Oct. 13, 1925. 1,557,301

F. J. LYANS

PHOTOGRAPHIC PRINTING MACHINE

Filed May 22, 1924 3 Sheets-Sheet 1

Fig. 1.

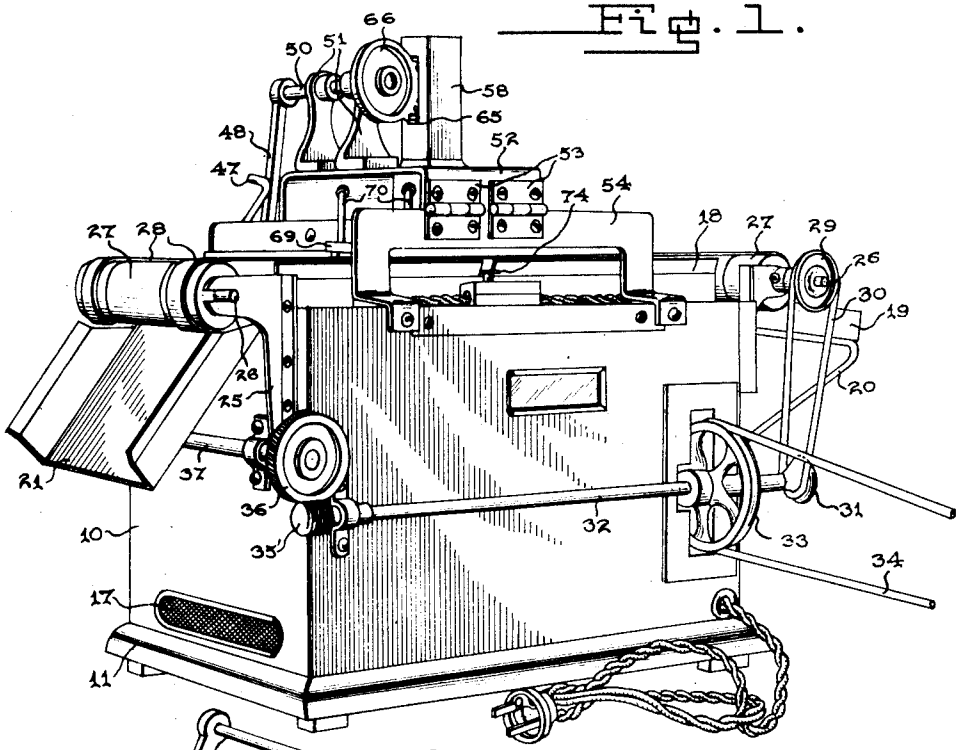
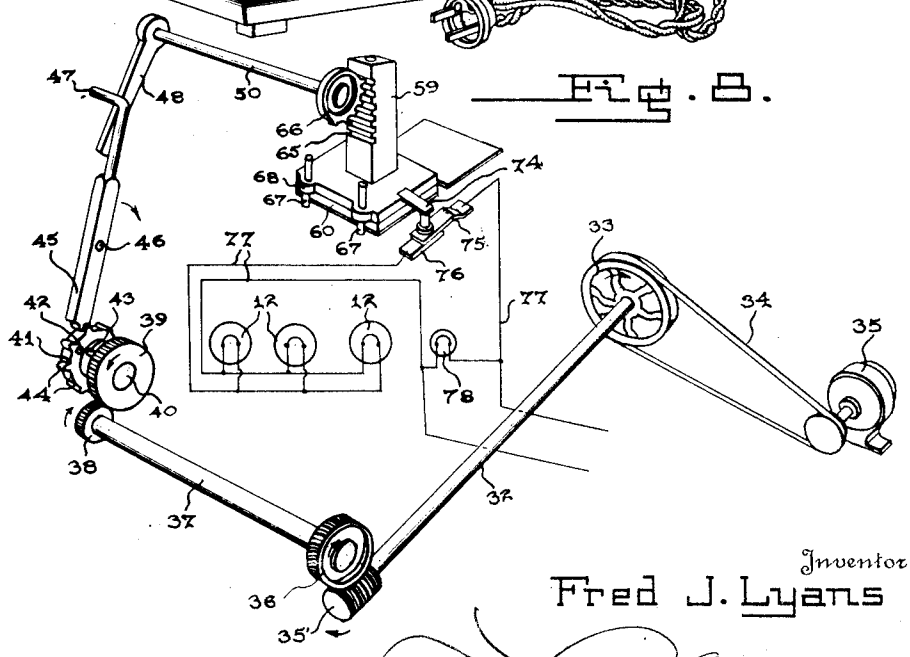


Fig. 2.



