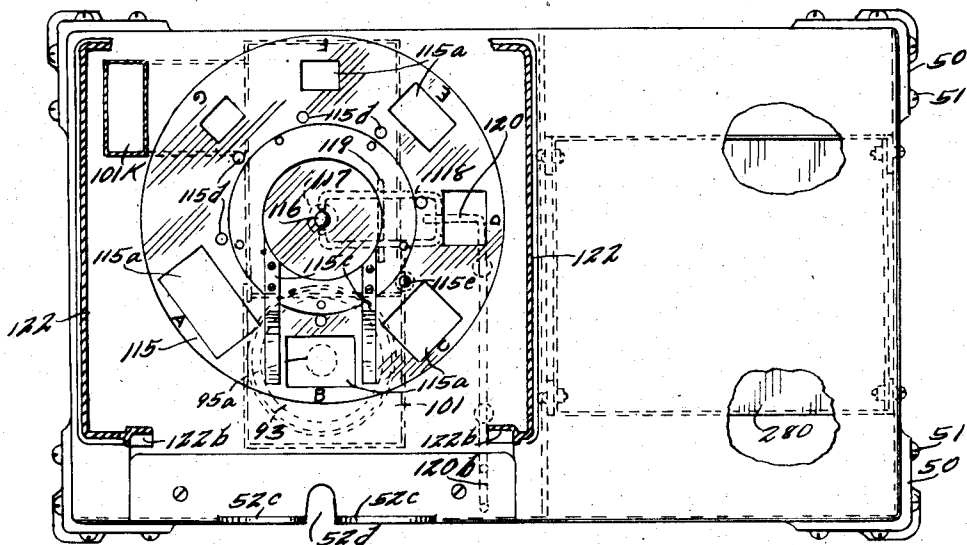


Fig. 3.

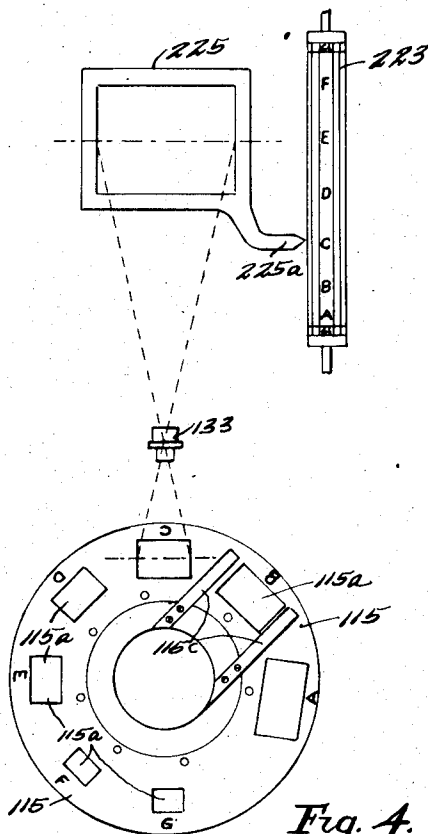


Fig. 4.

