Oct. 7, 1924. 1,510,748

G. REKERS

AUTOMATIC PHOTOGRAPHIC PRINTING MACHINE

Filed Dec. 29, 1922 2 Sheets-Sheet 1

FIG. 1.

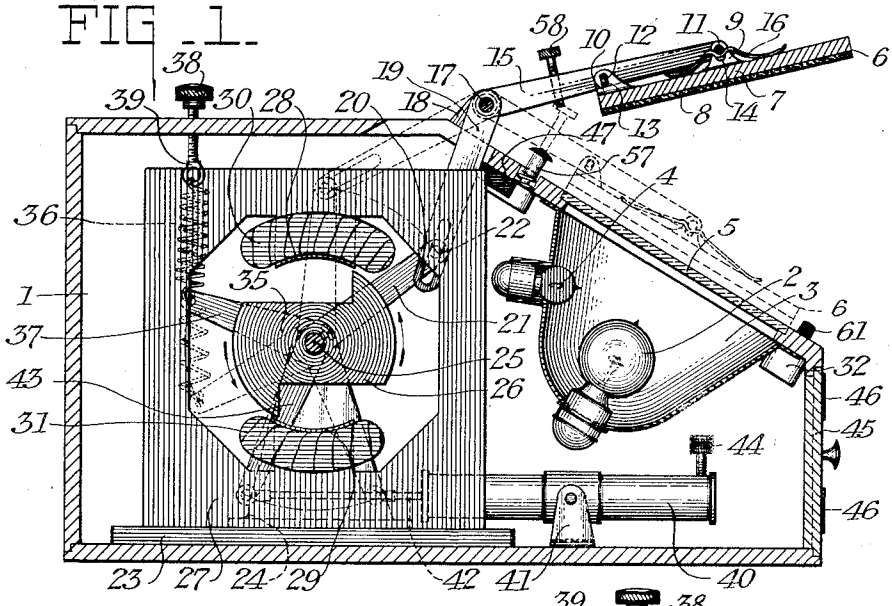


FIG. 2.

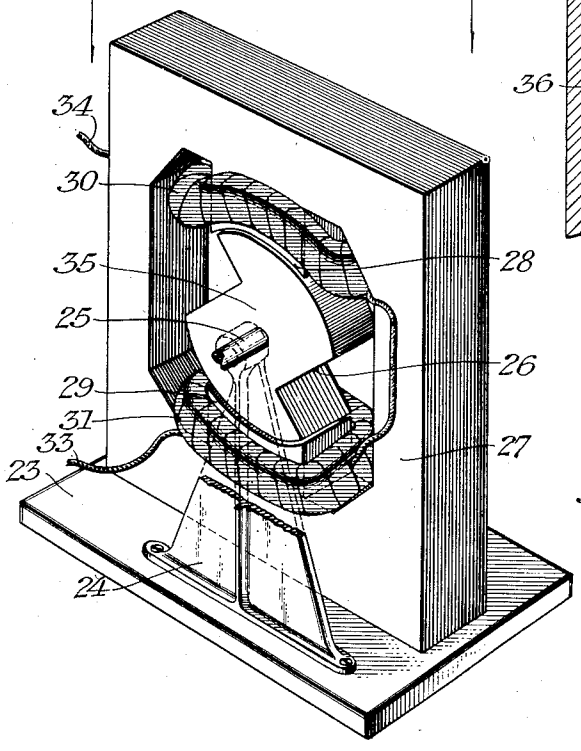
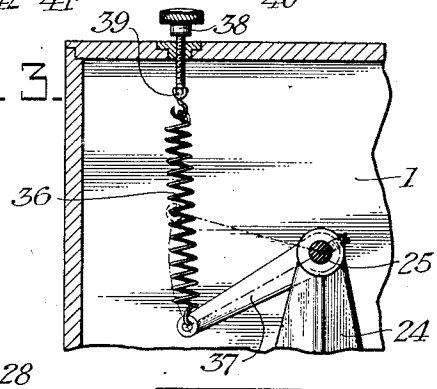


FIG. 3.



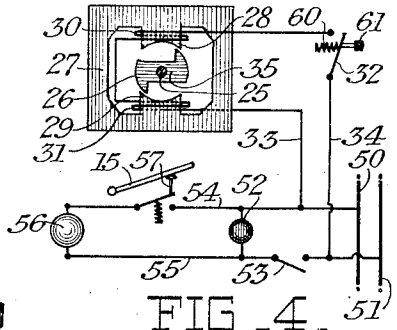


FIG. 4.