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Fig. 2.

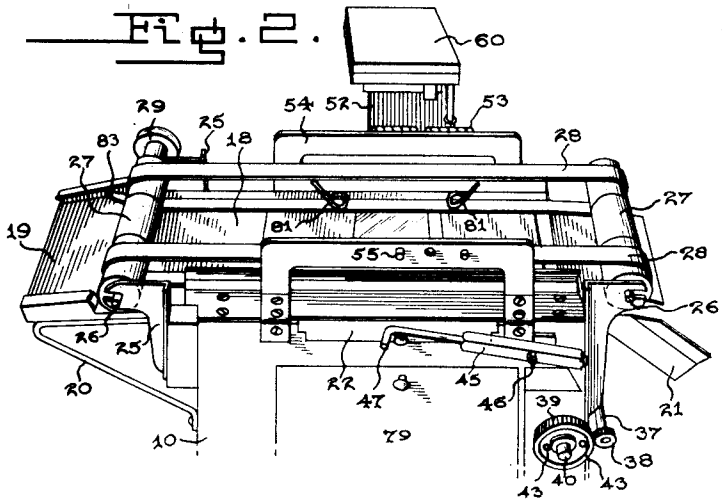


Fig. 5.

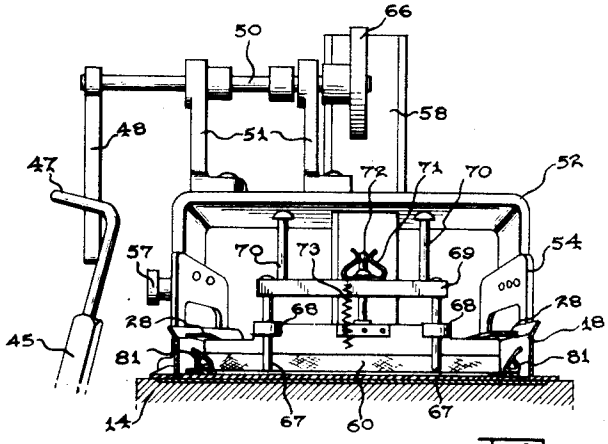


Fig. 6.

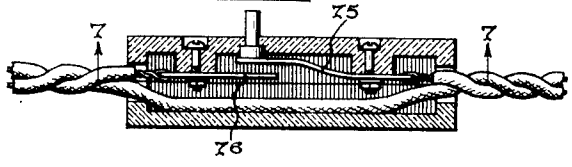
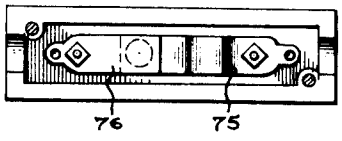


Fig. 7.



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Fig. 3.