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5 Sheets-Sheet 4

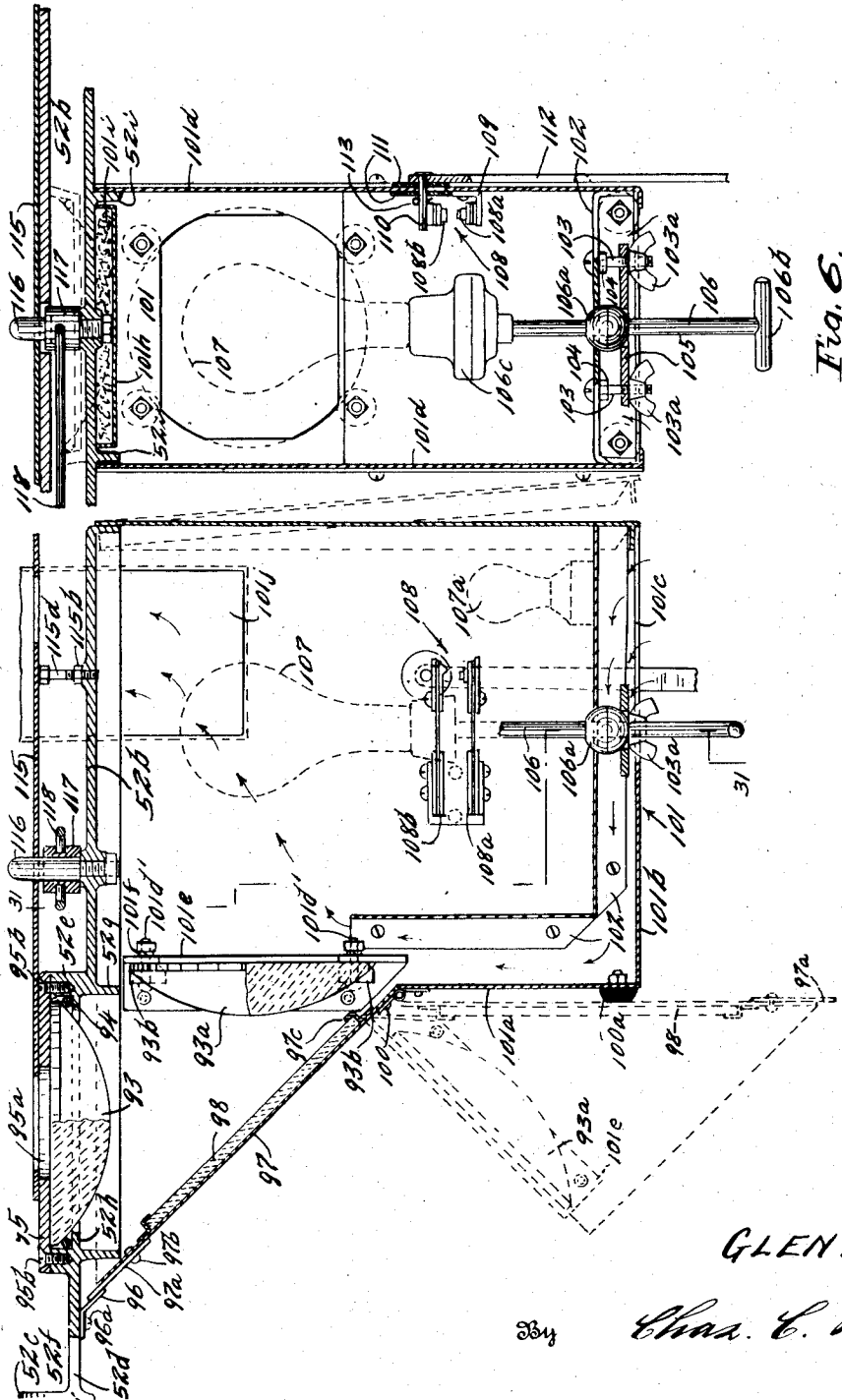


Fig. 5.

Fig. 6.