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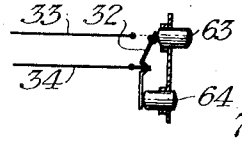


FIG. 5.

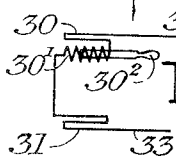


FIG. 4A

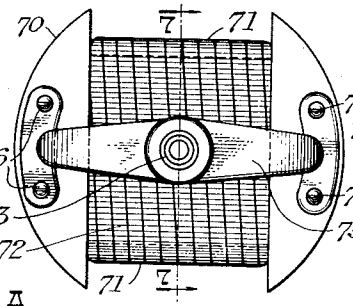


FIG. 6.

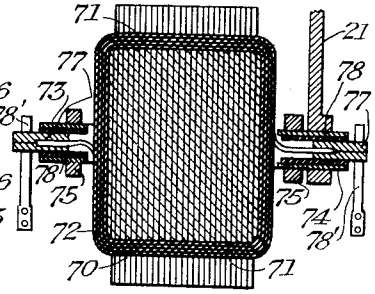


FIG. 7.

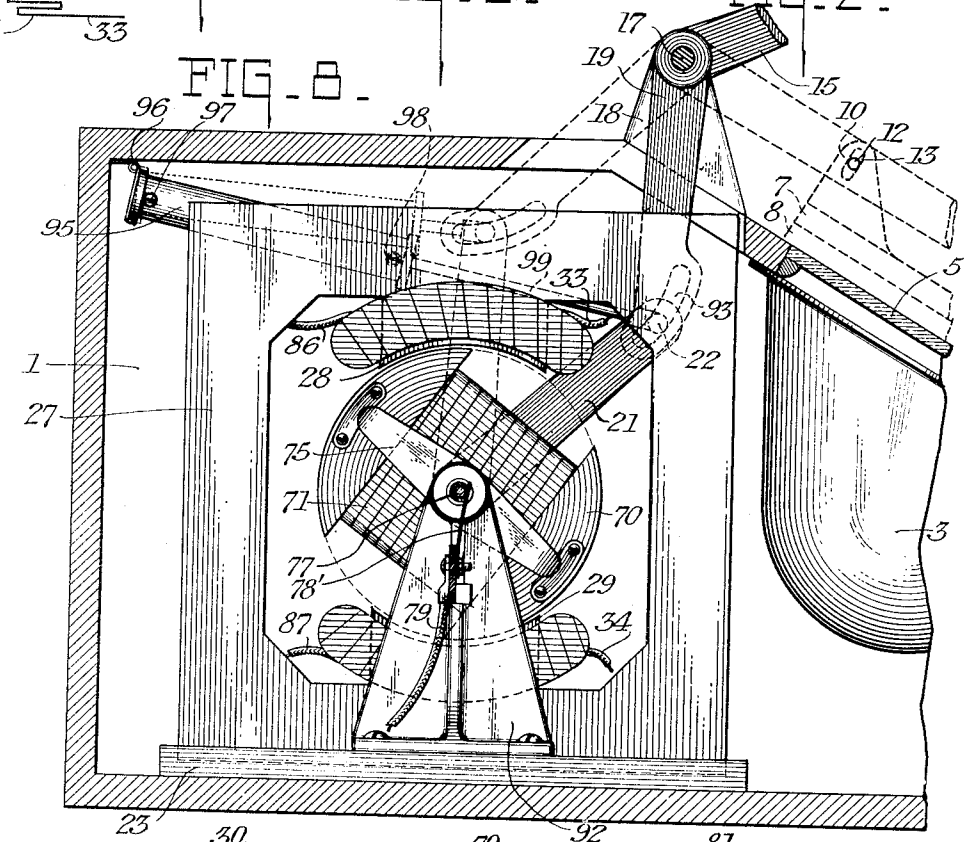


FIG. 8.

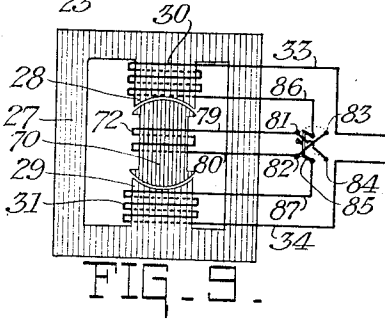


FIG. 9.

