

April 15, 1952

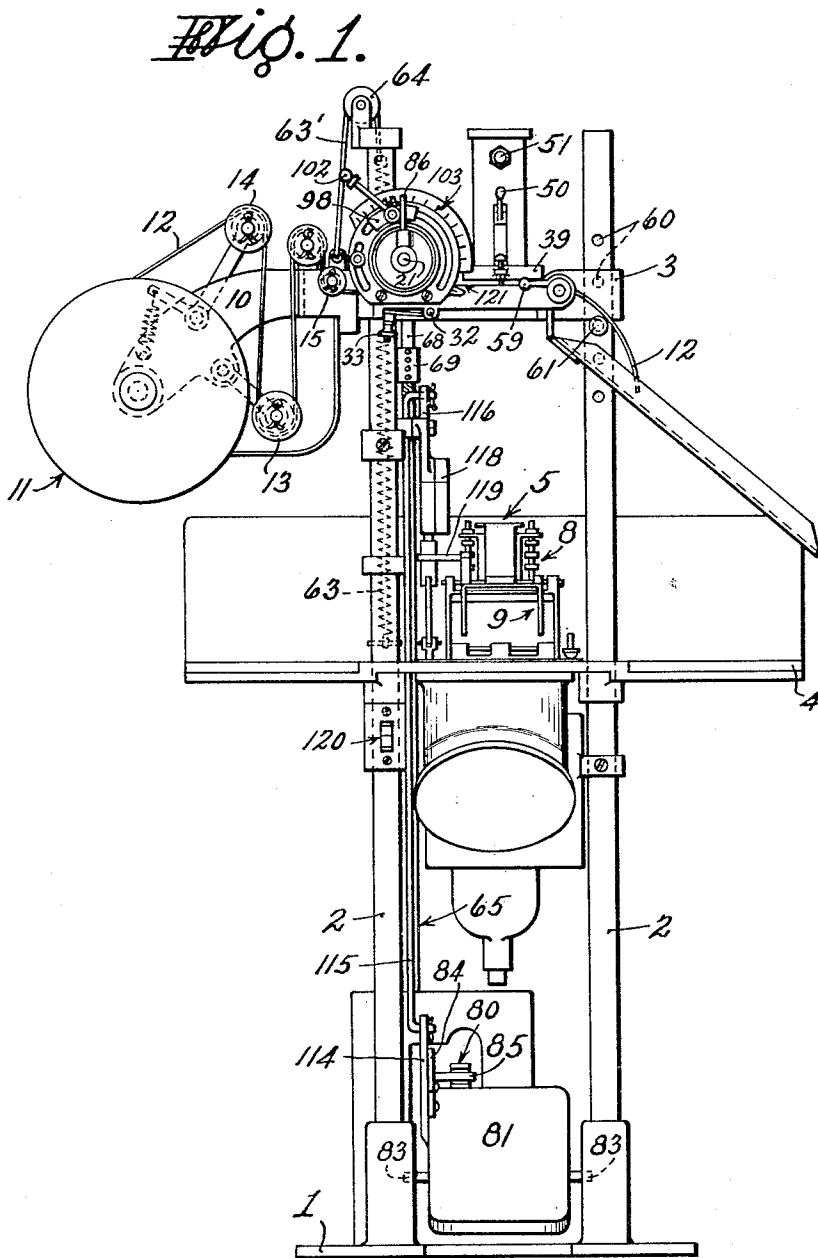
P. S. PIRMOV

2,592,735

PHOTOGRAPHIC PROJECTION PRINTING MECHANISM

Filed Nov. 1, 1949

4 Sheets-Sheet 1



INVENTOR

PAUL S. PIRMOV

