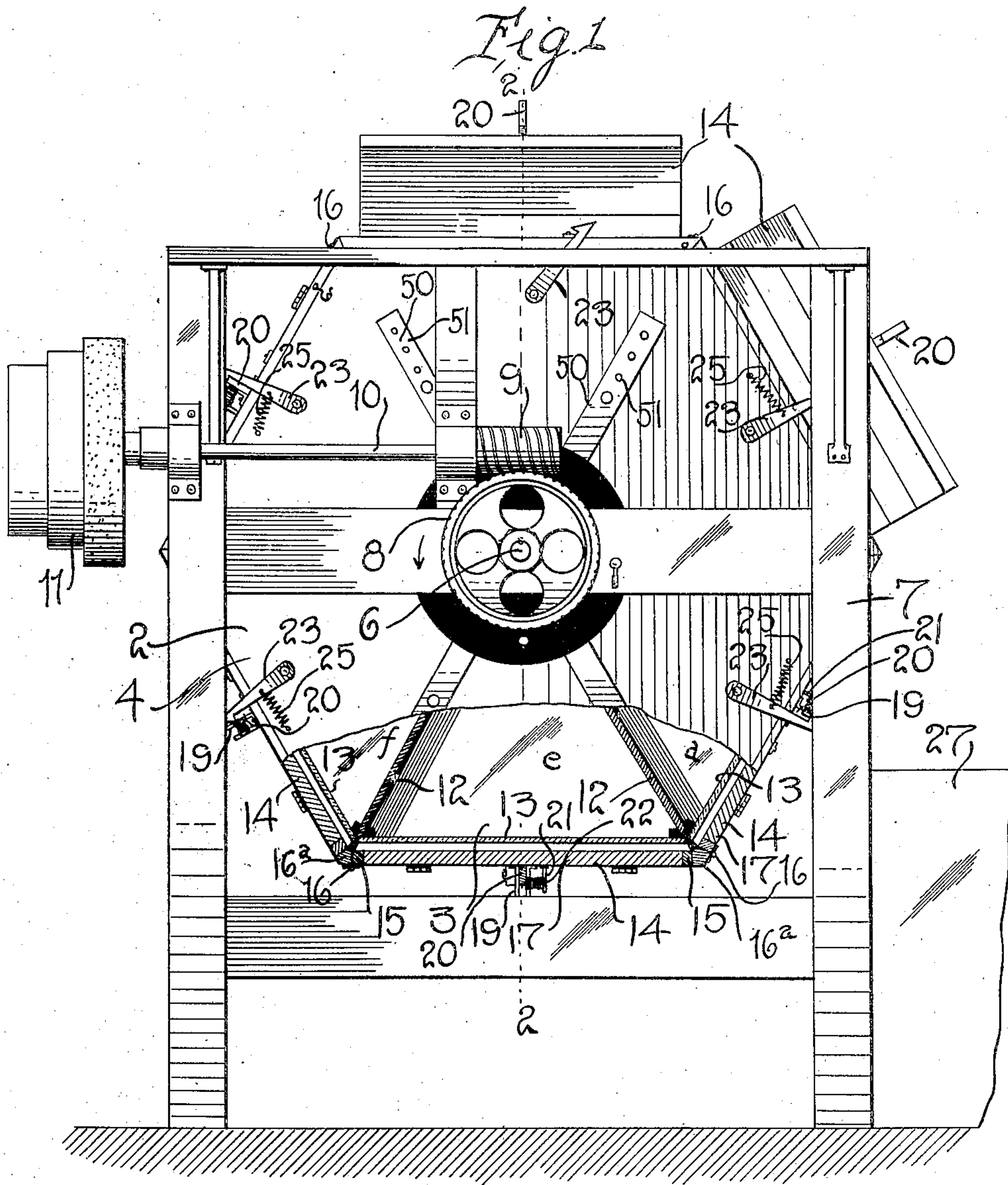


S. A. SMITH.  
 PHOTOGRAPHIC PRINTING APPARATUS.  
 APPLICATION FILED NOV. 23, 1914.

1,154,735.

