Nov. 23, 1937. P. A. M. PRIOU 2,100,087

PHOTOGRAPHIC PRINTING MACHINE

Filed Feb. 19, 1936 3 Sheets-Sheet 1

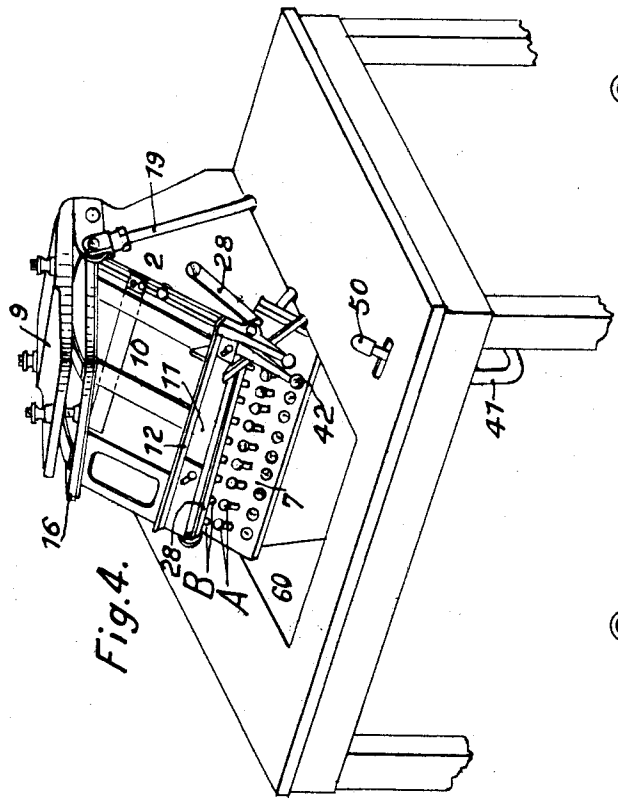


Fig. 4.

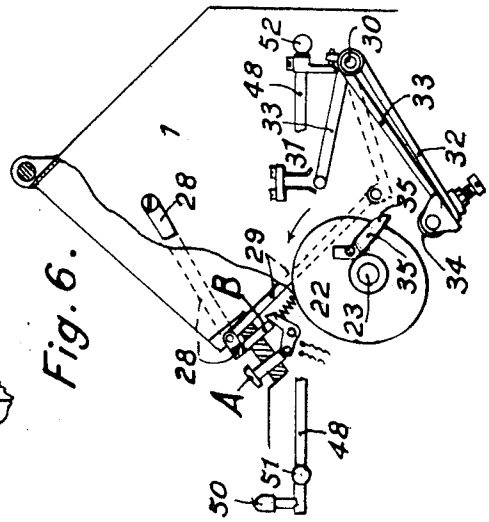


Fig. 6.

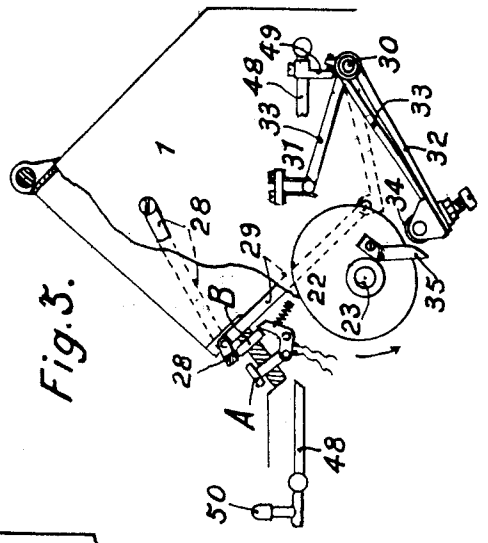


Fig. 5.