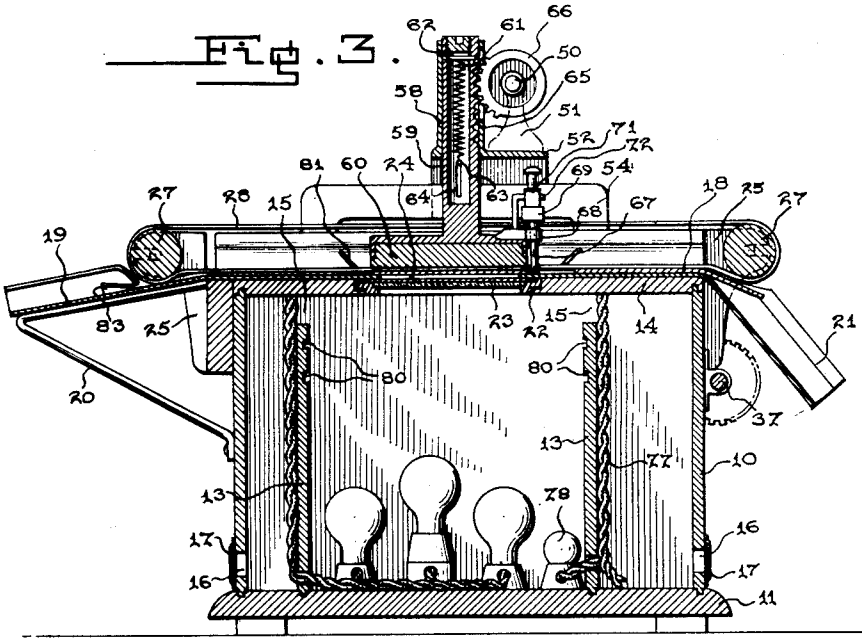
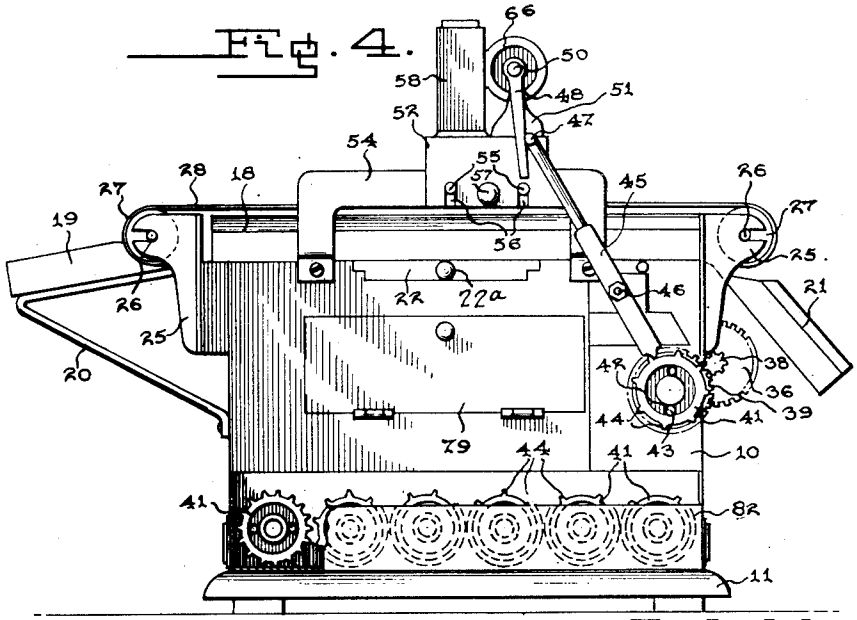


Fig. 4.



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Patented Oct. 13, 1925. 1,557,301

UNITED STATES PATENT OFFICE.

FRED J. LYANS, OF MADISON, WISCONSIN.

PHOTOGRAPHIC-PRINTING MACHINE.

Application filed May 22, 1924. Serial No. 715,202.

To all whom it may concern:

Be it known that I, FRED J. LYANS, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in a Photographic-Printing Machine, of which the following is a specification.

The present invention relates to photographic printing machines, and more particularly to that type adapted to produce pictures at a rapid rate for commercial reproduction.

An object of the present invention is to provide a machine of this character which embodies the features of simplicity and strength in design and in the arrangement of its various parts for disposing compactly the several instrumentalities necessary to the complete operations of feeding, registering, exposing and delivering the sensitized elements upon which the photographs are to be reproduced.

Another object of this invention is to provide a machine with a continuously actuated feeding mechanism, and a combined device for controlling the exposition of the sensitized element and the arresting of the feeding device in its motion momentarily during exposure, such mechanisms being automatically controlled in proper timed relation to the operation of the feeding device.

A further object of the invention is to provide a photograph or the like reproduction machine for making copies in large quantities and at a minimum initial outlay, and with apparatus which may be maintained and operated at low cost so as to reduce to a commercial basis such reproductions on postcards or other objects or sheets which may be coated with a sensitized element and which may be conveniently handled by the feeding mechanism.

A still further object of the invention is to provide a machine of this character with a novel registering means which is automatic in action for liberating an exposed element so that it may be delivered from the machine, and which is automatically returned to operative position for arresting the advancement of a new element to register the same with the negative or the like from which the photograph is to be projected.

The invention still further aims at the provision of a machine of this character embodying all of the above characteristics, and which is so constructed and arranged as to permit easy access to all parts thereof, which permits easy removal and replacement of the negative or the like to be reproduced, and which permits of the easy cleansing and adjusting of the parts to maintain the machine in proper order without material delay in its operation.

A further object is to provide a casing or cabinet construction which is novel and provides for an improved air circulation to carry off the heat from the inner compartment and to prevent passage of light rays either from or into the inner compartment.

The above and various other objects and advantages of this invention will in part be described in and in part be understood from the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a photographic printing machine constructed according to this invention.