Patented Sept. 28, 1915.

3 SHEETS—SHEET 1.



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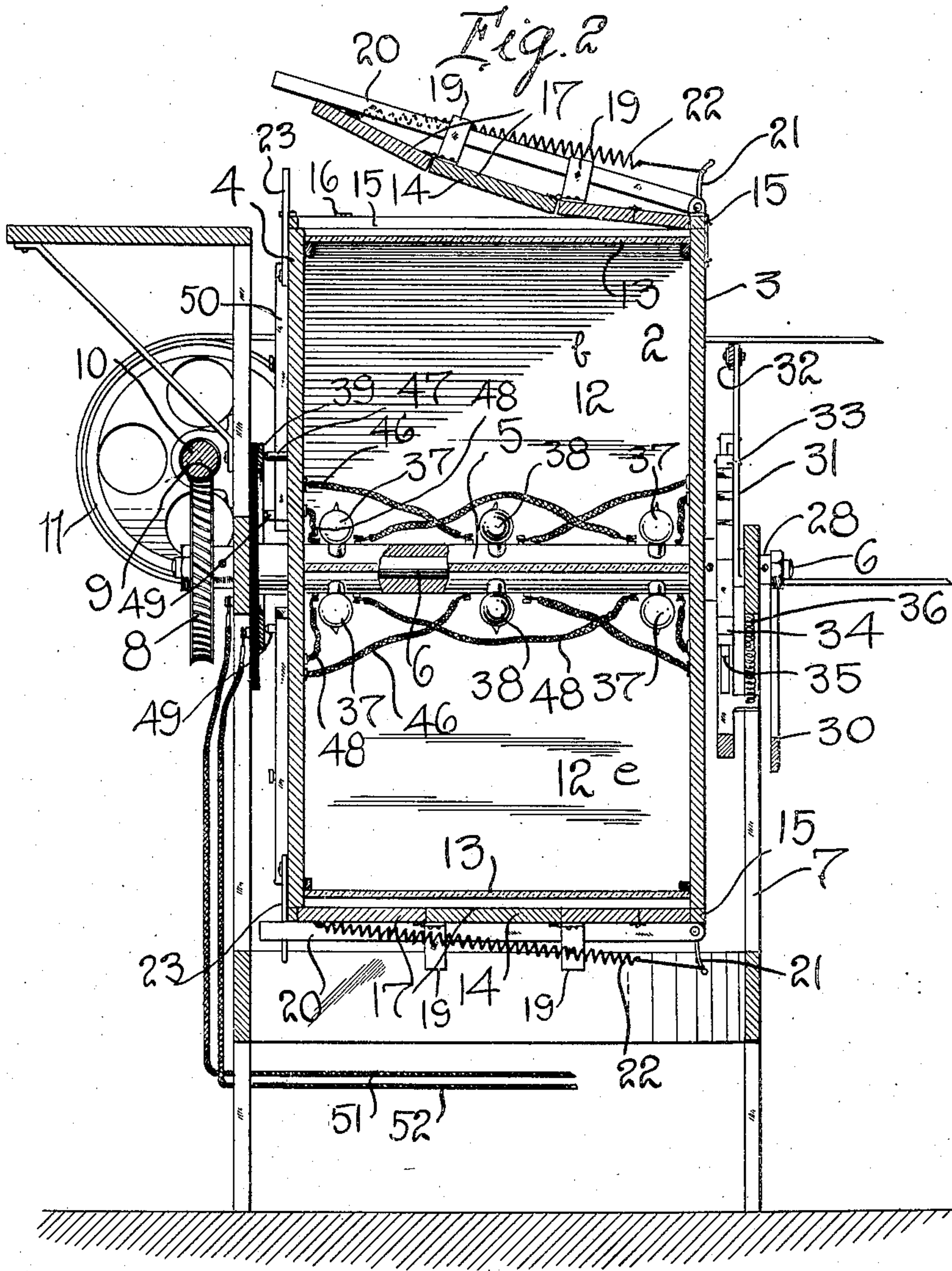
Attorney

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3 SHEETS—SHEET 2.