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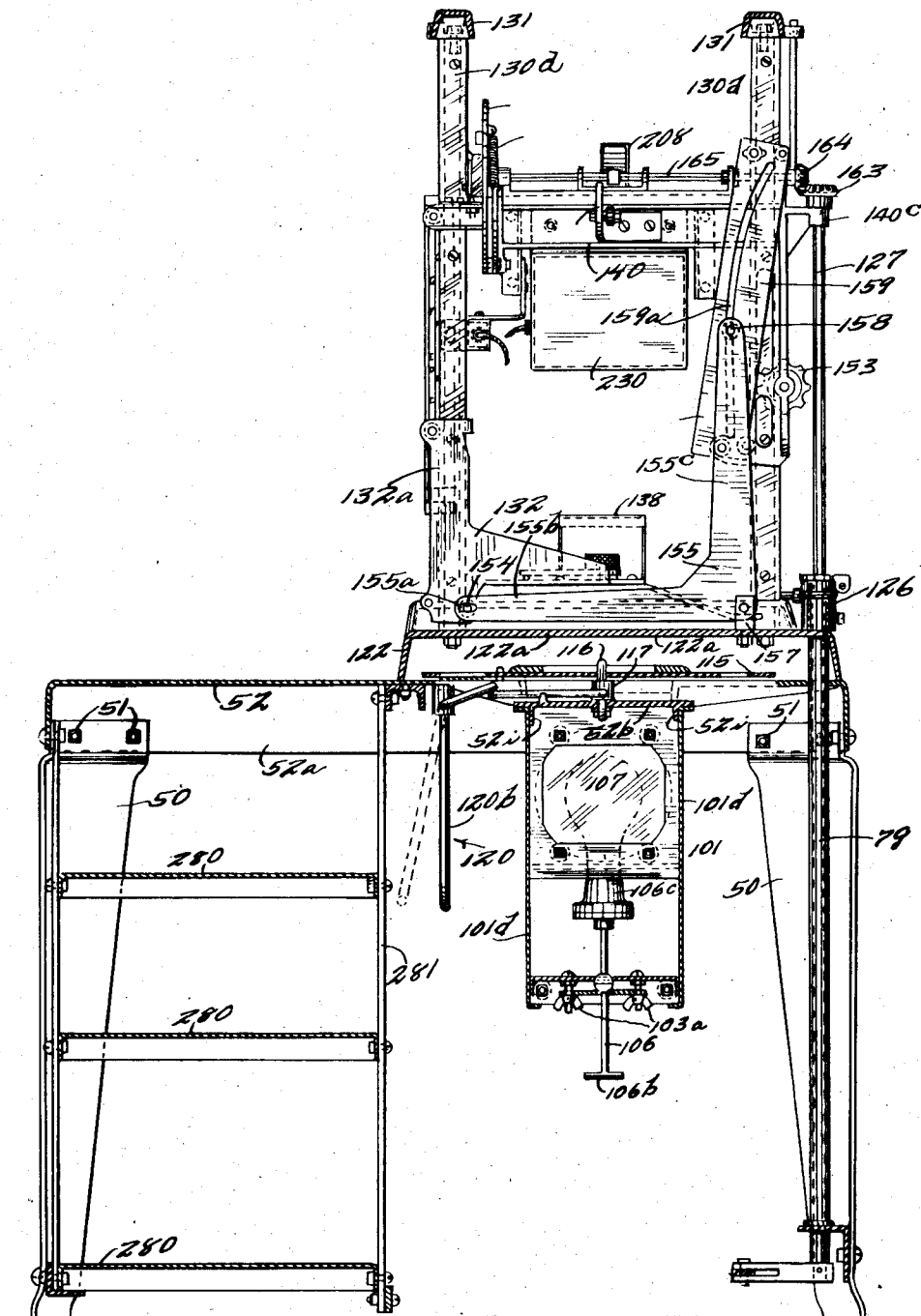
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2,384,019

MACHINE FOR MAKING PRINTS

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Original application November 7, 1938, Serial No. 239,269. Divided and this application July 10, 1942, Serial No. 450,396

10 Claims. (Cl. 88—24)

This invention relates to a projection printer for making photographic prints or to a machine for making oversized prints. The machine is designed to make projection prints from negatives of different sizes, which prints will have a size range comprising a very large proportion of such projection prints or enlargements now commercially made.

It is an object of this invention to provide a motor driven projection printer which is constructed and arranged for rapid, convenient and efficient operation.

It is a further object of the invention to provide a projection printer including a negative holder of efficient construction and one that can be quickly and conveniently operated.

It is another object of the invention to provide a projection printer including a revoluble member having a plurality of different sized openings therethrough and forming a combined mask and negative holder.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which—

Fig. 1 is a view in front elevation of the machine;

Fig. 2 is a view partly in side elevation as seen from the right of Fig. 1 and partly in vertical section taken through the lamp box;

Fig. 3 is a horizontal section taken just above the negative holding means;

Fig. 4 is a diagrammatic view illustrating the relation between the openings in the negative holder, the lens and the print;

Fig. 5 is a central vertical longitudinal section through the lamp box and negative holder;

Fig. 6 is a vertical section taken through the center of the negative holder in a plane at right angles to that of Fig. 5; and

Fig. 7 is a view partly in rear elevation and partly in vertical section taken through the negative holder and lamp box.

Referring to the drawings, a machine is shown comprising a frame including legs 50 shown as four in number. These may be of any suitable construction and are illustrated as of angle shape in cross section tapering toward their lower ends, with the inside of their angles disposed inwardly and secured at their upper ends by screws 51 to a substantially horizontal plate or table 52 having a depending flange 52a extending thereabout with the inner side of which legs 50 engage. A

bar 53 of angular cross section extends between legs 50 at one side adjacent their bottoms.