Fig. 2 is a fragmentary perspective view of the upper portion of the machine looking down upon the same, and showing the platen and its support swung back.

Fig. 3 is a longitudinal vertical section taken through the machine.

Fig. 4 is a side elevation of the same.

Fig. 5 is a fragmentary end elevation of the rear or outlet end of the machine, parts being broken away showing the position of the platen and the location of the registering device.

Fig. 6 is a detail enlarged section taken longitudinally through the electric switch controlling the lamp circuit.

Fig. 7 is a longitudinal section taken horizontally through the same substantially on the line 7—7 of Fig. 6 and looking in the direction of the arrows, and

Fig. 8 is a detail perspective view of the controlling mechanism for actuating the feeding device and the light circuit switch.

Referring to the drawings, 10 designates a casing or cabinet which may be of any suitable construction and shape, but which is preferably of rectangular form as shown and provided with a bottom or baseboard 11 upon the central portion of which are mounted a number of lamps 12 adapted to illumine the interior of the cabinet and project the rays upwardly when energized. The

lamps 12 are inclosed in an inner compartment within the casing 10 which is formed by transverse partitions 13 arranged between the sides of the casing 10, and which extend upwardly to a point near the top 14 of the casing to provide air passages 15 through which air is adapted to circulate in its passage through the cabinet 10 and through the upper portion of the inner compartment to carry off heated air therefrom. The end walls of the cabinet 10 have, near their lower ends, openings 16 through which air is adapted to pass in entering and leaving the cabinet. The air enters one opening 16 and passes upwardly against the outer sides of the adjacent partition 13, over the top of the same, through the passage 15, across and sweeping downwardly through the inner compartment and over the opposite partition 13 into the casing 10 and out through the opposite opening 16. The arrangement of the partitions and openings is such that no danger results from over heating the interior of the cabinet, and the light rays are not permitted to either enter or leave the cabinet so that the exposure of the sensitized surface to the inner compartment is not jeopardized. Screens 17 or the like may be fitted over the openings 16 to prevent entrance of dirt and the like to the interior of the cabinet 10.

Mounted lengthwise on the top 14 of the cabinet is a trough 18 which is of substantially of the width of the casing 10 and has its upturned flanges extending substantially the entire length of the casing. One end of the trough is extended beyond the casing and bent downwardly at a slight angle to provide a feeding table 19 which may be supported upon a bracket 20 projected from the adjacent end of the casing 10 beneath the table 19. The other end of the trough 18 projects beyond the casing 10 and is preferably bent downwardly at a greater angle to provide an outlet chute 21 for directing the finished article into a suitable container or the like, which may be positioned below the end of the chute 21. The intermediate portion of the trough 18 is cut away to provide an exposure opening, and the top 14 of the casing is likewise cut away so as to provide an opening which extends downwardly into the inner compartment of the cabinet 10. A frame 22 is slidably mounted in the top 14 of the cabinet, and is arranged to move through one lateral edge thereof to move the frame into and out of registery with the central opening. This frame 22 carries a transparent panel 23 which constitutes the retaining or covering panel to support a negative 24 which may also be in the form of a photographic plate, a sheet of glass, a film or the like which carries the photograph or configuration adapted to be projected upon the sensitized surface of the article to be printed. The exposed side of the frame 22 may be provided with a knob 22^a or the like to facilitate the sliding of the frame into and out of position.

At each corner of the cabinet 10, and at the top thereof, is an outstanding bracket 25. The brackets 25 are arranged in transverse pairs and support transverse shafts 26 upon which are mounted rollers 27 which also extend entirely across the trough 18. Arranged upon the opposite end portions of the rollers 27 is a pair of endless feeding belts 28, the lower runs of which lie in proximity to the upper surface of the bottom of the trough 18 so as to carry over said bottom of the trough sheets of paper, postcards, or other articles adapted to be imprinted. The frictional contact of the belts 28 is sufficient to slide or advance the articles from the feeding table 19 through the trough 18. The feeding belts 28 may be operated in any suitable manner, but preferably by means of a pulley 29 mounted on the outer end of one shaft 26 and over which is trained a belt 30 which extends downwardly to a pulley 31 mounted on one end of a longitudinal shaft 32 mounted across one side of the cabinet 10. The shaft 32 is the drive shaft and is provided with a large pulley 33 which receives a belt 34 which may be driven by an electric motor 35, as shown in Fig. 8 or any other suitable driving means. The drive shaft 32 has on its other end opposite the pulley 31 a worm 35 which meshes with a worm wheel 36 on a transverse shaft 37 secured across the adjacent or rear end of the machine, and which carries a pinion 38 on its opposite end which meshes with a gear wheel 39 on a stub shaft 40.