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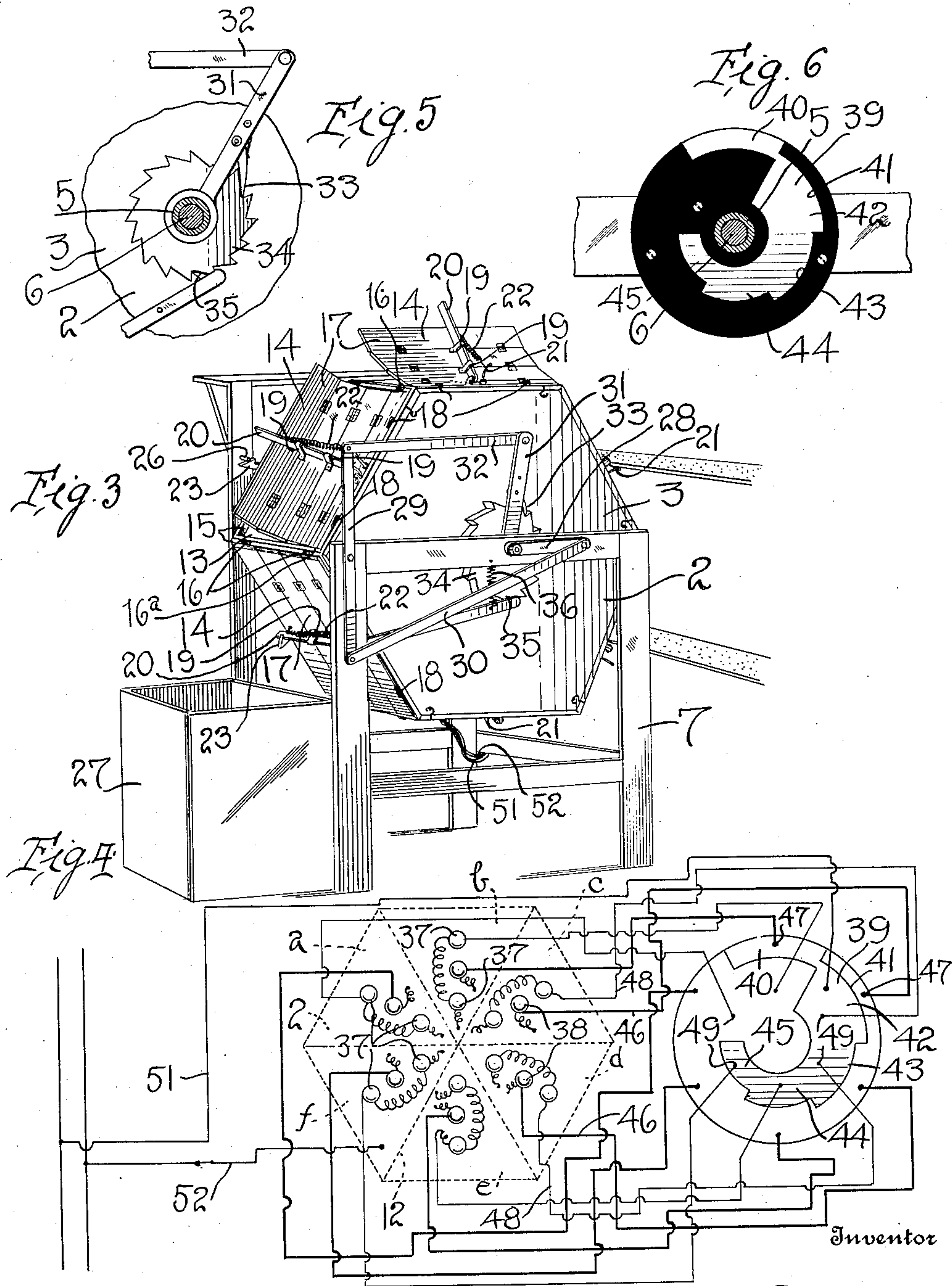


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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

SIMON A. SMITH, OF BURLINGTON, VERMONT.