A lamp box is provided, the top of which is formed by a plate or casting 52b which is secured in and in effect forms part of table top 52. Said plate 52b has a flange 52c at its forward end having therein a slot or opening 52d which is continued as a slot through the bottom of plate 52b for some distance. Said plate 52b has a raised portion 52e therein and a trough 52f is formed at the front portion of the plate 52b between flange 52c and portion 52e. Portion 52e is apertured and has a depending cylindrical flange 52g extending downwardly therefrom. An annular flange 52h is formed in portion 52e and forms the support for a lens 93. Said lens may be positioned on a resilient annular strip 94 shown as circular in cross section. Said lens 93 is held in position by a plate 95 which may be made of any suitable material and in practice has been made of Masonite. Plate 95 is secured to portion 52e by countersunk screws 95b. A small bracket 96 is secured to the underside of plate 52b at its forward portion by small screws 96a and has a lip extending downwardly and inwardly substantially at a 45 degree angle. A front plate 97 is provided for the lamp box, the same having a latch 97a pivoted thereto by a pivot member 97b, said member 97a being adapted to be moved over the inner side of bracket 96 to hold plate 97 in closed position. Plate 97 has small brackets 97c secured thereto the same being offset to form lips directed toward each other and to extend over a mirror 98 which is thus secured to the inner side of plate 97. Plate 97 is hinged by a hinge 100 to the vertical stationary front side plate 101a of the lamp box casing 101. Side plate 101a has secured thereto adjacent its bottom a resilient cushion block 100a against which plate 97 will engage should it be dropped. Casing 101 has a bottom plate 101b having an aperture 101c therethrough, one function of which is to admit cool air into the lamp box. The lamp box also comprises side plates 101d which engage the outer side of flanges 52i formed on plate 52b and to which they are secured. Brackets 102 illustrated as formed from angle members are secured to side plates 101d and extend across the lamp box adjacent the bottom thereof. Headed screws 103 extend through the lower part of bracket 102, being held therein by nuts 104, said bolts also extending through a plate 105 and being equipped with wing or thumb nuts 103a beneath plate 105, said nuts thus holding said plate in position. Plate 105 is centrally

apertured and forms a seat for a ball member 106a formed on a rod 106 which extends through the bottom of the lamp box through opening 101c and carries at its upper end the lamp socket 106c in which the printing lamp 107 is secured. Rod 105 has a handle 106b at its lower end. A stationary contact member 108a forming one part of the printing lamp switch 108 is carried on a small angle bracket 109 secured to one side plate 101b. The movable contact 108b of switch 108 is carried on a pin 110 slidable vertically in a slot in side plate 101b, plates 111 of insulating material being disposed at the inner and outer sides of side plate 101b and moving with and forming in effect guide members for pin 110. Pin 110 extends through a vertically movable bar 112, said pin having a head formed thereon at the outer side of said bar and having a small cotter pin 113 extending therethrough at the inner side of inner plate 11. Bar 112 extends downwardly and is connected to a mechanism for controlling contact 108b. A pilot lamp 107a is also provided in the bottom of lamp box casing 104. A second and condensing lens 93a is provided, disposed at right angles to lens 93 and carried in an angle bracket 101e and secured therein by headed and nutted bolts 101d'. Spring washers 101f are disposed under the nuts on bolts 101d' and clamping members 93b which may be of resilient material are disposed under the heads of the nuts on bolts 101d and engage lens 93a. It will be seen from Fig. 5 that lenses 93 and 93a are flat on one side and have convex surfaces at their other side, said convex surfaces being directed toward mirror 98. A flat casing 101h is disposed below plate 52b above lamp 107, the same containing insulating material 101i. Said parts are provided to prevent the heat from lamp 107 unduly heating plate 52b thereabove. An opening 101j leads from the upper part of the lamp box and communicates with a vertical flue 101k which extends upwardly to the top of the machine. While said flue may be of any form, in the embodiment of the invention illustrated it is shown as rectangular in cross section.