A detachable timing gear 41 is mounted on the outer end of the stub shaft 40 and may have one or more socket openings 42 to receive locking pins 43 which are carried upon the outer side of the gear wheel 39 for holding the timing gear 41 from turning on the stub shaft. The timing gear 41 is provided with a plurality of suitable spaced apart projections 44 adapted to consecutively and intermittently strike the lower end of an arm 45 which is pivoted at 46 to the side of the cabinet 10, and which has an upper reduced end bent laterally to provide a striking finger 47 which moves in the path of an arm 48 secured to a cross shaft 50. The shaft 50 is supported in a pair of brackets 51 which rise from the intermediate portion of an arched frame 52 which is disposed over the trough 18. The arched frame 52 is hinged by hinges 53 at one end to a bracket 54 which is secured to the adjacent side of the cabinet 10 and which projects upwardly to a point above the trough 18.

The arched frame 52 at its free end is arranged to seat upon the upper edge of an opposite bracket 54 secured to the other side

of the cabinet 10. The said opposite bracket 54 is provided on its outer side with one or more studs 55 which enter slots 56 formed in the free downturned end of the arched frame 52. A handle 57 is carried by the free end portion of the frame 52 to facilitate the swinging of the frame upwardly upon its hinges 53, and thus swinging the superstructure to one side out of the way. This arched frame 52 carries an upstanding sleeve 58 which opens down through the frame 52 and which houses a shank 59 which extends upwardly from a platen 60 adapted to operate in the trough 18. The platen 60 may be of any suitable construction, but preferably comprises a rigid back against which is secured a relatively soft substance forming a bed plate or backing for clamping a sensitized element against the negative 24. The opposite sides or lateral portions of the platen 60 are adapted to enter between the top and bottom runs of the conveyor belts 28, and to press downwardly upon the lower runs of the belts immediately over the negative frame 22 for arresting the movement of the belts and for compressing the superposed sheets or plates together. The platen 60 is normally held in a downward position by a spring 61 which is housed within a cavity in the stem 59, and which at its upper end is secured to a cross bar 62 in the top of the stem 59 and which extends downwardly in its pocket to a cross pin 63 which projects at opposite ends through slots 64 formed in the opposite sides of the stem 59. The pin 63 at opposite ends encases the under side of the frame 52 so as to exert a tension on the spring 61 and urge the stem 59 downwardly.

The stem 59 at one side has rack teeth 65 which meshes with a sector 66 fixed upon the shaft 50 mounted in the brackets 51 which rise from the frame 52. The arm 48 when rocked by the finger 47 lifts the stem 59 and its platen 60 so as to release the lower run of the belts 28 and permit the same to proceed in movement under tension of the belt 30.

For the purpose of insuring the proper registry of the articles over the frame 22, the platen 60 carries a registering mechanism which comprises a pair of stop pins 67 which are slidably mounted in eyes 68 formed at the rear end of the platen 60, the pins 67 being connected at their upper ends by a crossbar 69. The crossbar 69 carries upstanding pins 70 arranged to engage the underside of the frame 52 when the bar 69 is raised to a predetermined height. The crossbar 69 is provided with a pair of converging spring fingers 71 arranged to impress a finger 72 which is carried upon the platen 60 and which extends upwardly therefrom and is then bent rearwardly to engage between the spring fingers 71. The fingers 71 are adapted to connect the cross bar 69 with its pins 67 to the platen for movement therewith. The upper ends of the pins 70 are adapted to strike the underside of the frame 52 when the platen is raised to a predetermined extent so as to then free the bar 69 and permit the pins 67 to drop into the path of the next approaching article with a sensitized element thereon. The crossbar 69 is normally urged down by a spring 73 having one end attached to the bar 69 and its other end to the platen 60. The spring 73 is weaker than the spring fingers 71 so that the latter is permitted to hold the bar 69 with its stop pins 67 in elevated position until the spring fingers 71 are forced away from the fingers 72 by the engagement of the pins 70 against the underside of the arched frame 52. As soon as the spring fingers 71 are forced from the finger or pin 72 the spring 73 snaps the bar 69 downwardly to bring the stop pin 67 against the bottom of the trough 18, and in the path of the oncoming article, so that the article will be stopped immediately over the negative frame 22.