PHOTOGRAPHIC-PRINTING APPARATUS.

1,154,735.

Specification of Letters Patent.

Patented Sept. 28, 1915.

Application filed November 23, 1914. Serial No. 873,545.

*To all whom it may concern:*

Be it known that I, SIMON A. SMITH, a citizen of the United States, residing at Burlington, in the county of Chittenden and State of Vermont, have invented certain new and useful Improvements in Photographic-Printing Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to the art of photography, and particularly to means for printing from photographic negatives.

The primary object of my invention is the provision of a printing frame adapted to carry a plurality of negatives, and adapted to expose the photographic paper to the action of light for a predetermined and regulatable time.

A further object of the invention is the provision of a photographic printing apparatus in which a plurality of negatives may be supported for the production of a plurality of photographs, the frame being so arranged that while the sheet of sensitized paper is being removed, another sheet may be inserted and a plurality of sheets may be coincidentally exposed to the light.

A further object of the invention is to provide a rotatable printing frame having means for supporting a plurality of negatives and sensitized sheets, these negatives being arranged so that at one period of rotation the back of each printing frame will be opened, allowing the removal of the exposed paper, during which period the lights within this particular frame are turned off, and during another period the back of each frame will be opened so as to permit the insertion of a fresh sheet in that particular frame, during which period a red light will be energized, and during the remainder of the rotation the plate and sensitized paper will be subjected to the action of electric light whereby to cause the printing of the negative upon the sensitized paper.

A further object is to provide in a device of this character a drum carrying a plurality of printing frames and divided into compartments coincident with these frames and provide means for illuminating the interior of each one of the compartments or cutting off this illumination, and provide means for giving a step by step rotation to the drum.

Still another object is to provide means

for automatically exposing the sensitized paper to light for a greater or less period of time, as may be desired.

A still further object is to so construct the back of each of the frames that the back will be automatically opened as the frame arrives at a predetermined position, so as to permit the removal of the sensitized paper and the insertion of a fresh sheet and further provide means for reducing the shock or jar incident to the opening of the back.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a printing apparatus constructed in accordance with my invention; Fig. 2 is a vertical section on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of the device; Fig. 4 is a diagrammatic view showing the wiring and light timing devices coacting therewith; Fig. 5 is a detail view of the pawl and ratchet feed to secure a step by step motion of the drum; Fig. 6 is a face view of the timing disk or plate.

Corresponding and like parts are referred to in the following description and designated in all parts of the accompanying drawings by like reference numerals.

Referring to these drawings, and particularly to Figs. 1, 2 and 3, it will be seen that I provide a drum or carrier 2 which is formed with opposed spaced end portions 3 and 4. These end portions are mounted upon a barrel 5 which is rotatable upon a shaft 6. This shaft 6 is mounted in any suitable manner upon a frame designated generally 7, this frame having supporting legs, or being arranged in any desired manner. The drum is rotatable upon the shaft and the shaft is adapted to be driven in any suitable manner, as by means of a worm gear 8 and a worm 9. This worm 9 is mounted upon a shaft 10 supported in the frame work which carries at its ends the band wheel 11 whereby power may be applied to the shaft. It will of course be obvious that a rotation of the shaft 10 will cause a continuous rotation of the shaft 6 in one direction. Mechanism is provided whereby this continuous rotation of the shaft 6 is transformed into a step by step rotation of the drum in a reverse direction



to that of the shaft. This mechanism will be later described.