BY *Chapin & Neal*
ATTORNEYS

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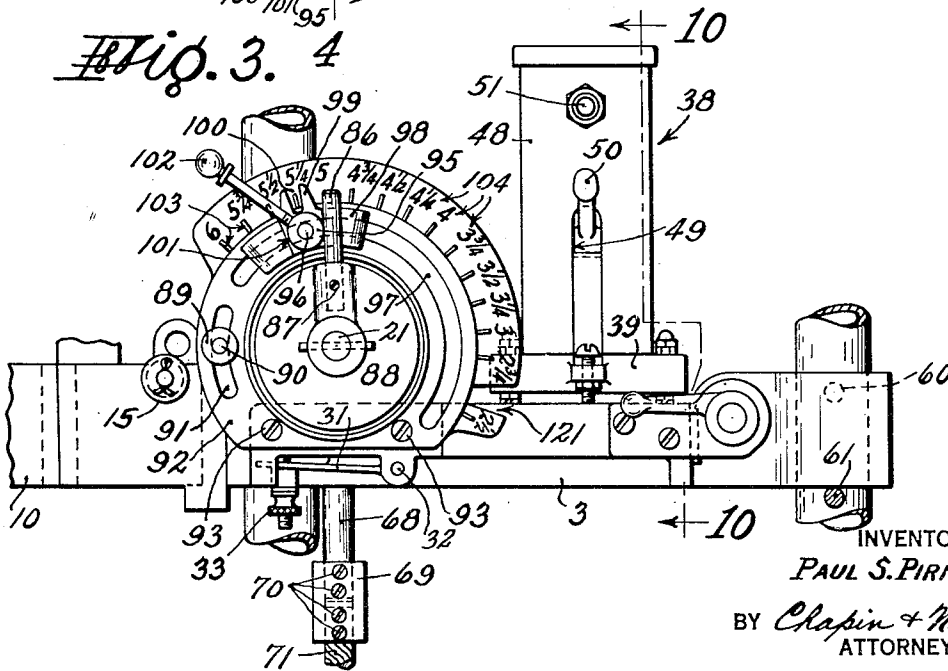
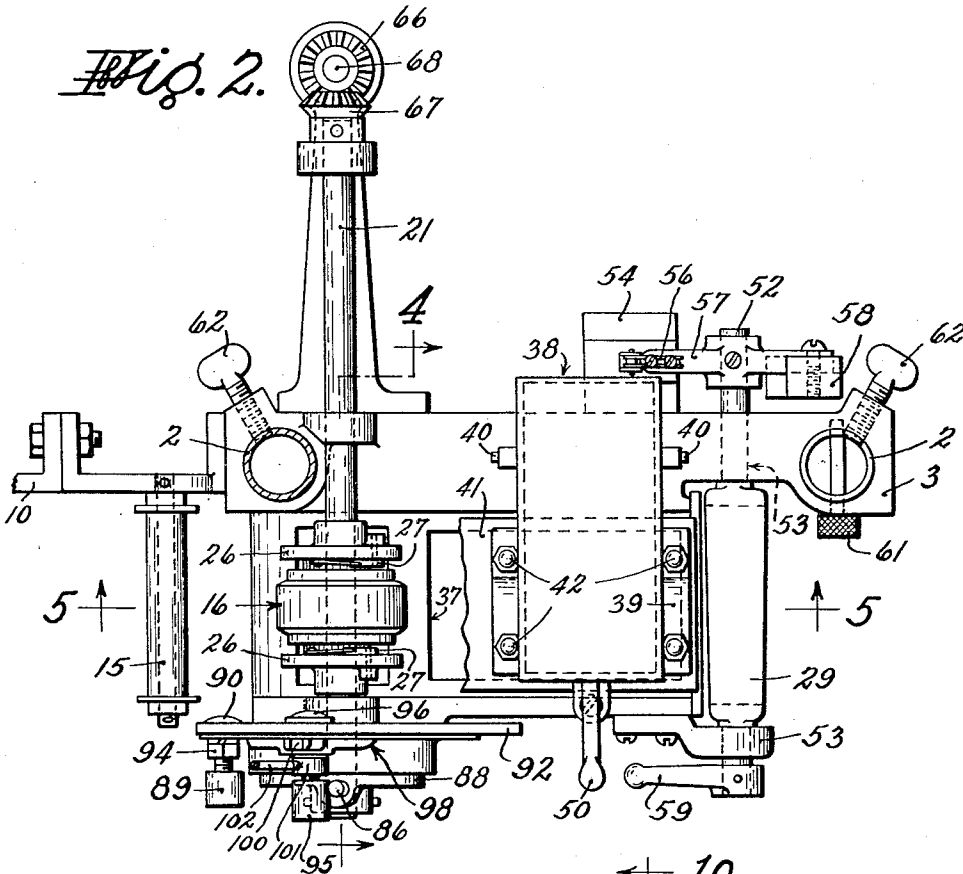
P. S. PIRMOV