The member 95a has an opening therein through which the light for printing passes and the top surface of member 95 forms the supporting surface for the negatives such as films which are to be printed. A negative holding means is provided, comprising a rotatable plate or turret 115. Plate 115 is rotatably mounted on a pin 116 secured in member 52b and is arranged to be raised by a sleeve 117 disposed therebeneath and slidable on pin 116. A rest for plate 115 is provided comprising a headed screw 115d adjustably threaded into member 52b and adapted to be held in adjusted position by a lock nut 115b. Sleeve 117 is adapted to be lifted by a lever 118 having end portions disposed in opposite sides thereof, said lever having parallel spaced portions joined at their ends remote from sleeve 117. Lever 118 is arranged to tilt about a fulcrum member 119 carried on member 52b. An operating means for plate 115 is provided and comprises a knee-operated lever 120 having a horizontal portion 120a journaled in bearings 121 secured to the underside of table 52, said portion being bent at its end substantially at a right angle, and disposed to overlie the closed or outer end of lever 118. Lever 120 also has an outer downwardly extending portion 120b formed with spaced parallel sides, which portion is contacted by the knee of the operator. While lever 120 may be of any suitable form, in the embodiment of

the invention illustrated it is shown as made from a round rod. It will be seen that by pressing laterally on portion 120b plate 115 will be lifted and it can then be easily rotated about pin 116. Plate 115 has quite a number of circumferentially spaced openings 115a therethrough adjacent its circumference, which openings are of different sizes and shapes. Openings 115a are thus adapted to determine different areas to be printed. Flat spring members 115c are secured at either side of one of the openings 115a and press on plate 115 at the sides of said opening, said springs being adapted to hold certain small films or to engage a special holding means for a very small film such as a strip film from a motion picture camera. Plate 115 is adapted to be held or locked in position with one of the openings 115a over the light opening 95a and for this purpose said plate is provided with a plurality of holes 115d, there being one for each opening 115a. When the respective opening 115a is in proper position relative to the light opening the corresponding hole 115d receives a pin 115e which upstands from member 52b. When the plate 115 is lifted for rotation it is lifted clear of pin 115e. A casing 122 having a substantially horizontal top 122a spaced a short distance above table 52 extends over holder 115, the same having outwardly and downwardly sloping sides. Said casing 122 is open at its front for the insertion and removal of the negatives and also has its top offset upwardly at said front. The open front portion of casing 122 is closed during the printing operation by a flexible opaque curtain 123. Curtain 123 is adapted to be raised by oscillation of a crank rod 124 having an offset curtain-engaging central portion 124a and end portions 124b. End portions 124b are journaled in small bearings supported on the frame. Crank rod 124 is oscillated by a pulley 125 connected by a suitable belt to pulley 126.

Bar 55 shown as angular in cross section, is also secured to and extends between the rear legs 50 adjacent their bottoms. This bar supports a motor used to drive the moving parts of the machine, the same being enclosed in a casing 56d. A conductor 276 is shown as leading to said motor. A shaft 79 is operated by suitable connections from the motor and extends to and drives a pulley member 126. A shaft 127 is connected to shaft 79 and operated therefrom.

Two rear rods 130 and two forward rods 130a and 130b are secured at their lower ends in top 122a and extend vertically to a three sided yoke 131. While yoke 131 could be variously made, in the embodiment of the invention illustrated it is shown as in the form of a channel with its open side directed downwardly. Rods or posts 130, 130a and 130b form guides on which are slidable two assemblies, one of which carries the projecting lens and the other and upper of which carries the paper supporting and handling mechanism. The first of said assemblies include a plate or lens carriage 132 having a rather long portion 132a arranged for vertical movement. Carriage 132 carries the lens unit 133 which comprises the usual iris or diaphragm for exposing more or less of said lens to decrease or diminish an opening close to said lens. This iris is arranged to be operated by an oscillating arm 134. Plate 132 has secured thereto and depending therefrom spaced plates 136 connected by a similar rear plate 137. Plates 136 and 137 move close to the sides of an opening in top plate 122a and prevent the passage of light outwardly from cas-

ing 122 when lens unit 133 moves upwardly. Also movable with the lens carriage at the front and above plates 136 and 137 is a plate 138 having a forwardly curved upper end which extends over a plate 139 fixed to the top plate 122a. Plates 138 and 139 prevent the passage of light upwardly.

The other of said two assemblies constitutes a paper carriage and comprises a member 140 having a sleeve portion slidable on forward rod 130a and small rollers engaging a flat bar 130d secured to bar 130a. Member 140 at one side has secured thereto a pulley 142 rotatable on a headed stud secured in member 140. A cord or cable 144 is secured at one end to a lug 131a projecting from yoke 131 and extends downwardly around pulley 142 and then upwardly and over a pulley 145 rotatable on a headed stud 146 secured in yoke 131. From pulley 145 cable 144 extends downwardly and is connected to a rather long cylindrical counterweight 147 (see Fig. 2) which is movable in a tube 148 disposed at one side of the machine and secured in table 52. Member 140 has projecting forwardly therefrom a bail handle 150. Rod 130a has a rack 130e formed on and secured to its outer side with which meshes a small pinion carried on a shaft journaled in member 140, which shaft has secured thereto at the front of member 140 a small hand wheel 153. It will be apparent that member 140 and the parts supported thereon may be raised and lowered by handle 150 and that accurate adjustment may be had by turning hand wheel 153. Movement of the paper carriage is quite free and easy due to counterweight 147.