The platen 60 is provided at one side with an outstanding arm 74 adapted to engage the upper contact 75 of a switch to depress said upper contact against a lower contact 76 for completing an electric circuit through the lamps 12. The lamps 12 are connected in parallel with a pair of leads 77, one of which terminates in the lower contact 76 while the other lead goes to a suitable source of electric energy. The other lead comes from said source of electric energy to the upper contact 75. A pilot light 78 is secured across the leads 77 outside of the switch 75 so as to act as a telltale in the condition of the circuit. This pilot light 78 may be mounted in the inner compartment with the lamps 12.

The casing 10 is provided at one side with a hinged door 79 for gaining access to the interior of the cabinet 10 and into the inner compartment so that the lamps 12 and 78 may be adjusted, renewed or the like. The upper ends of the partitions 13 are provided with registering grooves 80 in their inner surfaces adapted to receive vignetting or dodging plates which are adapted to be slid into and out of the door 79.

For the purpose of maintaining an even pressure on the lower run of each of the belts 28, the sides of the trough 18 are provided with spring fingers 81 which are given suitable configuration to overhang the lower runs of the belts 28 at opposite ends of the platen 60. The feeding table 19 is provided at one side with a spring leaf 83 adapted to lie substantially flat against the bottom of the feeding table and beneath which the articles are adapted to be tensioned for entry beneath adjacent roller 27.

In operation it is only necessary to swing the platen 60 over to one side on the hinges 53 so as to gain access to the bottom of the trough. The frame 22 may now be withdrawn laterally through the cabinet 10 and a negative 24 placed in the frame 22 against the transparent panel 23. The parts are now replaced and the normal position of the platen 60 under tension of spring 58 is lowermost and with the swinging arm 69 advanced rearwardly. The motor 35 is now set in motion so as to turn the drive shaft 32. The drive shaft 32 operates the belt 30, which in turn drives the adjacent shaft 26 and operates the feeding belts 28 which lie in the opposites of the trough 18. When the platen 60 is lowered it exerts pressure upon the lower runs of the belts 28 and holds the belts from movement, causing the belt 30 to slip over its pulley 29. At the same time the shaft 32 continues to operate and rotates the transverse shaft 37, which in turn actuates the timing gear 41 to intermittently bring the projections 44 into engagement with the lower end of the rocking arm 45. When the projection 44 engages the arm 45 it swings the upper end of the arm forwardly against the depending arm 48 and rocks the shaft 50 in such direction as to cause the segment 66 to lift the rack 61 and stem 59, elevating the platen 60 and freeing the belts 28. As the platen 60 rises it carries the pin 72 therewith and the pin 72 carries with it the springs 71, which are mounted on the crossbar 69. The studs 70 of the crossbar approach the underside of the arched frame 52 and engage the latter when the platen 60 is elevated to a predetermined height. When such position is reached the studs 70 arrest the upward motion of the crossbar 69 and force the springs 71 out of engagement with the head of the pin 72. When such occurs the bar 69 is free to drop and to carry its studs 70 downwardly therewith, and also to project the stop pins 67 against the bottom of the trough 18 and in the path of an article to be exposed.

The articles, such as postcards, sheets or the like, are placed upon the feeding table 19 and forced one at a time into engagement with the adjacent roller 27, the lower runs of the belts 28 engaging the articles and carrying it forward over the bottom of the trough 18. Of course, the articles may be fed one after the other from the table 19. When the article is carried to the central portion of the trough 18 it strikes the stop pins 67, and is thus held in registry with the frame 22. After the operation has continued through a predetermined cycle, the platen 60 is again moved downwardly to engage the lower runs of the belts and to also bind the subjacent article against the negative 24. This downward movement of the platen 60 also closes the light circuit through the contacts 75 and 76 to cause the lamps 12 to be illuminated. The rays from the lamps are projected upwardly through the transparent panel 23 of the frame, and through the negative 24, the light passing through these objects acting upon the sensitized film of the article to photograph the configuration of the negative upon the article. This downward movement of the platen 60 also yieldingly interlocks the registering or stop pins 67 with the platen so as to be elevated by the latter when it is raised.

It will be noted from Fig. 4 that the cabinet 10 may be provided along one side with a trough 82 adapted to receive a number of the timing gears 41 so that the timing gears may be made in different sizes and with different numbers of projections 44 thereon, depending upon the use to which the photographing machine is to be put.