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4 Sheets-Sheet 2



INVENTOR

PAUL S. PIRMOV

BY *Chapin & Neal*
ATTORNEYS

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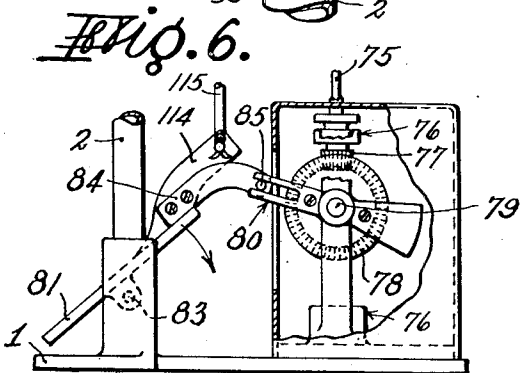
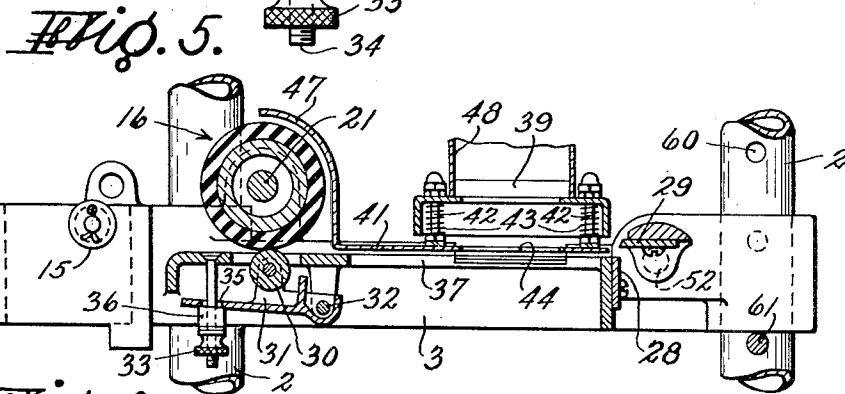
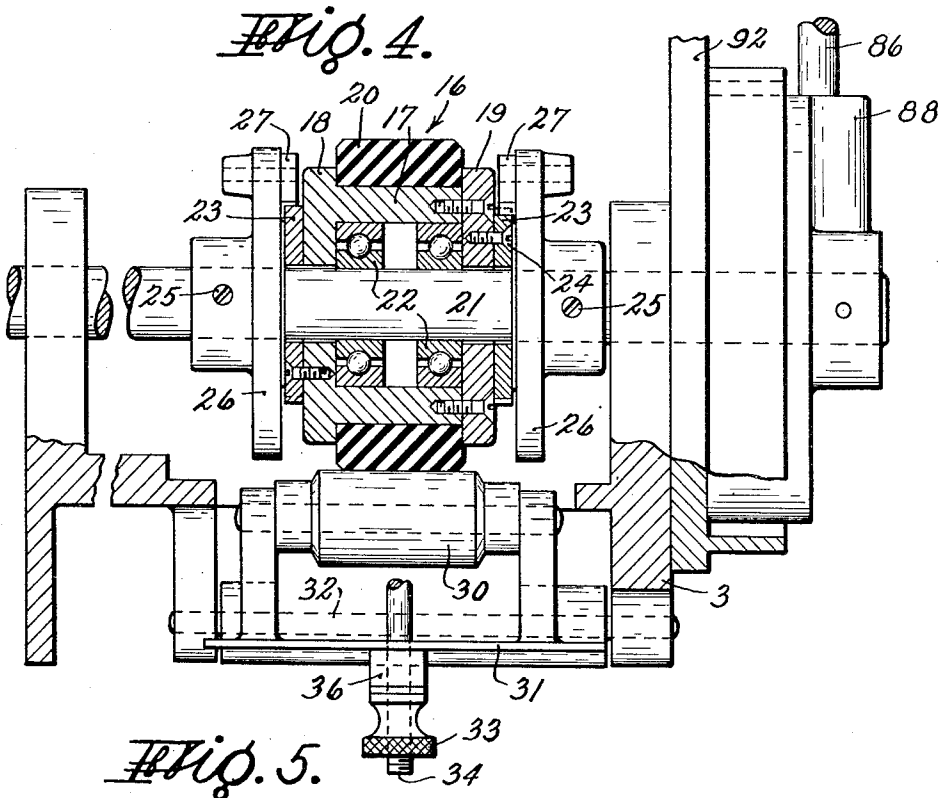
P. S. FIRMOV