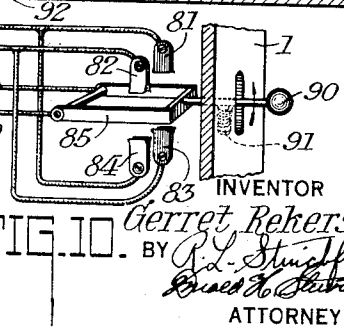


FIG. 10.

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Patented Oct. 7, 1924. 1,510,748

UNITED STATES PATENT OFFICE.

GERRET REKERS, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

AUTOMATIC PHOTOGRAPHIC-PRINTING MACHINE.

Application filed December 29, 1922. Serial No. 609,745.

To all whom it may concern:

Be it known that I, GERRET REKERS, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Automatic Photographic-Printing Machines, of which the following is a full, clear, and exact specification.

This invention relates to photography, and more particularly to photographic printing machines, and it has for its object to provide a relatively compact power-operated machine particularly adapted for use in printing from amateurs' negatives on a large scale. To these ends the improvements are directed particularly to means for actuating the platen; to means for moving the platen the required distance by means of an armature; to means for controlling the armature; to means for securing a firm pressure upon the platen when it is lowered upon the printing frame; and to a motor means which is simple to construct, is positive in operation, and is operable upon a very small amount of electric current, (either alternating or direct).

In the drawings, in which like reference characters denote like parts throughout:

Fig. 1 is a section through a printer constructed in accordance with and illustrating one embodiment of my invention;

Fig. 2 is a perspective of the motive member removed from the printer;

Fig. 3 is a fragmentary section of a part of the printer;

Fig. 4 is a wiring diagram;

Fig. 4A is a modified form of wiring diagram;

Fig. 5 is a modified form of switch;

Fig. 6 is an end elevation of another type of armature;

Fig. 7 is a section on line 7—7 of Fig. 6;

Fig. 8 is a partial section through a machine embodying another form of my invention;

Fig. 9 is a wiring diagram for the machine shown in Fig. 8; and

Fig. 10 is the control switch for this machine.

This machine consists of a cabinet 1 in which the operating mechanism is housed and in which there is a printing lamp 2, reflector 3 and pilot lamp 4, all mounted beneath the glass printing panel 5.

The platen 6 consists of a plate 7 faced with felt 8 supported by the ears 9 and 10 which engage a rod 11 and a pin 12 having a slidable connection therewith due to the slots 13 and 14 through which these members pass. Similar arms 15 carry the rod and pins, but only one is shown in the drawing. Springs 16 tend to press the platen from its supporting members and permit a limited universal movement to automatically care for different thicknesses which occur from the use of different films, plates and papers.

Arms 15 are affixed upon a shaft 17 supported by bearings 18 attached to the cabinet 1. This shaft is moved by means of a lever arm 19 having a cam slot 20 in one end and affixed to shaft 17 at the other end. There is an arm 21 cooperating with lever arm 19 by means of a pin 22 entering slot 20. It will be obvious that as arm 21 moves from position shown in full lines to that shown in dashed lines the pin 22 riding in cam 20 exerts a gradually increasing pressure upon the platen through arms 15 and 19, as the mechanical advantage of arm 21 increases during the latter part of the stroke. This structure also creates a firm even pressure of the platen on the printing panel during the printing operation.

In order to move arm 21 the following mechanism is used: A base 23 carried inside of cabinet 1 supports castings 24 forming bearings for shaft 25 upon which there is a Z-shaped oscillatory member 26. This member forms an armature which has only a limited angle of movement. An electro-magnet 27 surrounds the armature and has two poles 28 and 29 around which there are coils 30 and 31, shown in Fig. 2 as being wrapped with tape. When switch 32 is closed current flows through wires 33 and 34, and the armature will turn from the position shown in Fig. 1 to that of Fig. 2 in which position the platen is pressing against the printing panel as shown in dashed lines in the first figure. This angle of movement is somewhat less than that of which the armature is capable of making, thus a continued force tends to hold the platen upon the printing panel after the actual movement ceases.