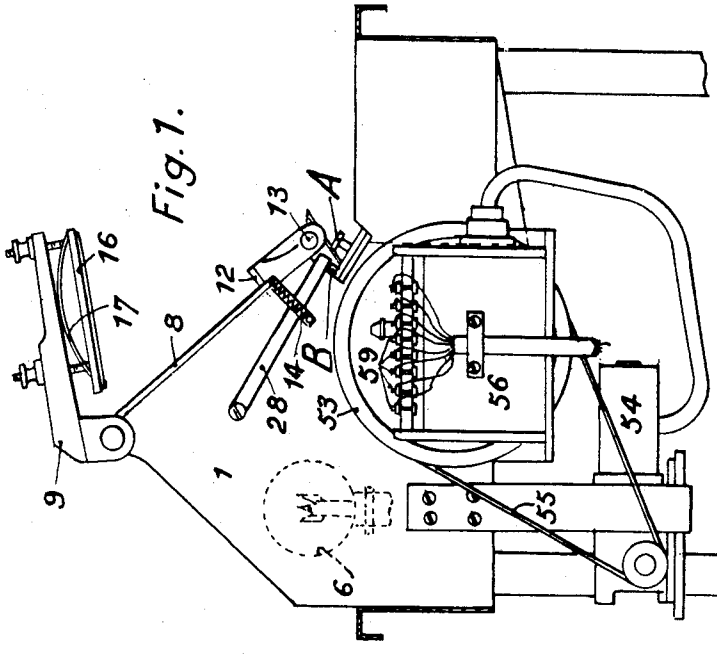


Fig. 1.

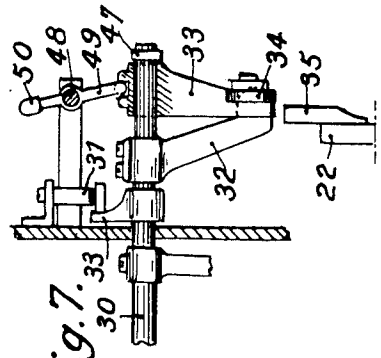


Fig. 7.

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Fig. 3.

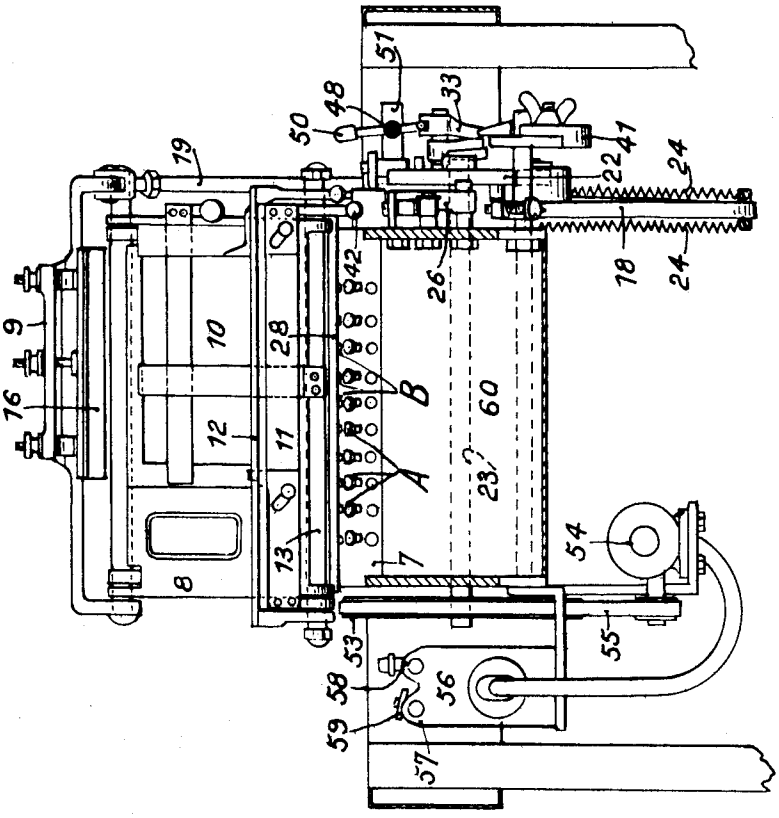
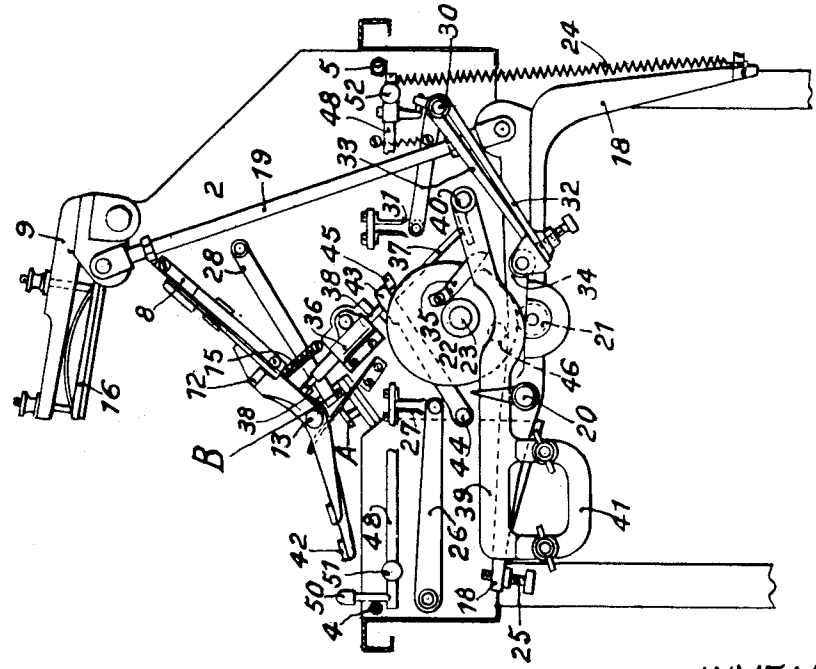