The lens carriage and paper carriage are interconnected and arranged for determined relation in movement so that the image projected by the lens will always be sharply focused on the paper by lens unit 133. To this end member 132 has a pin 154 projecting at its rear and this pin is disposed in an arcuate slot 155a formed adjacent the end of one arm 155b of a bell crank lever 155 pivoted on a pivot 156 supported in a small bracket 157 secured to top plate 122a. Lever 155 has its other arm 155c extending upwardly and said arm has a pin 158 secured therein, which pin is disposed in and arranged to move in a cam slot 159a formed in a cam plate 159 secured to a paper carriage 140.

The paper carriage 140 has secured therein by plate brackets 161 having dove-tailed grooves therein, a plate glass portion 162 which has bevelled sides fitting in said grooves. The shaft 127 already mentioned extends upwardly to and has a reduced portion journaled in a stationary bearing. Above said bearing shaft 127 has secured thereto a bevelled gear 163 with which meshes another bevelled gear 164. Gear 164 is secured to a shaft 165 extending horizontally and journaled in suitable bearings.

A mask carrier is provided as well as a platen structure including a platen carrier 172 suitable connected to a shaft 165 to be oscillated thereby. Different positions of member 172 are shown in Fig. 2. A print guiding member 218 extends across the rear of the machine and a print guiding plate 219 is provided adapted to guide the discharged print P into any suitable receptacle such as a tray 220 shown in Fig. 2. A numbering device 208 is provided suitably operated to print an identifying number or character on each print. An index member 223 is provided suitably mounted upon a rod 221 between members 222, the same having characters designating the

openings 115a, said characters being disposed in vertical rows and appropriately spaced. Said index member or column 233 also has arranged circumferentially thereon at top and bottom the identifying characters of the masks provided for the machine. A bracket 224 depends from one of the brackets 161 which holds member 162 and has secured thereto a small casing 225 having a pointer 225a at one side adapted to move along and cooperate with the index member 223. In practice the pointer will be horizontally aligned with one of the letters on the column at the front of said index member. There is a lamp in casing 225 and a conductor 273 is shown therefor.

An exposure guide or meter is provided comprising a casing 230, the same being secured to the central part of paper carriage 140. The front of casing 230 on its upper portion is provided with a plurality of holes or openings 234a and these will have extending thereover a diaphragm or sheet of material of such nature so that light will show through holes 234a in different degrees of density. These openings may be designated by certain characters and a pointer member is adapted in the operation of the machine to move along said row of openings. Said exposure guide also includes a mirror 233 in which the negative is reflected so as to be viewed by the operator. A lamp is used in casing 230 to vary the intensity of illumination and thus the degree of density of the openings 234a and a resistance is provided in the circuit of the lamp and a pointer 245a moves along a scale at the bottom of casing 230 to indicate the degree of resistance cut into the circuit.

The machine has a series of shelves 280 illustrated as three in number extending horizontally at one side thereof beneath table 52 and supported upon vertical bars 281 secured at their upper ends to table 52 and a channel member 282 extending across the same. Drawers 283 are adapted to be disposed on the shelves 280, the same having handles 283a on their front ends. A shelf 284 is formed at the right side of the machine, the same sloping downwardly and forwardly at an angle of substantially 45 degrees and having an upwardly and forwardly extending portion 284a at its lower end. The shelf 284 is adapted to support one of the drawers 283, which drawers as shown in Fig. 1, are provided with a cover 283c. Forwardly of the foremost partition 286 the machine is provided with a plurality of compartments 287 formed by partitions 288 having rounded forward corners. Drawers 283 have compartments 283b therein.

This application is a division of applicant's co-pending application S. N. 239,269, filed November 7, 1938, now Patent Number 2,291,613, issued August 4, 1942, on "Projection printer." The matter claimed in the present application relates principally to the means for holding the negative and parts connected therewith. Other parts of the machine shown in the drawings are generally described but form no part of the claimed invention. A full description of the machine appears in applicant's previously filed case to which reference is above made.