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PHOTOGRAPHIC PROJECTION PRINTING MECHANISM

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4 Sheets-Sheet 3



INVENTOR
PAUL S. FIRMOV
BY *Chapin & Neal*
ATTORNEYS

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4 Sheets-Sheet 4

Fig. 7.

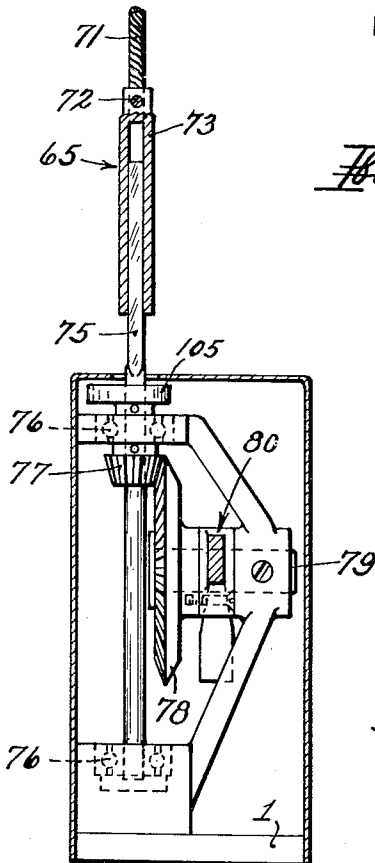


Fig. 8.

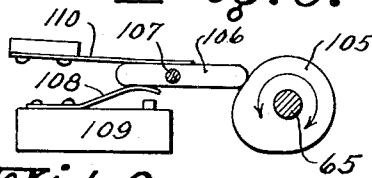


Fig. 9.

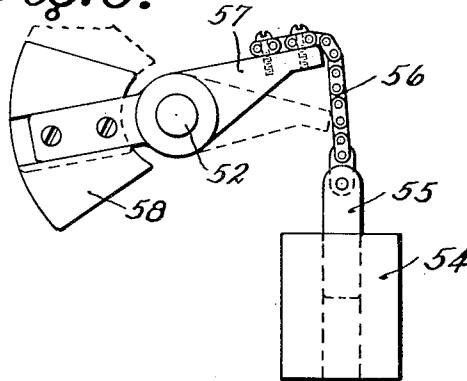


Fig. 11.