It will be noted that in this position the straight arm 35 of the armature is not in alignment with the poles 28 and 29 of the field so that so long as the current is con-

tinuous there is a strong and constant pressure upon the platen due to the tendency of the armature to assume a position in alignment with the poles.

If desired, the phase of one of these coils 30, 31, may be shifted relative to the other to lessen the heating and reduce the noise on alternating current. This is shown in the wiring diagram in Fig. 4A wherein an adjustable inductive resistance 30^1 is used in connection with a coil 30, there being a handle 30^2 for making the adjustment.

Where the switch 32 is released, breaking the current, the armature is returned to its initial position by spring 36 and arm 37 which is keyed to shaft 25. The spring may be tensioned more or less in a preliminary adjustment by screw 38 on which there is a swivel ring 39 holding one end of the spring. When once set this adjustment will not ordinarily be altered.

To reduce the shock of the sudden movement of the various parts, I prefer to use a dash-pot 40 swung upon a yoke 41; and having a piston 42 pivoted to an arm 43 keyed to shaft 25. A screw 44 may be used to adjust an air vent to control the speed of operation. A door 45 hinged at 46 to cabinet 1 provides access to this adjustment, which, however, is generally not altered after the first setting. It is also useful to provide a shock-absorbing block 47, here shown as a rubber pad, against which lever 19 may rest when the platen reaches its open or its inoperative position.

Wiring has been omitted from Fig. 1 and is shown in diagrammatic form in Fig. 4, wherein power is supplied from the line wires 50 and 51. A red pilot lamp 52 burns continuously when switch 53 is closed, and the printing lamp 56 only when switch 57 is depressed by arm 15. A set screw 58 may be adjusted to properly time the operation of this lamp with the movement of the platen, as for best results, this lamp should only burn while the platen exerts pressure upon the printing panel.

Wires 33 and 34, broken by switch 32, here shown as spring pressed open by spring 60, control the circuit to the armature field. When the circuit is made the armature turns its shaft 25 as above described; and when the circuit is broken, spring 36 returns the armature to the position shown in Figs. 1 and 4.

The operation of my machine is as follows: Upon first using the machine the screws 38 and 44 may have to be adjusted to get the desired speed of operation for the type of work required. It is then only necessary to depress button 61 thereby making the armature circuit through switch 32 causing the platen to press the paper and film together over the printing panel. The last part of the platen movement lights the printing lamp. Upon releasing button 61 the printing lamp is extinguished and the platen automatically raised. The duration of the exposure is entirely controlled by switch 32 which also controls the platen.

If preferred a different form of control switch may be used, as is shown, for instance, in Fig. 5, where the wires 33 and 34 leading to the field are interrupted by a switch bar 32 actuated in one direction by button 63 and in the other by button 64. This type is advantageous if prolonged exposures are to be made.

In Figs. 6 to 10 inclusive, I have illustrated a second embodiment of my invention wherein the platen is moved positively in each direction by the armature. As the machine box, platen, lamps, etc., are the same, similar reference characters will be used for the same parts where shown.

The field magnet 27 is the same as in the first type of machine, but the armature 70 is of different construction being provided with reduced side parts 71 in which a coil of wire 72 is located. The hollow shafts 73 and 74 for the armature are carried by similar castings 75 fastened at 76 to the armature. As the armature turns the electrical connections are made by the terminals 77 which are rotatable with the bearings 73 and 74 but are insulated therefrom by means of the sleeves 78. Brushes 78′ contact with terminals 77 and wires 79 and 80 lead to the switch points 81 and 82, and then from these posts they cross to posts 83 and 84, (Fig. 9), thus making a reversing switch. It will be noted in Fig. 9 that the armature is shown as being vertical in alignment with the poles of the magnet. This was done for convenience in showing the wiring only, as in practice, like in the first embodiment of my invention the armature only tends to reach this position, being prevented from doing so by the platen and associated mechanism. By this arrangement firm contact is assured at the end of the stroke, as there is a continuous and constant force exerted upon the platen. A double-pole double-throw switch 85 is connected by wires 86 and 87 to one end of each field coil 30 and 31. The opposite ends of these coils are connected by wires 33 and 34 to the power line wires 50 and 51.

As is shown in Fig. 10 in which the switch is shown half way down, the operator may press the handle 90 against the spring 91 causing the platen to move to its operative position. When released the handle returns to its normal position in which the platen is raised, that is, with the contacts 85 engaging contacts 81 and 82.