In operating the machine the switch for the motor in casing 56d will be closed and this starts the motor and lights a lamp in casing 225 for the index member 223 and also lights the pilot light 107a. The function of the pilot light is to furnish sufficient light for the operator to place the negative over the light opening 95a. It will be understood that the machine will be operated in

a dark room. The operator now takes the negative to be printed and selects the proper mask to give the desired enlargement or the desired size of print. It will be understood that at this time the platen is in its rearward position shown in dotted lines in Fig. 2. The mask is quickly placed in position and the operator now presses laterally on the downturned portion 120b of lever 120, thus lifting the negative holder 115. Said holder is thus free for rotation and is quickly turned to bring the desired opening 115a in forward position. A negative is placed beneath the opening 115a and lever 120 is released. Plate 115 then descends holding the negative firmly on the top of plate 95. The operator grasps handle 150 and moves the paper carriage and pointer 225a to bring the pointer opposite the letter designating the opening 115a beneath which the negative has been placed. As previously described, movement of the paper carriage 150 through the connection thereof with the lens carriage also moves the lens carriage. The interconnection between the paper carriage 140 and the lens carriage 132 is so designed that the lens unit 133 is always brought to proper position so that the projected image will fill the mask opening when the pointer 225a registered with the proper letter on the index guide 223. The paper is now placed in position and the machine is operated through a suitable clutch to go through its cycle. The platen holder 172 is now swung down to paper holding position. At the same time the printing member 208 is operated and an identifying character is printed on the paper. As the platen reaches its position on the paper plate switch 108 is closed and this lights the printing lamp 107. Shaft 127 is rotated, rotating pulley block 126, and this rotates pulley 125, thus moving crank rod 124 and lowering curtain 123 to its closed position. Curtain 123 is closed before the printing lamp is lighted. When the printing lamp is lighted the image as stated, is sharply focused on the printing paper. The image of the negative is reflected in mirror 233 which as shown in Fig. 1, is in view of the operator. The operator glances at said image and picks out a portion thereof which will determine the printing period. Every negative has certain contrasting parts therein and an experienced operator in looking at the negative, can and does pick out some portion thereof which will determine the density of the print to be made or the time of exposure. Having selected the said portion of the image the operator then selects the opening 234a which most nearly corresponds to the density of the selected portion. The pointer shown in Fig. 1 travels along said openings and when it reaches the selected opening the operator steps on the control pedal of the machine and brings the printing period to an end. The machine then passes through a cycle which operates shaft 127 and shaft 165 so that the mask carrier and platen are raised together lifting the print and discharging it rearwardly. The print slides from the platen against panel 218 and then drops onto deflecting plate 219 and is guided into tray 220. The operation is quite rapid and the making of prints is only a matter of seconds. The work order envelopes containing the films for each order can conveniently be placed in the compartments 287. The drawers 283 contain the print paper and paper of different speeds will be contained in compartments 283b. The drawers can be conveniently positioned on the shelf 284 so that the paper is within easy reach of the opera-

tor. Another important feature of the machine is the trough formed in the rear of flange 52c. As the work is finished on each negative the operator can merely push the negatives forwardly so that they drop into said trough. When the particular order is finished the operator can reach into the trough with the thumb and finger through the opening 52e and grasp the pile of negatives between the thumb and finger so that they can be easily and quickly removed as a group.

From the above description it will be seen that I have provided a very efficient and compact machine by means of which enlargements or oversized prints can be made with great ease and speed. The member 115 in effect forms a combined mask for the negative and negative holder. The opening which it is desired to use can be very quickly brought into position over the lamp opening, the negative can be quickly placed in position and plate 115 then lowered to hold the negative. The member 115 is simple in construction and can be easily and quickly operated. The machine has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth, in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A photographic printing device having in combination, a support having a surface for supporting a negative and having an opening there-through for the passage of light for printing from said negative, a pin upstanding from said member, a circular plate revoluble about said pin and having a plurality of circumferentially spaced openings of different sizes therethrough, any one of which may be brought into register with said first mentioned opening, said plate having a plurality of circumferentially spaced holes therethrough, one for each of said openings therein, a pin adapted to pass through any one of said holes to hold said plate in position and means under the control of the operator for raising said plate to place a negative thereunder and lowering the same to hold said negative in position.

