

No. 753,455.

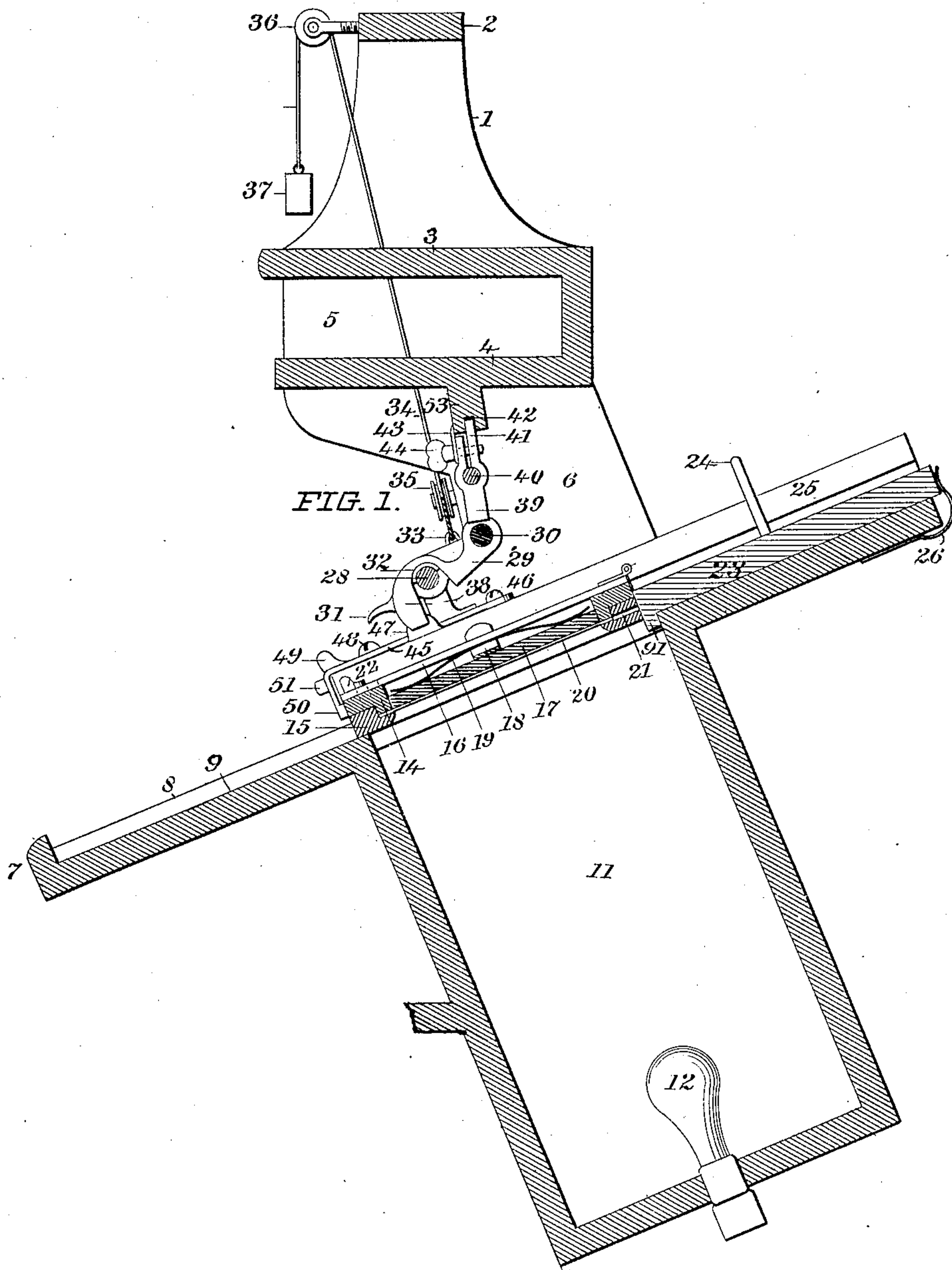
PATENTED MAR. 1, 1904.

H. C. WHITE & A. H. MALLISON.  
PHOTOGRAPHIC PRINTING APPARATUS.

APPLICATION FILED APR. 21, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES.

*Charles H. Houghton,*  
*Albert S. Starbaway*

INVENTORS.

*HAWLEY C. WHITE.*

*ALVIN H. MALLISON.*

BY *Franklin Scott,* ATTORNEY.