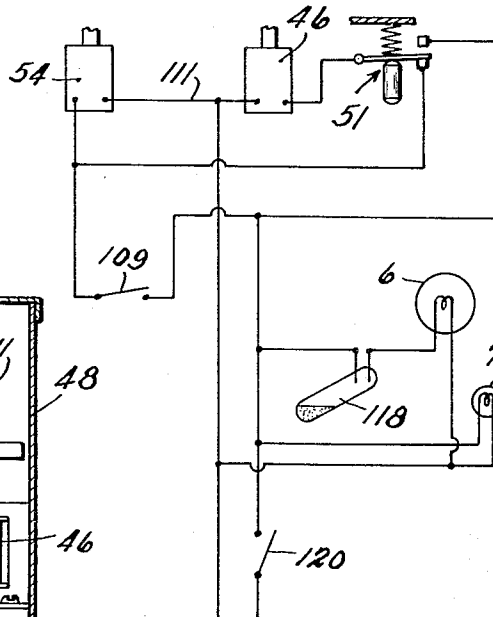
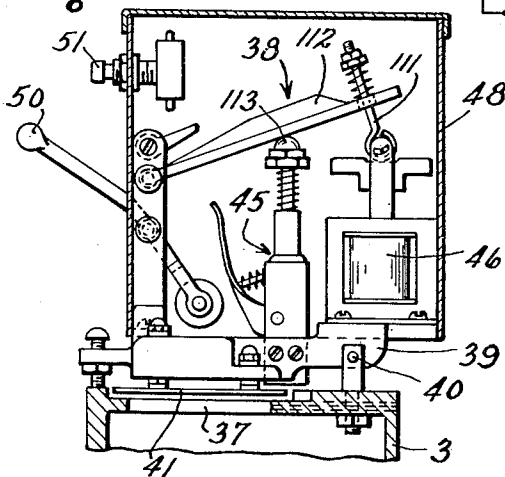


Fig. 10.



INVENTOR
PAUL S. PIRMOV
BY *Chapin & Neal*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,592,735

PHOTOGRAPHIC PROJECTION PRINTING
MECHANISM

Paul S. Pirmov, Shelburne, Mass.

Application November 1, 1949, Serial No. 124,885

1 Claim. (Cl. 88—24)

1

This invention relates to an improvement in photographic projection printers, and more particularly to devices of that kind which are automatically operated.

The principal object of the invention is to provide a printer of the above kind in which the prints are automatically made and numbered on a strip of sensitized photographic paper, the print severed from the strip, and the strip automatically advanced in an improved manner a predetermined distance corresponding to the dimensions of the negative from which the next print is to be made, together with means for automatically actuating the several elements of the machine at the same time that a selective timing of the exposure is afforded the operator.

Other and further objects residing in the details of the structure and their arrangement will be made apparent in the following specification and claim.

In the accompanying drawings, which illustrate a projection printer embodying the invention:

Fig. 1 is a front elevational view;

Fig. 2 is a plan view of the structure shown in Fig. 1 on a larger scale;

Fig. 3 is a front elevational view of the paper feeding and cutting members;

Fig. 4 is a sectional detail view substantially on line 4—4 of Fig. 2, on an enlarged scale;

Fig. 5 is a section substantially on line 5—5 of Fig. 2;

Fig. 6 is a fragmentary detail view with parts broken away showing the operating mechanism;

Fig. 7 is a detail view of a portion of the drive;

Fig. 8 is a detail of one of the switches and its actuating cam;

Fig. 9 is a detail of knife actuation solenoid mechanism;

Fig. 10 is a sectional view substantially on line 10—10 of Fig. 3; and

Fig. 11 is a wiring diagram.

Referring to the drawings, particularly Fig. 1, the device is shown as comprising a base 1 which supports standards or posts 2 upon which table members 3 and 4 are mounted in spaced relation. The lower table 4 carries projection apparatus and lens system all generally indicated at 5 by which the image from the negative to be printed is projected on sensitized paper presented on the upper table 3, as later more fully described.

The specific construction of the elements of the projection device do not form a part of the present invention, and a detailed description of their structure is not believed necessary, except where

2

as later pointed out their structure has been modified or added to for the purposes of the invention. They include a projection lamp 6, a pilot light 7 (Fig. 11), a plurality of lens focus adjustments 8, and a shutter 9.

The upper table 3 carries at one end a bracket 10, which supports a reel or roll 11 of sensitized photographic paper 12. Bracket 10 also supports a gravity actuated, pivoted guide roll 13 and a spring actuated, pivoted guide roll 14 which maintain tension equalizing loops in the web and direct the web to the automatic feeding device.