The drum or carrier 2 is provided, as illustrated in Fig. 1, with a plurality of compartments, each of these compartments being triangular in form and having the radially directed side walls 12. These side walls 12 are preferably formed of highly polished metal, the polished surface of the metal acting as a reflector. I do not wish to be limited, however, to the use of metal in the side walls, as mirrors might be used for the purpose. The outer end of each compartment is preferably provided with means for supporting therein the photographic negative 13, so that this negative may be readily removed and as readily inserted in place in the printing frame formed by the side walls 3 and the reflecting end walls 12.

As illustrated, the drum 2 is hexagonal in form so as to provide six printing compartments, or frames, designated respectively *a, b, c, d, e* and *f*, (see Fig. 4). Each compartment is formed with a back designated generally 14 which comprises an exteriorly rectangular frame designated 15, which frame is hinged at 16 to a strip 16<sup>a</sup> extending across between the walls 3 and 4 of the drum. This frame 15 is held in closed position by means of hooks or other forms of latches, and the frame 15 is only opened to permit the insertion or removal of the negative 13. Extending across this frame 15 are a plurality of back sections 17, illustrated as four in number, and hinged to each other, one of the end sections being hinged to the frame 15, as at 18. As before stated, these sections 17 are hinged to each other, and two of the sections carry upwardly extending U-shaped straps 19 extending in transverse alinement. Pivotaly mounted upon the side wall 3 of the drum at the middle of each back section 14 is a transversely extending bar 20 which passes through these U-shaped straps 19 and has sliding engagement in these straps, as illustrated clearly in Figs. 2 and 3. Extending upward from the frame 15 at the pivoted end of this bar is a finger 21, and connected with this finger 21 is a coiled contractile spring 22, the outer end of which is connected to the outermost section 17, as shown clearly in Fig. 2. The bar 20 extends beyond the side wall 4 of the drum and is adapted to be engaged and held in locked position by means of a latch 23. There are of course as many latches 23 as there are bars 20, and these latches are mounted upon the side wall 4 of the drum. The latches are held in position to engage over the ends of their respective bars 20 by means of springs 25, it being obvious of course that the latches may be shifted so as to disengage the bars 20 and that when so

disengaged the spring 22 associated with any particular bar 20 will cause the opening of the door or back. These latches are automatically shifted from engagement with the bars at a particular point in the rotation of the drum. As illustrated in Fig. 3, a pin 26 is provided which projects from the frame and is adapted to engage each latch as it comes in contact with the pin, withdrawing the latch from its engagement with the corresponding bar 20 and causing the corresponding back to open. The opening of each back is preferably at a point where the negative in that particular frame or compartment is inclined to a vertical plane so that the printed sheet within the compartment may readily slide out of the compartment and drop into a box 27 intended for the reception of these sheets. The back of the compartment remains open until the drum is turned one step, carrying the proper compartment into a horizontal plane, as illustrated in Fig. 3, and a new sheet of sensitized paper is inserted in this compartment and the back closed by hand, the proper catch snapping over the bar 20 of the back. The back then remains closed throughout the further rotation of the drum until it again arrives at the unlatching device 26.

For the purpose of giving the drum a step by step rotation, I might provide any suitable mechanism, but preferably I mount upon one end of the shaft 6 a crank 28. I pivot upon the frame the lever 29, one end of which is connected to the crank by means of a link 30 and the other end of which is connected to a lever 31 by means of a link 32. This lever 31 is pivoted upon the shaft or axis of the drum and carries a pawl 33 engageable with the ratchet wheel 34 which rotates freely upon the shaft 6 but is fixed to the drum. It will thus be obvious that each rotation of the shaft will cause an oscillation of the pawl carrying the lever 31, which in turn will cause a predetermined movement of the drum, the extent of this angular movement being such that each oscillation of the lever 29 will cause one step of the drum. In order to prevent any reverse movement of the drum and hold it steady at the end of each rotation or step, I provide the pawl 35 which is pivoted in one end and which at its free end carries a tooth engaging the ratchet teeth on the ratchet wheel 34. This pawl is held in close contact with the ratchet wheel by means of a spring 36.