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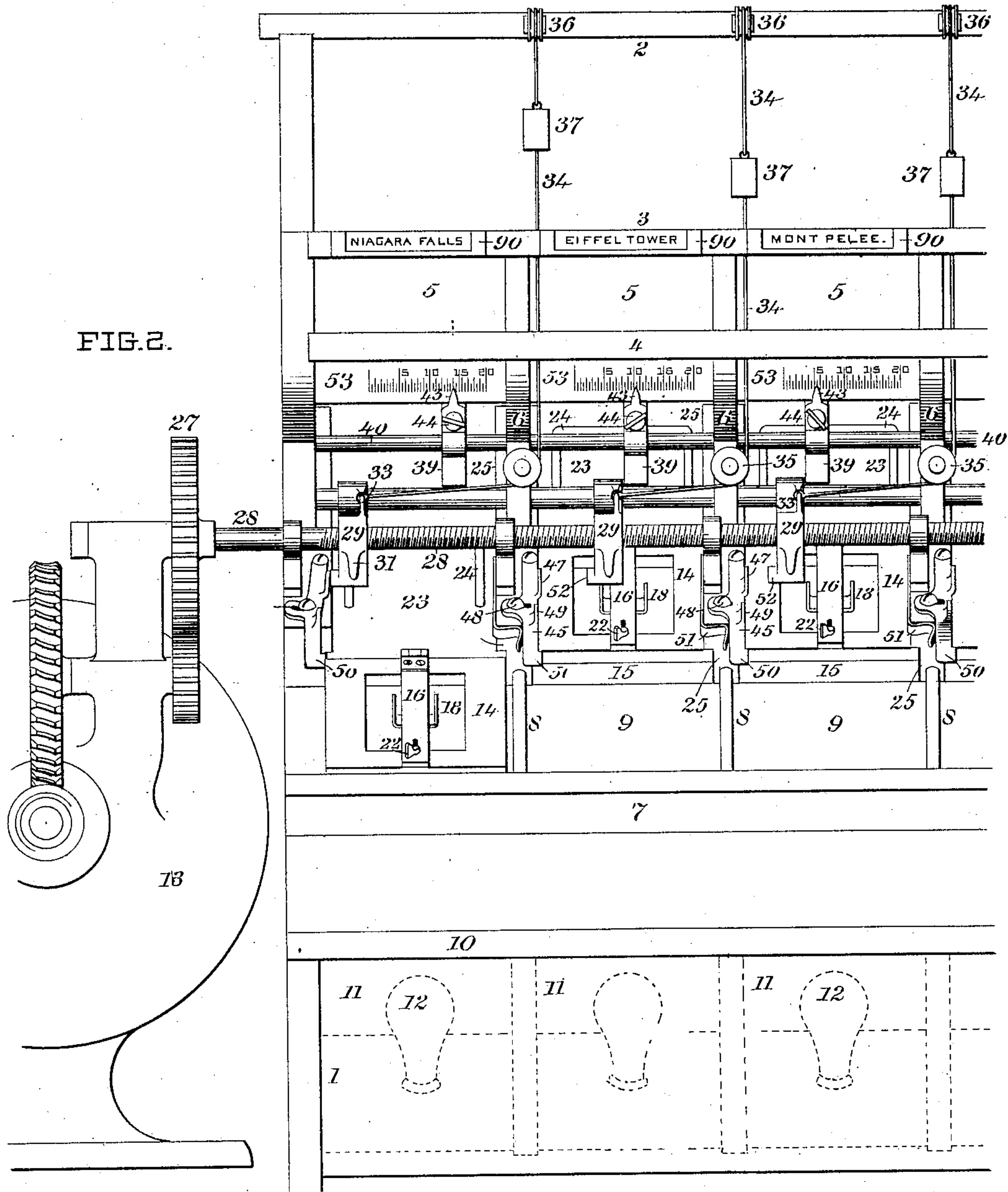
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HAWLEY C. WHITE.  
ALVIN H. MALLISON.  
BY Franklin Scott, ATTORNEY.



# UNITED STATES PATENT OFFICE.

HAWLEY C. WHITE AND ALVIN H. MALLISON, OF NORTH BENNINGTON, VERMONT, ASSIGNOR TO H. C. WHITE CO., A CORPORATION OF VERMONT.

## PHOTOGRAPHIC-PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 753,455, dated March 1, 1904.

Application filed April 21, 1903. Serial No. 153,639. (No model.)

*To all whom it may concern:*

Be it known that we, HAWLEY C. WHITE and ALVIN H. MALLISON, citizens of the United States of America, and residents of North Bennington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Photographic-Printing Apparatus, of which the following is a specification.

10 This invention relates to apparatus for printing photographs from ordinary negatives.

Among other things it has for its object to provide means automatic in character whereby a diversity of prints from different negatives may be made in the same machine at the same time, also means whereby all the prints made from the same negative will be uniform in tone and intensity, also means whereby prints from different negatives and requiring different periods of exposure may be made at the same time.

It also embraces means for varying the period of exposure for each negative without interfering with any other.

25 Means are also provided for retiring the picture from its exposed to an obscured position at the termination of the prescribed exposure.