As best shown in Figs. 3 and 4, the feeding mechanism includes a guide roll 15 and a driven feed roll generally indicated at 16. Roll 16 comprises a hollow cylindrical member 17 having an integral side flange member 18 and a removable flange member 19 between which are secured an annular rubber member 20 which forms the feeding surface of the roll. The roll is rotatably mounted on a shaft 21 by way of roller bearings 22. Fixed to the flanges 18 and 19 are fine toothed ratchets 23 secured thereto in any suitable manner as by screws 24. Secured to the shaft 21 outwardly of the ratchets 23, as by screws 25, are collars 26 carrying spring pressed, pivoted pawls 27 which respectively engage the ratchets 23. The ratchets and pawls are preferably so positioned with respect to each other that one of the pawls is in full driving engagement with its ratchet when the other pawl is in neutral position, which arrangement together with the fineness of the spacing of the ratchet teeth assures a minimum of lost motion in the start of the feeding movement of the roll. Counterclockwise rotation of the shaft 21, as viewed in Fig. 5, by means later described, moves the pawls into driving engagement with their ratchets and causes counterclockwise rotation of the roll as viewed in the latter figure to thereby advance the leading end of the paper web 12 across the table and over and beyond a fixed cutting blade 28. A rotary cutter blade 29, as later described, co-operates with the fixed blade 28 to sever the projecting portion of the web.

The web is pressed against the feed roll 16 by an adjustable pressure roll 30, carried by a bracket 31 pivoted at 32 to the underside of the table 3. The roll 30, which is preferably hard surfaced, is pressed into engagement with the rubber surface of the feed roll by means of an adjustable nut 33 threaded on a stud 34 which passes through an opening 35 in the bracket 31. An annular rubber member 36 positioned between the nut 32 and the bracket 31, controls the pres-

sure with which the roll 30 is forced against the rubber surface of the feeding roll.

The table 3 is provided with an opening 37 through which the sensitized surface of the web is exposed to the image projected through the opening by the projection mechanism on the lower table 4.

Positioned over the opening and above the web passing thereover is a printing device generally indicated at 38, and mounted on a base member 39 pivoted to the surface of the table at one side of the opening 37 as at 40. The base 39 carries a plate 41 mounted on pins 42 and urged downwardly against the upper surface of the web by springs 43. The plate 41 is formed with an opening 44 through which a conventional number printing device 45, carried by member 39, is automatically brought into engagement with the upper surface of the paper by means of a solenoid 46. The rear portion of plate 41 is preferably bent upwardly as at 47 to form a guard for roll 16. The printing mechanism and its solenoid are enclosed in a casing 48. The casing 48 is formed with an opening 49 through which extends a manually operable lever 50 by means of which the number presented by the number printing means may be changed. As later described, solenoid 46 may be manually operated by a momentary switch 51. The rotary cutter blade 29 is carried by a shaft 52 mounted in bearings 53 supported by the table 3 and is operated by a solenoid 54, the armature 55 of which is connected by a flexible chain 56 to one end of a lever 57 secured to the shaft 52, the opposite end of the lever 57 being provided with a counterweight as at 58. The shaft 52 is provided with a handle 59 by which the cutter may be manually operated if desired.

For reasons later explained, the table 3 is made adjustable on the posts 2, predetermined positions of adjustment being determined by spaced openings 60 in the posts adapted to receive a movable pin 61. Set screw 62 clamps the table in adjusted position. For ease in making the adjustment, the weight of the table is counterweighted by a tension spring 63 conveniently placed in one of the posts 2 and connected to the table by a cable 63' passing over a pulley 64.