Fig. 2.




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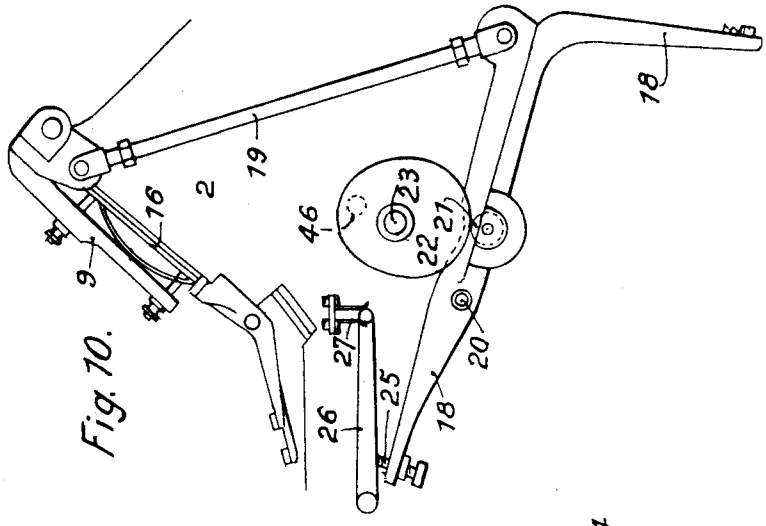



Fig. 10.

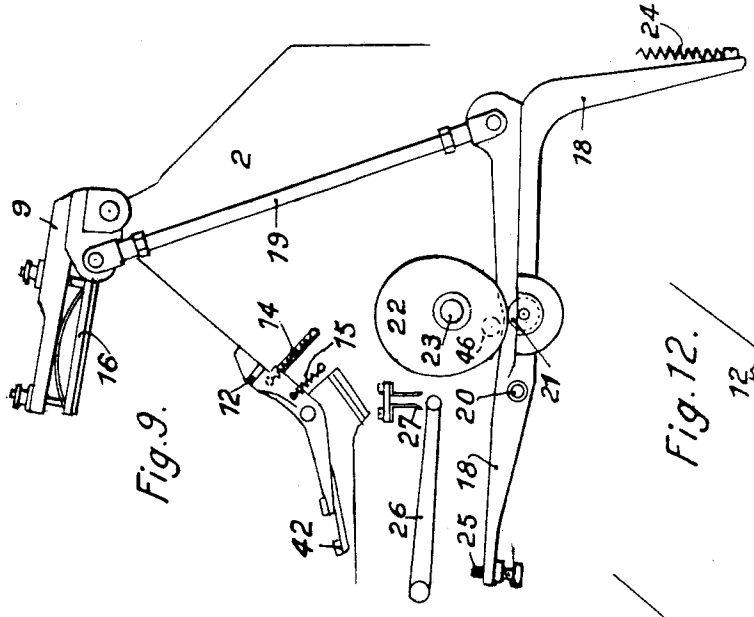



Fig. 9.