As before stated, I do not wish to be limited to the exact construction herein shown, as it is obvious that many changes might be made in this mechanism without departing from the spirit of the invention.

It is necessary that the photographic negative and the sensitized paper be sub-



mitted to light for a predetermined time, and that then the back 14 shall be opened to permit the discharge of the printing sheet and that at this time the white lights previously burning shall be turned out. It is also obvious that at the time the new sheet of sensitized paper is to be inserted, a red light should burn within the proper compartment of the drum so as to give out illumination whereby the operator may see to placing paper on the negative without any danger of exposing the sensitized sheet to the light before it is in proper position with the back closed. To this end I provide in each compartment a plurality of lamps. Preferably I provide two electric lamps, designated 37, which are white in color and preferably disposed at the ends of the compartments, and I provide at the middle of each compartment a red lamp 38.

Mounted upon the frame of the machine and insulated therefrom is a copper contact plate 39 which is shown in the face view in Fig. 6. This copper contact sheet or plate is fixed with relation to the drum. This sheet has an arcuate portion 40 which is disposed at the maximum distance from the axle of the drum and which is intended respectively to energize the red lights of the several compartments. The plate 39 rearward of the portion 40 is cut away on an arc of a circle as at 41, to provide a portion 42 disposed nearer to the center of motion than the portion 40. The plate 40 is then further cut away as at 43 to provide an arcuate portion which is still nearer to the center of rotation. The plate is still further cut away rearward of the portion 43 to provide a portion 44 on a line within the portion 43, and is still further cut away to provide a portion 45 which is still nearer the axis of rotation. It will be noted from Fig. 6 that the portion 45 has an angular extent of approximately 240 degrees, and the portion 44 has an angular extent of approximately 180 degrees; the portion 43 has an angular extent of approximately 110 degrees, and the portion 42 has an angular extent of approximately 55 degrees.

As illustrated in Figs. 2 and 4, the wire 46 leading from one side of each electric light 38 connects it to a binding post operatively connected to a brush or pin 47 which is so disposed upon the drum that in its rotation it will wipe against the face of the portion 40 of the plate 39. During the period when the pin 47 of any compartment is wiping against this portion 40 of the plate the lamp 38 of that compartment will be energized and the compartment will be illuminated by a red light. There are of course as many of these pins or brushes 47 as there are compartments, and when any pin passes out of contact with the portion 40 of the plate 39 the corresponding red lamp will

go out. Inasmuch as this portion 40 of the plate 39 is arranged above the shaft 6, it is obvious that a compartment will be illuminated with a red light when it reaches its uppermost position. Thus in Fig. 4, the compartment *b* is being illuminated with the red light.

The white lights 37 are shown as connected in series, and the wire 48 leading from each pair of white lights connects to a post or brush 49 which is adapted to also contact with the plate 39, but inward of the portion 40 thereof. In order to secure an adjustable regulation and control of the time during which the white lights are displayed I preferably so mount these brushes or posts 49 that they may be shifted inward or outward radially from the axial center of the portion so that the brushes will wipe against any one of the portions 42, 43, 44 or 45. It will be obvious that if any one of these posts or brushes wipes against the portion 45 the white lights will be energized during a rotation of the drum through 240 degrees, and that if the post or wiper be so disposed as to contact with the portion 44 then the white light will be illuminated during the rotation of the drum through 180 degrees, and so on. Thus when the brushes are so adjusted as to contact with the portion 42 of the plate 39 the white light will be on in each compartment a relatively short or minimum time, while when the brushes contact with the portion 45 of the plate the white lights will be on for a maximum or relatively long time. In order to secure the adjustment of these brushes 49 I mount each brush upon a radially extending rod 50, the upper end of which is provided with a plurality of perforations 51 through any one of which a bolt 52 passes. It will be obvious that by adjusting the rods inward or outward toward the frame or shaft 6, the brushes or posts 49 carried thereby will be adjusted either to contact with the segment 42, the segment 43, the segment 44 or the segment 45. It will of course be understood that the contact plate 39 is electrically connected to a source of current, as for instance by the wire 51 in Fig. 4, and that the wires 40 and 48 are connected at one end to the respective posts 47 and 49 and at their other ends connected to said source of current in any suitable manner, as by the wire 52.