Shaft 21 is driven from a vertical, oscillating shaft 65 which is provided on its upper end with a bevel gear 66 which meshes with a bevel gear 67 secured to one end of shaft 21. The shaft 65 is formed in four sections, an upper section 68 to the upper end of which gear 66 is secured, the lower end of section 68 being connected by a collar 69 and set screws 70 to the upper end of a flexible section 71. The lower end of the flexible section 71 is connected as by set screw 72 to the upper end of a tubular section 73. The inner surface of tube 73 is square in cross section and slidably engages over a squared upper portion of a lower shaft section 75 which is journaled in ball bearings 76 and is provided intermediate said bearings with a small bevel gear 77. Gear 77 meshes with a large bevel gear 78 rotatably mounted on a stub shaft 79 and provided with a forked crank member 80. A pedal 81 pivoted between the bases of post members 2 at 83 carries an arm 84 provided at its upper end with a pin or roller 85 which engages in the fork of crank member 80. As will be apparent in Fig. 6, movement of the pedal in the direction of the arrow in the latter figure will rotate shaft 21 in a counterclockwise direction, which rotation imparts no movement to

feed roll 16 because of the idle movements of the pawls at 27 over the ratchets 23.

The downward movement of the pedal 81 is limited by the engagement of a stop pin 86, secured by means of set screw 87 in a hub 88 pinned to the end of shaft 21, with an adjustable stop member 89 carried at the outer end of a headed carriage bolt 90 slidable in a relatively short slot 91 formed in a vertical plate member 92 fixed to the table 3 by screws 93. Bolt 90 is held in adjusted position in slot 91 by a nut 94 threaded on the bolt between the stop member 89 and the face of plate 92.

Upon the reverse movement of pedal 81 gear 78 is driven in the opposite direction, thereby rotating shaft 21 in a counterclockwise direction, as viewed in Fig. 5, and, through the pawls and ratchets 27 and 23, drives roll 16 to advance the web of paper over table 3 and opening 37 as previously described. The extent of the rotation of roll 16 and therefore the length of paper fed forward during the upward movement of the pedal is determined by the engagement of stop pin 86 with an adjustable stop member 89 carried by the outer end of a headed carriage bolt 96, slidable in an arcuate slot 97 formed in the plate 92.

Mounted on the bolt 96 adjacent the face of plate 92 is an indicating member 98 having a radially extending portion 99 provided with an indicating slot 100. Bolt 96, together with the stop member 89 and the indicating member 98, are adapted to be held in adjusted position in the slot 97 by a nut 101 threaded on the bolt between the stop and indicating members. For easy setting and loosening of the nut 101 the latter is provided with a radially extending arm or handle 102. The plate member 92 is provided with a plurality of graduations 103 adapted to be visually located in the slot 100 to indicate the length of paper which will be fed forward by roll 16 as the stop pin travels between the stop member 89 and stop member 95 upon the upward movement of the pedal. The appropriate measurement in inches is shown on the vertical plate at 104 in association with each of the graduations 103.

The various gear ratios are such that the maximum oscillatory movement of shaft 65 is less than a complete rotation.

The initial non-paper-feeding oscillation of shaft 65 upon downward movement of the pedal I employ for the automatic operation of the numbering, cutting, and projection printing operations of the machine. Secured to the section 75 of shaft 65 is a cam 105 adapted shortly after the initiation of downward movement of pedal 81 to engage one end of an arm 106 pivoted at 107, the other end of arm 106 being thereby moved into engagement with a spring 108 which closes a switch 109. A spring 110 normally holds the arm 106 in position for engagement with switch operating spring 108 while permitting the cam to swing the arm out of the way in its reverse movement without again actuating the switch.

As shown in Fig. 11, switch 109 closes the circuit to solenoid 46 causing the latter through its connection 111 to an arm 112 (Fig. 10) to cause the latter to engage the operating stem 113 of the number printing device to actuate the latter and imprint the reverse side of the sensitized paper underlying the opening 44. As is also apparent from Fig. 11, actuation of switch 109 simultaneously closes the circuit to solenoid 54 to

actuate the cutter blade 29. Preferably a manually operated momentary switch 51 is placed in the circuit to enable the operator to actuate the printing means independently of the cutter and at any point during the operation of the machine.