One shaft 74 is carried by a support 92. This shaft supports an arm 21 on which there is a pin 22. Pin 22 extends through a curved cam slot 93 in arm 19 so that as the platen approaches its operative position, arm

19 has a greater mechanical advantage and, in addition, exerts a wedging action during the last part of its stroke holding the platen firmly upon the printing panel.

The dash pot 95 in this form retards in each direction, being hinged at 96 to casing 1 and having similar set screws 97 and 98 for regulating air vents and consequently its speed of operation. The piston 99 is attached to pin 22.

While this form of my invention is more expensive than the first one, it has the additional advantages of moving the platen positively in each direction by the armature, and firmly returning the platen in each of its two positions of rest.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A photographic printing machine comprising a printing panel, a platen movable into and out of printing position on said panel, and means for moving said platen into and out of said printing position, said means including an electromagnetic source of motive power having an armature turning back and forth through a limited angle and connections between said armature and platen.

2. In a photographic printing machine, the combination with a printing panel, of a platen movable to and from an operative position thereover, an armature, means for turning the armature through a limited angle, a lever attached to the platen, and an arm attached to the armature, slidable connections between the last two members permitting the actuation of one by the other.

3. A photographic printing machine comprising a printing panel, a platen movable into printing position on said panel and removable from said panel to clearance position, means for moving said platen to printing position, holding it in such position and removing it to clearance position, said means including an electromagnetic source of motive power having an armature turning through a limited angle, a control member, the actuations of which are manually governed and connections between said member and said means, including a device for regulating the current to said source, said connections governing the means to move said platen to printing position upon actuation of the control member, to remove said platen to clearance position upon further actuation of said member, and to retain said platen in printing position between said actuations.

4. In a printing machine the combination with a printing panel, of a platen movable between two positions, one being over the panel and the other removed from it, a field magnet having poles, means for energizing the field magnet, and an armature capable of oscillating through a limited angle between the poles of the field magnet, connections between the armature and the platen to move the latter with the former, the total angle through which the armature oscillates to move the platen being less than the angle through which it is normally capable of moving, whereby the armature will exert constant pressure upon the platen after moving it to one position as long as the magnet is energized.

5. In a photographic printing machine, the combination of a printing panel, of a platen movable to and from an operative position thereover, an armature, connections between the armature and the platen, means including an electric circuit and a magnet for operating the armature in one direction for moving the platen to its operative position, and means also including the electric circuit and the magnet for moving the armature in the other direction to move the platen from its operative position.

6. In a photographic printing machine, the combination with a printing panel, of a platen movable into and out of printing position on said panel, a source of power, a field magnet having different poles, a motive means including an armature, means for changing the polarity of the armature whereby the armature may be driven in either of two directions to move the platen into and out of printing position upon the panel.

7. In a printing machine, the combination with a printing panel, of a platen movable into an operative and an inoperative position with respect to the panel, a field magnet having poles, an armature adapted to oscillate through a limited angle between the poles and means for reversing the polarity of the armature, means for energizing the field magnet to oscillate the armature, and connections between the armature and the platen to move the platen to and from its operative position.

8. In a photographic printing machine, the combination with a printing panel, of a platen movable thereover, an electrically actuated motive means, an actuating member connected to the motive means, and a member connected to the platen and having a shiftable connection with the actuating member, whereby the mechanical advantage of the actuating member will increase toward one end of the stroke, tending to increase the pressure applied by the platen upon the printing panel.

9. In a photographic printing machine, the combination with a printing panel, of a platen movable to and from an operative position thereover, a motor member, a lever moved by the motor member, an arm connected to the platen, a cam slot in one member and a pin in the other, the pin extend-

ing into the cam slot giving a greater mechanical advantage to the power-driven member as the platen approaches its operative position over the printing panel.

10. In a photographic printing machine, the combination with a printing panel, of a platen movable to and from an operative position thereover, a motor member, a lever moved by the motor member, an arm connected to the platen, a curved cam slot in one member, and a pin cooperating with the curved slot and carried by the other member, the pin and slot being positioned to give the motor member an increasing mechanical advantage over the platen-moving member as the platen approaches its operative position over the printing panel.

Signed at Rochester, New York, this 26th day of December, 1922.

GERRET REKERS.