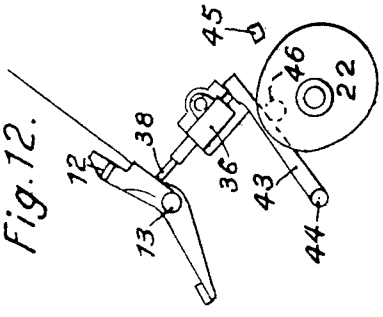



Fig. 12.

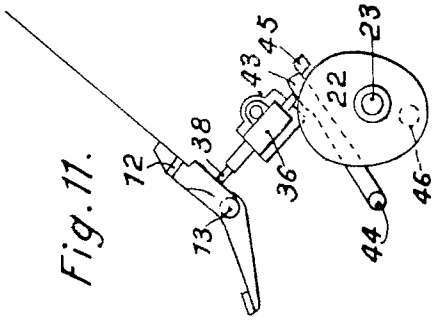



Fig. 11.

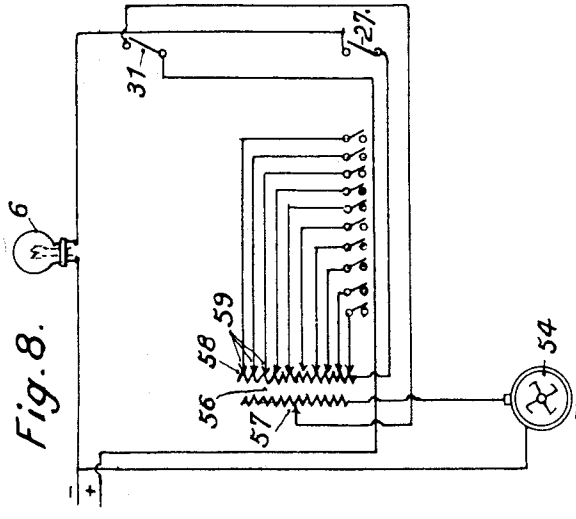



Fig. 8.

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Patented Nov. 23, 1937

2,100,087

# UNITED STATES PATENT OFFICE

2,100,087

## PHOTOGRAPHIC PRINTING MACHINE

Pierre Auguste Marcellin Priou, Chinon, France

Application February 19, 1936, Serial No. 64,713
In France February 28, 1935

3. Claims. (Cl. 95—73)

This invention refers to photographic printing machines which are practically automatic in operation.

It is known that photographic printing machines are provided at their upper part with a movable pressure plate, the function of which is to press the sensitized paper on to the negative during printing, and which must be lowered by the operator himself, thus rapidly causing a certain fatigue.

On the other hand, the operator only has at his disposal relatively slow means for modifying either the duration of the printing, or the intensity of the light which will be necessary for obtaining a satisfactory print from negatives nearly always different from each other.

The invention which will be described remedies all these inconveniences, it allows of providing a mechanical photographic printing machine actuated by a motor eliminating all fatigue, and is moreover characterized by the combination of a series of numbered electric switches modifying the intensity of the light emitted by the printing lamp in such a manner that, the time of exposure remaining fixed, the operator will only have to press upon the suitably chosen knob, in order that the printing machine may immediately produce a correct print, without any other intervention on his part.

In the accompanying drawings:

Fig. 1 is a view of the left-hand side of the photographic printing machine.

Fig. 2 is a view of the right-hand side.

Fig. 3 is a front view.

Fig. 4 is a perspective view of the photographic printing machine fitted on a work table.

Fig. 5 is a partial side view showing one of the interrupters or switches of the apparatus lowered into the position corresponding to the closing of the motor circuit.

Fig. 6 is a similar view showing the same switch raised and the motor circuit open.

Fig. 7 is a diagrammatic view of the device for starting and stopping the machine.

Fig. 8 is a diagram of the electric connections.

Fig. 9 shows the pressure plate of the apparatus raised and the printing lamp 6 extinguished.