The operation of my invention will be plain from the preceding description, and it will be observed that I provided a printing device including a plurality of printing compartments or frames arranged in a barrel rotatable around a common axis by a step by step motion, and that I have provided means for automatically opening the back of each compartment as it arrives at a predetermined point and simultaneously deenergizing all the lights



of said compartment and then turning on a red light in that compartment as it moves to a further predetermined point where a fresh piece of sensitized paper is to be inserted, and then deenergizing the red light and energizing the white lights composed in this same compartment and keeping said lights energized while the compartment is rotated to its initial position.

10 I have found my construction extremely convenient in practice, and forming a relatively large output of prints. The step by step motion given to the barrel gives to the operator ample time to insert and remove the various sheets of paper to be printed.

15 It will of course be obvious that I may provide any suitable clutch mechanism whereby the machine may be disengaged from its driving mechanism so as to permit the negatives within the frame to be changed if desired, but these negatives may be changed while the barrel is still.

1. In a photographic printing apparatus of the character described, a carrier movable in a closed path and adapted to support a negative and a sensitized sheet, means mounted within the carrier for automatically subjecting the negative and sheet to the action of actinic light during a predetermined portion of the movement of the carrier, and means for illuminating the negative and sheet by a non-actinic light during a further portion of the movement of the carrier.

35 2. In a photographic printing apparatus of the character described, a carrier movable in a closed path, means mounted upon the carrier for supporting a negative and a sensitized sheet therein, means for automatically subjecting the negative and sensitized sheet to the action of actinic light during a portion of the movement of the carrier, means for automatically illuminating the negative and sensitized sheet with non-actinic light during a portion of the movement of the carrier, and means for automatically opening said closing means when the negative and the sheet are illuminated by a non-actinic light.

50 3. In photographic printing apparatus of the character described, a printing frame, means for carrying said frame bodily along a predetermined path, means carried with the printing frame for automatically illuminating the printing frame with a white light during a portion of its travel and means for illuminating the printing frame with a red light during another portion of its travel.

60 4. In photographic printing apparatus of the character described, a rotatable carrier divided into a plurality of compartments, a printing frame forming the end of each of said compartments, illuminating means carried by each compartment, means for

rotating the carrier, and means for energizing the lighting means during a predetermined part of said rotation.

5. In photographic printing apparatus of the character described, a rotatable carrier divided into a plurality of compartments, a printing frame forming the outer end of each compartment, a white lamp and a red lamp disposed in each of the compartments, means for energizing the white lamps in each of said compartments during a predetermined angular rotation of the carrier, and means for energizing the red lamps during another predetermined part of the rotation of the carrier.

6. In photographic printing apparatus of the character described, a rotatable carrier divided into a plurality of compartments, a printing frame forming the outer end of each compartment, a back for each compartment hingedly connected to the carrier and co-acting with the corresponding printing frame, a white lamp and red lamp disposed in each compartment, means for holding the back of each compartment closed during a predetermined portion of the rotation of the carrier, means for energizing the white lamp in each compartment while the back is closed, and means for automatically opening the back at a predetermined point in the rotation of the carrier and simultaneously deenergizing the white light and energizing the red light.

7. In photographic printing apparatus of the character described, a rotatable drum divided into a plurality of compartments, the walls of said compartments having reflecting surfaces, a printing frame forming the outer end of each compartment and hinged to a drum, a back hinged to said printing frame, means normally urging the back to an open position, a latch for each back holding it in closed position, means for automatically releasing the back at a predetermined point in the rotation of the drum to permit it to open, and means for illuminating each compartment with a white light while the back of that compartment is closed.