2. A machine for making photographic prints having in combination, a member having a negative supporting surface with an opening there-through for the passage of light, a second member having a plurality of openings therethrough of different sizes and movable to bring any one of said openings into register with said first mentioned opening, a movable paper carriage, a movable lens carriage, means connecting said carriages to move in synchronism, an index member having spaced characters thereon corresponding to said last mentioned openings, and a member movable with said carriages cooperating with said index member and movable therealong to properly position said carriages for the particular opening used in said second member so that the proper sized image is projected on the printing paper by said lens.

3. A photographic printing device having in combination, a table having a surface adapted to support negatives of various sizes such as films and having an opening therethrough for the pas-

sage of light, a plate revoluble about an axis substantially perpendicular to said surface having a lower surface parallel to said surface and having a plurality of circumferentially spaced openings of different sizes therethrough, said plate being of a diameter so that said openings are adapted to be brought respectively over said first mentioned opening, and means for raising said plate for rotation and for permitting a negative to be placed on said table beneath said plate and for lowering said plate for holding said negative between the same and said table.

4. A photographic printing device having in combination, a table having a substantially horizontal surface for supporting negatives of various sizes and having an opening therethrough for the passage of light, over which opening a negative may be positioned, a plate having a lower flat substantially horizontal surface disposed over said table and pivoted for rotation about a vertical axis, said plate having a series of circumferentially spaced apertures of different dimensions therethrough and being of a diameter to extend over said opening, said apertures being adapted to be positioned respectively over said opening, means for holding said plate in position with one of said apertures over and alined with said opening in said table, and means for raising said plate to rotate the same and to permit a negative to be placed thereunder and for lowering said plate on said table to hold said negative clamped against said table.

5. A photographic printing device having in combination, a support having a surface for supporting negatives of various sizes and having an opening therethrough for the passage of light for printing of said negatives, a member comprising a combined negative holder and mask having a plurality of openings of different sizes therethrough, any one of which may be brought into position with its central axis in substantial alignment with the central axis of said opening, said member also having a lower surface parallel to said first mentioned surface, means for raising said member to permit a negative to be placed on said first mentioned surface therebeneath and for lowering the same onto said negative to clamp said negative between the same and said first mentioned surface to hold said negative in position during the printing operation.

6. The structure set forth in claim 5, said last mentioned means including a lever having a portion adapted to be actuated by the operator.

7. The structure set forth in claim 5, said last mentioned means comprising a lever having a portion operatively connected to said holder and a depending portion adapted to be engaged and swung by the knee of the operator.

8. A photographic printing device having in combination, a support having a surface for supporting negatives of various sizes and having an opening therethrough for the passage of light for printing from said negative, a combined negative holder and mask member comprising a flat rigid plate having a lower surface parallel to said surface and having a plurality of circumferentially spaced apertures of different sizes therethrough, said member being rotatable to bring any one of said spaced apertures over and into alinement centrally with said opening, means for raising said member to permit a negative to be placed on said first mentioned surface therebeneath and for lowering said member onto said negative to hold the same against said first mentioned surface during the printing operation.

9. A projection photographic printing device having in combination, a negative receiving chamber arranged to be darkened during the printing operation, a support having a substantially horizontal surface for supporting negatives of various sizes in said chamber and having an opening therethrough for the passage of light for printing, a print disposed over said chamber, a member revoluble about a central axis and having a plurality of different sized circumferentially spaced apertures therethrough disposed about said axis, said member having a lower substantially horizontal surface and being revoluble to bring any one of said spaced apertures into alinement centrally with said opening, means for holding said member in position and respective aperture in such alinement, means for lifting said member to permit a negative to be placed on said first mentioned surface therebeneath and for lowering said member onto said negative to hold the same between said member and first mentioned surface during the printing operation.

10. A photographic printing device having in combination, a support having a surface for supporting negatives of various sizes and having an aperture therethrough for the passage of light for printing from said negative, a rigid member forming a combined negative holder and mask having a plurality of openings of different sizes therethrough and movable so that any one of said openings may be brought over and into alinement centrally with said aperture and having a surface substantially parallel to said surface, and means for causing relative movement between said support and member to separate the same to permit a negative to be placed between said surfaces and to hold said negative in position clamped between said surfaces.

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