Fig. 10 shows the pressure plate lowered and the lamp lighted.

Figs. 11 and 12 show the checking bar 12 of the papers lowered and raised, respectively.

In the form of construction illustrated, the apparatus comprises two parallel cheek members 1 and 2 connected by cross members 4 and 5. The light box containing the printing lamp 6 is arranged between these cheek members as well as the shelf 7 on which are placed the numbered switches for starting the apparatus. The frame 8 covering the upper part of the light box is inclined and connected at the rear to a shaft on which it can pivot as well as the pressure plate carrier 9.

On each side of the cheek members 1 and 2 is arranged the entire operating mechanism, this allowing a compact and rugged construction and constituting one of the features of the invention. On the frame 8 placed above the light box are arranged the glass plate 10 on which the negatives are laid, the clip 11 for holding the negatives, and the stop bar 12 against which the photographic papers abut. These two latter elements pivot on a common spindle 13 and are constantly restored towards frame 8 by springs 14 and 15. At the other end of the frame and pivoted on the same shaft as the latter, is located the pressure plate carrier 9 from which is hung a pressure plate 16 subjected to the pressure of springs 17. The pressure plate carrier is connected to a pedal 18 (pivoted on a pin 20) by a link 19. The pedal 18 carries a roller 21 immersed in an oil bath and constantly rolling on the periphery of a cam 22 rigidly secured on a driving shaft 23.

To the end of the pedal 18 are attached springs 24, tending to constantly restore the roller 21 against the cam 22. The other end of the pedal 18 carries an adjustable screw 25 adapted to press upon the arm 26 of a contact 27 lighting the printing lamp 6.

The numbered switch knobs secured on the shelf 7 in front of the photographic printing apparatus are preferably of the type comprising two push-buttons arranged in a line. A flat rod 28 bent in U shape rests, through its entire front face, on the entire rear series of push-buttons B and is pivoted, at both its sides, on each of the cheek members 1 and 2. This U-shaped member is connected, by a link 29 and an arm, to an intermediate shaft 30 carrying, on the one hand, the contact 31 of the electric motor, and, on the other hand, the stop and start pedals 32 and 33. It will thus be understood that, if any of the push-buttons A arranged in front of the photographic printing apparatus is pressed upon, the U-shaped rod 28 resting on the push-button B will lift, thus actuating the link 29 as well as the contact 31 of the electric motor which will come in engagement and also the stop and start pedals 32 and 33 which will come in the path of the movement of rotation of cam 22, or the roller 34 carried by the end

of pedal 33 can be engaged by a finger 35 secured on cam 22.

On the cheek member 2 is arranged a member 36 carrying parallel tubes in which freely slide two round rods 37 and 38. The upper end of one of these rods is level with the lower face of the clip 11 holding the negatives, whilst the lower end of said rod rests on the pedal 39, pivoted on a pin 40 and upwardly movable. Said pedal 39 can be lifted, through its end 41, by the knee of the operator. It is also to be noted that the clip 11 holding the negatives can be directly lifted by hand by pressing on a key 42.

The upper end of the other sliding rod 38 comes level with the under face of the bar 12 serving as abutment for the photographic papers, whilst the lower end of said rod 38 rests on a link 43 movable about a pin 44 and bearing in waiting position on a fixed abutment 45.

The cam 22 carries a roller 46 which, when rotating, engages the lower face of link 43 and, by this means, lifts the sliding rod 38 which thus actuates the bar 12 serving as abutment for the photographic papers, in order to allow the latter to be ejected.

The pedal 33 carrying a roller is mounted on shaft 30 and can freely slide on this shaft between the fixed pedal 32 and an abutment 47. A shaft 48 at right angles to shaft 30, carries, at one end, a claw 49 engaging in an aperture formed in pedal 33, whilst an operating lever 50 is fitted on the other end of shaft 48. This shaft 48 is journalled in supports or bearings 51 and 52.