8. In photographic printing apparatus of the character described, a rotatable drum divided into a plurality of printing compartments, each of said compartments at its outer end being constructed to support a negative, a back for each compartment adapted to extend behind the negative but having means urging the back to an open position, a latch holding each back closed, electric lamps in each compartment, means for deenergizing the lamps in any one compartment while the back of that compartment is closed, and means for automatically releasing the back of any compartment when it arrives at a predetermined position.

9. In photographic printing apparatus of



the character described, a rotatable drum divided into a plurality of compartments, each compartment being formed at its outer end to support a negative, an electric light in each compartment connected on one side to a source of energy, a brush projecting from the drum and electrically connected to the other side of said lamp, and a fixed contact member with which said brush engages during a predetermined portion of the rotation of the drum, said contact member being connected in circuit with said source of energy.

10. A photographic printing apparatus of the character described, including a rotatable drum divided into a plurality of compartments, each of said compartments being formed at its outer end to support a negative electric lights disposed in each compartment and connected on one side to a source of energy, a brush for each compartment disposed upon the exterior of the drum and connected each to its corresponding lamps, said brushes being adjustable radially toward or away from the center of motion of the drum, a contact plate disposed concentric to the axis of the drum and with which said brushes contact, said plate being connected in circuit with the source of energy, said plate being formed with a plurality of arcuate tracks of different lengths whereby to time the energizing of said lamps.

11. A photographic printing apparatus of the character described, a rotatable drum divided into a plurality of compartments, each compartment being formed at its outer end to support a negative, a white lamp in each compartment connected on one side to a source of energy, a red lamp in each compartment connected on one side to the source of energy, a brush for each compartment mounted upon the drum and to which the other side of the red lamp is connected, a brush for each compartment mounted upon the drum and to which the other side of the white lamp is connected, a contact plate concentric to the axis of rotation of the drum, having an arcuate portion or track with which the brushes of the red lamps successively contact, and having an arcuate portion or track with which the brushes of the white lamps successively contact, said plate being connected in circuit with said source of energy, and means for giving a step by step rotation to the drum.

12. In a photographic printing apparatus of the character described, a drum divided into a plurality of printing compartments, a back for each compartment composed of a plurality of hinged sections, a bar hinged

to one of said sections and extending across the other sections and operatively connected thereto, latches mounted upon the drum, one for each of said bars, and engaged therewith to hold the back closed, and means for successively releasing said latches.

13. In a photographic printing apparatus of the character described, a rotatable drum divided into a plurality of printing compartments, a back for each compartment comprising a plurality of sections hinged to each other and one of said sections being hinged to the side wall of said compartment, a bar extending transversely across the several sections and hinged to the wall of the compartment, U-shaped members attached to the sections and extending over said bar and permitting the bar to have a predetermined movement independent of the sections, a spring urging the free end of the bar outward, a plurality of latches mounted upon the drum, one for each bar, and engaging the bar to hold the corresponding back closed, and means for successively releasing said latches to permit the opening of the back.

14. In photographic printing apparatus of the character described, a rotatable drum divided into a plurality of printing compartments, means for supporting negatives and sensitized paper within said compartments, a shaft passing through the drum, a ratchet wheel carried by the drum, means for rotating the shaft continuously in one direction, and means carried by the shaft and operatively engaging the ratchet wheel to cause a step by step rotation of the drum upon a continuous rotation of the shaft.

15. In photographic printing apparatus of the character described, a drum divided into a plurality of printing compartments and adapted to support a negative in the outer end of each compartment, a rectangular frame disposed in the outer end of each compartment and hinged to one of the end walls thereof for movement in a plane parallel to the plane of rotation of the drum, a back hinged to said rectangular frame for movement at right angles thereto, means for latching said back in closed position, and means for releasing the latching means at a predetermined point in the rotation of the drum.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

SIMON A. SMITH.

Witnesses:

VAN A. NYE,

N. K. BROWN.