The pedal 81 is provided with an arm 114 to which is connected the lower end of a rod 115, the upper end of which is connected to a lever 116 carrying a mercury switch 118 which controls the circuit to the projection lamp 6. The angularity of the mercury switch is such that the circuit to the projection lamp is not closed until the pedal approximates the end of its motion and until after the cutting and printing devices have been actuated by the cam 105. The lever 116 simultaneously with or shortly after the initiation of its movement engages a rocker arm 119 connected to the shutter 9 to swing the latter out of the path of the projected beam of the lamp. The mercury switch 118 maintains the circuit of the projection lamp closed as long as the pedal 81 remains in its lowermost position, thus permitting the operator control of the duration of the exposure. The pilot light 7 is so positioned as to illuminate the negative sufficiently to permit the operator to judge the character of the negative and time the exposure accordingly. The pilot lamp 7 as shown in Fig. 11 burns constantly or as long as the master control switch 120 is closed. The lamp 7 is of insufficient power to affect exposure of the sensitized paper.

Typical operation of the device is as follows: Assuming the paper to be threaded through the device, the operator provided with a set of negatives sets the lens system to the proper adjustment 8 for the size of the negative and raises or lowers the table 3 to the level of the proper opening 60 to correspond. He then takes the envelope which is to receive the completed prints with their negatives, lifts the printing mechanism on its pivot, inserts the envelope thereunder and operates the printing device by means of the manual switch 51 thereby applying to the envelope the same number that is to subsequently be automatically printed on each print of that particular order. As shown in Fig. 3, the plate 92 is provided with a slot 121 to accommodate the passage of envelopes of greater width than the base 39.

He then places one of the negatives in position and actuates pedal 81 thereby driving shaft 65 through the limit of its oscillatory movement in one direction. In the course of this oscillatory movement as previously described, cam 105 actuates the printer to apply an order identifying number to the rear of the portion of the web about to be exposed and also actuates the cutter to sever the previously printed portion of the web, if any, which projects beyond the knife 28. Towards the end of the oscillatory movement on the shaft in that direction, lamp 6 and shutter 9 are actuated as above described to project the image of the negative onto the leading portion of the web and this exposure is continued in accordance with the judgment of the operator until a proper exposure has been made. During the entire movement of the shaft

65 in its initial direction the feeding roll 16 has remained inoperative, the pawls 27 sliding idly over the ratchets 23.

At the termination of the exposure the operator reverses the direction of movement of pedal 81 thereby opening the circuit to lamp 6, terminating the exposure and initiating the feeding movement of roll 16 which, through the action of pawls 27 and ratchets 23, is driven throughout the complete oscillatory movement of shaft 65 in the opposite direction, this feeding movement being terminated by the engagement of pin 86 with stop member 95 where it has been previously adjusted, as above described, to the size of the print desired. Following the exposure and projection beyond the knife of the last print of a given order, the operator may actuate the cutter manually by means of handle 59, permitting the prints and negatives of the given order to be placed in the previously numbered envelope before another group of negatives is printed. The last print may be left projecting to be automatically severed in the next cycle of operation of the machine if preferred.

What I claim is:

In an automatic photographic printing device having means including a lamp for projecting an image from a photographic negative, a table member adjustably spaced from said projection means and adapted to support the leading end portion of a web of sensitized paper, an opening in the table through which the sensitized surface of a part at least of said portion of the web is exposed to said image, a roll to feed the web over the table, solenoid actuated means to stamp an order identifying number on the reverse side of the portion of the web exposed through said opening, solenoid actuated cutting means to sever the fed portion of the web, a common switch controlling said solenoids, an oscillatory shaft, means to oscillate said shaft, a cam carried by said shaft positioned to actuate said solenoid control switch during the initial movement of said shaft in one direction, means connected to said shaft oscillating means to actuate the projection lamp control switch during the terminal portion of the movement of said shaft in the same direction and at the termination of said movement, and one-way driving means connecting said shaft to said web feeding roll, to drive the latter throughout the movement of the shaft in the opposite direction, and adjustable means to terminate the movement of said shaft in the last-named direction.

PAUL S. FIRMOV.

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