It will be understood that if lever 50 is actuated, so as to restore pedal 33 against pedal 32, the roller 34 is thus moved in the path of finger 35 rigid with cam 22; this will cause, by engagement of these two members, the motor to be stopped by opening of contact 31, and will also cause the lowered or depressed push-button A to be returned to its initial position, whereas if the reverse operation is effected, that is to say if pedal 33 is restored against abutment 47, the roller 34 is removed from the path of member 35 and the apparatus is thereby caused to continuously operate.

On the outer face of the opposite cheek member 1 is arranged a grooved wheel 53 fast on the driving shaft 23 on which cam 22 is rigidly secured. This wheel 53 is actuated by an electric motor 54, provided with a speed reducing device allowing to obtain the suitable speed by means of a belt 55, preferably of trapezoidal shape.

A rheostat 56, divided into two parts 57 and 58, is also provided. On one of these parts are arranged contacts 59 connected to the numbered switch buttons, as clearly shown in Fig. 8.

These contacts are adapted to ensure a progressively increasing illuminating power for the printing lamp, according to the very arrangement of the push-buttons, and the position of these contacts on the rheostat is such that it allows of completely eliminating the phenomenon of inertia in the lighting of the printing lamp when the voltage of the latter is reduced. This automatic correction of the actinism is obtained by the judicious computation of the distance separating the contacts from each other on the rheostat, which distance or spacing apart corresponds, not to the geometrical progression of the light emitted by the printing lamp 6, but to the geometrical progression of the intensity of the light really received by the sensitized paper during printing. This improvement also constitutes one of the features of the invention.

The other part of the rheostat is reserved for the motor and thus allows, by means of a slider, of modifying its speed according to the electric currents used.

The operation of the photographic printing apparatus is as follows:

By pressing with the knee on pedal 39, the operator lifts the clip 11 holding the negatives, through the medium of the sliding rod 37. After having placed under this clip the negative (glass plate or film, cut out in the shape of a strip), he releases the pressure exerted by his knee and the clip secures the negative in printing position. The sheet of sensitized paper is then placed against the abutment bar 12 which carries a right-angled abutment allow to square the sheet of paper, and the numbered push-button A, corresponding to the intensity of light considered necessary for obtaining a satisfactory print from the negative, is then pressed upon.

The push-button switch A being of the rocker type, the push-button B lifts in synchronism, actuating the U-shaped rod 28 surmounting it; this rod 28 lifts, through the medium of the link 29, the contact 31 of the motor and closes it, inserting at the same time the roller 34 in the path of the rotary movement of finger 35. The motor starts, and the cam 22, when rotating, presents an incline which, through the medium of the roller 21 rolling on its periphery and secured to the pedal 18, lowers, through link 29, the pressure plate 16 which thus presses the sensitized photographic paper on the negative. At the same time, the screw 25 pressing upon the arm 26 of contact 27, the printing lamp 6 lights and gives the intensity of light corresponding to that of the numbered switch buttons which will have been depressed.

The cam continues to rotate. Before reaching the end of the incline, the roller 46 engages with the link 43, lifts it and, at the same time, also lifts, through sliding rod 38, the bar 12 on which the photographic papers abut.

The cam 22 continuing its rotation, presents the end portion of the incline to the roller 21 which participates to the movement, this causing the opening of contact 27 and lifting the pressure plate 16 restored to waiting or open position by the springs 24 acting on pedal 18. As soon as the sensitized paper is released from the pressure of plate 16, it is no longer retained by bar 12 which has moved up, and it immediately slides by gravity in a box 60 where an endless band or other conveyor device can directly lead it to the developing bath.

Cam 22 continuing its rotation, the roller 46 moves away from link 43, and the bar 12 resumes its position owing to springs (not shown) which immediately restore it against the clip 11 holding the negatives.

Continuing its rotation, the finger 35 comes in contact with the roller 34, secured on the pedal 33 rigid with the shaft 30 of switch 31. Under the pressure of finger 35, the roller 34 moves away, thus opening the contact 31 controlling the motor. On the other hand, the pull exerted at the same time by the link 29 and the U-shaped rod 28 on the push-button B, which at this moment is raised, causes the numbered switch to rock, this switch instantaneously returning to its original position.

It will therefore be clearly understood that the same cycle of operations will occur again in the same order indefinitely and whatever may be

that of the numbered switches which will have been depressed.