It is of course understood that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of the invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the cabinet, a feeding device adapted to bring sensitized articles into registry with the negative holder, a reciprocating platen mounted over the feeding device and adapted to engage the feeding device for arresting the motion thereof when the article registers with said negative holder, and light controlling means mounted on said platen for controlling the illumination within the cabinet.

2. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the top of the cabinet, a feeding device normally operating over the top of the cabinet for carrying sensitized articles, one at a time, into position over the negative holder, a reciprocating platen mounted over the feeding device and in line with the negative holder, means for periodically lowering the platen to engage the feeding device and arrest the motion thereof to hold an article in line with the negative holder, and a circuit closing switch lying in the path of the platen adapted to be closed when the platen is lowered for energizing the source of illumination.

3. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the top of the cabinet in line with the source of illumination, a platen mounted on the top of the cabinet in overhanging relation

to the negative holder, a spring normally urging the platen toward the negative holder, operating mechanism including an intermittent trip device adapted to elevate said platen against the tension of the spring, and an endless feeding mechanism operable across the top of the cabinet adapted to carry articles one at a time into registry beneath said platen, said platen when lowered being adapted to engage said feeding device and arrest the motion thereof and clamp the article against said negative holder during the exposure of the article to the rays of light.

4. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the top of the cabinet in line with the source of illumination, a vertically reciprocable platen disposed over the negative holder, a pair of endless belts mounted over the top of the cabinet adapted to deliver articles to said negative holder, said platen being adapted to be moved downwardly into engagement with said endless belts to arrest the motion thereof and to hold the article against the negative in the holder during exposure of the article to the source of illumination.

5. In a photograph printing machine, the combination of a cabinet, an operating shaft arranged along one side of the cabinet, a pair of rollers disposed at opposite ends of the cabinet at the top thereof, a pair of endless belts arranged over the opposite end portions of the rollers and traversing the top of the cabinet, a negative holder seated in the top of the cabinet beneath the belts, a source of illumination in the cabinet, said belts being adapted to receive articles therebeneath and convey said articles to said negative holder, a vertically movable platen mounted on the cabinet above said belts and having lateral portions engaging between the upper and lower runs of the belts, said platen being adapted to be lowered for binding engagement against the lower runs of the belts to arrest the feeding movement of the same and to press the article against the negative in said holder, and intermittent tripping means connected to said shaft for actuating the platen.

6. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the top of the cabinet, a vertically movable platen mounted on the cabinet over said negative holder, a pair of endless belts arranged to traverse the top of the cabinet and adapted to convey articles one at a time across the top of the cabinet, a pair of stop pins vertically movable in the rear end of said platen adapted to engage the top of the cabinet when the platen is lowered, a crossbar connecting the upper ends of said stop pins, a pair of spring fingers carried by the crossbar, a connecting pin carried by the platen and having its upper end disposed in line with said spring fingers and adapted to be grasped thereby for supporting the bar with its stop pins on the fingers to elevate the stop pins during the initial upward movement of the platen, and studs projecting upwardly from said crossbar for engagement with the superstructure of the cabinet to force said spring fingers out of engagement with the connecting pin of the platen for freeing the stop fingers, said stop fingers being adapted to drop downwardly in advance of the downward movement of the platen to engage the advanced edge of an article to hold the same in registry with the negative holder, said spring fingers being adapted to carry the stop pins downwardly with the platen to free the article and permit said endless belts to carry the exposed article across the top of the cabinet.

7. In a photograph printing machine, the combination of a cabinet, a source of illumination in the cabinet, a negative holder in the top of the cabinet, a continuously rotating operating shaft, a drive gear connected to the shaft and having a stud projecting axially therefrom, laterally disposed pins eccentric to the stud, a superstructure on the cabinet, a platen having a stem slidably mounted in the superstructure and provided with rack teeth in one side, a sector pivoted on the superstructure and meshing with said rack, an arm connected to the sector and depending therefrom, a lever pivotally mounted on the cabinet and having one end in the path of said arm, and a removable timing gear fitting on said stud of the drive gear and having eccentric openings therein adapted to receive said pin for detachably coupling the timing gear to the driving gear, said timing gear having spaced peripheral projections adapted to consecutively engage said lever and swing the same into contact with the depending arm for raising the platen at predetermined intervals.

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