For continuous printing, that is to say without the motor stopping and causing the switch to return to its original position after each print, it suffices to push the control lever **50** towards the left (Fig. 7), and the roller-carrying pedal **33** will slide on shaft **30** up to the abutment **47**.

In this new position, the roller **34** will be moved away from the path followed by the finger **35** during its movement of rotation, and the printing apparatus can continuously produce any number of prints. For stopping the operation of the apparatus, it suffices to push the lever **50** towards the right, this causing the motor to stop and restoring the depressed switch to its original position as soon as the finger **35** will have come in contact with roller **34**.

It is to be understood that the invention is not limited to the form of construction described and illustrated, and it is obvious that modifications can be made thereto without departing from the principle of the invention.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A photographic printing apparatus comprising frame members forming a box-like structure, a glass panel covering an aperture in the front upper portion of said structure and adapted to support a negative and a sheet of sensitized paper, a clip for holding the negative on said plate and an abutment bar for holding the sensitized sheet on the same plate, means for opening and closing said clip and moving said abutment bar, a horizontal pivot shaft upon the structure carrying a pressure plate normally held raised above said glass plate and capable of being lowered about said shaft to make contact with and resiliently press the negative and sensitized sheet on the glass plate, an electric printing lamp enclosed in said structure within said glass plate, a drive shaft, an electric motor for driving said shaft and connected in a circuit with said lamp, a control member fixed upon said shaft to rotate therewith, a switch for opening and closing the circuit of the motor, movable means for closing said switch, operated means for raising, at will, the clip and allowing insertion of a negative upon the glass plate, a plurality of similar movable manual means for initiating operation of the machine individually connected to a series of different resistances in the circuit of said lamp, intermediate means causing said movable means to close said switch upon operation of any one of the movable manual means in order to start said motor, rocking means pivoted upon the apparatus having a portion disposed in the path of said control member on said shaft and connected to said pressure plate so that rotation of the control member will cause movement of the pressure plate toward the glass plate, transmission means interposed between said motor and said drive shaft, and a movable contact member and a switch corresponding therewith for said lamp, said contact member being disposed in the path of movement of said rocking member so that operation of the latter to operate the pressure plate will cause said rocking member to move said contact member and close the switch of the lamp.

2. A photographic printing apparatus according to claim 1, wherein the apparatus is provided with means coacting with the control member upon the drive shaft and capable of returning any one of the manually operable means to start in position and additional means upon said control member adapted to engage against the rocking member connected to the pressure plate and be shifted thereby into initial starting position so as to disengage the contact members of the motor and lamp switches and simultaneously raise the pressure plate into idle position above the glass plate.

3. A photographic printing apparatus comprising frame members forming a box-like structure, a glass panel covering an aperture in the front upper portion of said structure and adapted to support a negative and a sheet of sensitized paper, there being means for retaining the negative on said plate and positioning the sensitized sheet thereon, a horizontal pivot shaft upon the structure carrying a pressure plate normally held raised above said glass plate and capable of being lowered about said shaft to make contact with and resiliently press the negative and sensitized sheet on the glass plate, an electric printing lamp enclosed in said structure within said glass plate, a drive shaft, an electric motor for driving said shaft and connected in a circuit with said lamp, a control member fixed upon said shaft to rotate therewith, a switch for opening and closing the circuit of the motor, movable means for closing said switch, a plurality of similar movable manual means for initiating operation of the machine individually connected to a series of different resistances interposed in the circuit of the printing lamp, mechanical means connected to said movable means operable upon operation of any one of said movable manual means effective to close the circuit of the motor, rocking means pivoted upon the apparatus having a portion disposed in the path of said control member on said shaft and connected to said pressure plate so that rotation of the control member will cause improvement of the pressure plate toward the glass plate, transmission means interposed between said motor and said drive shaft, a manually movable member and an associated member shiftable thereby connected to the movable means for closing the circuit of the motor and movable into and out of the path of movement of the control member upon the drive shaft, and a movable contact member and a switch corresponding therewith for said lamp, said contact member being disposed in the path of movement of said rocking member so that operation of the latter to operate the pressure plate will cause said rocking member to move said contact member and close the switch of the lamp.

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