The invention resolves itself into certain elements which in combination constitute a complete apparatus for carrying out all the purposes of the invention; but as the combination, which makes up the printing apparatus proper, may be repeated indefinitely and used in series with a common propeller, the printing apparatus only is shown in series and a single propeller in combination therewith.

Any illuminator which is adapted to photographing and gives out an intense and steady light may be used in operating our invention; but as the incandescent electric light is well adapted to its purposes and can be used in series it has been adopted in this apparatus.

The apparatus comprises an illuminating-chamber, over which the printing is done, a specially-constructed printing-frame, and a shutter fitted to slide in inclined ways over the top of this chamber, a lock for holding the printing-frame in position over the chamber during exposure and called a "frame-

holder," a propeller which rotates or runs at a constant speed and adapted to actuate a movable device called a "releaser," for releasing the frame-holder at the end of each exposure, and means for resetting the releaser at the termination of an exposure for a new operation.

The invention is fully illustrated in the accompanying two sheets of drawings, wherein—

Figure 1 is a vertical transverse section of the apparatus taken through the middle of one of the illuminating-chambers. Fig. 2 is a front elevation of the printing-machine.

The framework upon which our invention is mounted embraces uprights 1 1, between which extends an inclined bench 9, from the middle part of which depend a series of illuminating-chambers 11, each of which is equipped with an illuminator 12 at or near its bottom. Incandescent electric lights are here shown and serve the purposes required of them very well. Any other light which will print through a photographic negative will answer. These lamps may be arranged in series and adjusted to uniformity in action as nearly as desirable; but uniformity is not essential, as any differences in intensity may be met by variations in the lengths of exposure of the negatives. Each chamber opens upwardly and is arranged to be closed either by a printing-frame 14 15 or a shutter 23, both of which are fitted to move in slide-ways 25 25, the shutter occupying the upper and rear position. A ledge 7 runs along the front edge of the table and serves as an abutment, against which the printing-frames stop when they slide back at the finish of an exposure. When the printing-frame is put in exposure over chamber 11, it is supported there by a spring-catch 50, controlled by spring 51. Any other sort of a releasing-lock which is adapted to support the frame and be automatically released by suitable devices at the finish of an exposure is what is required in this relation. When the printing-frame is pushed into exposure over the chamber 11, the shutter 23 is pushed back out of the way, and both are held back by the



frame-holder 50. When this is released, both frame and shuttle are free to slide to the bottom of the ways. An impulse-spring 26 is provided at the rear of each shutter to give it a little start on the downward movement; but this may not be essential, and any other equivalent device may be employed to do its work. Ordinarily gravity will be sufficient. Above the chambers a screw-propeller 38 is provided, mounted in suitable bearings 38, which runs the entire length of the machine. In this case it is driven by a motor 13 through suitable worm and gear connections, as shown, and is adapted to run unintermittently at a constant rate of speed. A constant and definite speed is essential, as the time exposures of the different negatives are accommodated to it and depend upon it.

Abreast each chamber 11 a releaser 39 is provided having an open half-nut 32 on its under side which fits the screw 28 and is propelled by the screw when in engagement therewith. This releaser 29 is hinged on a smooth rod 30, so that it can both turn and slide thereon. It may be lifted by the finger-hook 31 out of engagement with the screw and then can be slid in either direction on the rod 30. Its lower end has a tappet 52, which in its progress toward the frame-holder 50 will engage the lip 47 of that member which is pivoted on the guide-bar 25 and throw it out of engagement with the printing-frame, thereby releasing the latter and leaving it free to slide down out of exposure. The shutter 23 has a bar 24 on its upper side which when the shutter descends strikes the under side of the releaser, which is inclined, as shown in Fig. 1, and lifts it out of engagement with the screw. When so disengaged, a weight 37, which is connected with it by means of cord 34 and pulleys 35 and 36, will draw it back on rod 30 against an adjustable stop 39, which is called a "time-gage," and is carried on the bar 40. Normally the weight of the releaser slightly overbalances the counterpoise 37, so that when the shutter 23 is pushed back, so as to carry bar 24 out from under the releaser, the latter will drop into engagement with the screw. While the shuttle is down, bar 24 will hold the releaser up out of engagement with the screw, so that all parts of the particular section remain inoperative until the shutter is pushed back, as in shoving the frame into the printing position to expose a fresh print, when the releaser will drop into engagement with the screw, as before stated. Time-gage 39 is adjustable along bar 40 by means of the clamp and screw 44 and has a pointer 43, which registers against a scale 53, which is graduated to correspond to seconds or minutes of exposure, according to the speed of the screw and the pitch of its thread. The theory of this part of the invention is that if a particular negative requires, say, ten seconds of exposure to produce a print of the desired de-

gree of intensity the time-gage is so set that its pointer will stand at "10" on scale 53. This will then define a traverse for the releaser between the gage and the frame-holder which will occupy ten seconds in passing over before the holder will be disengaged and the printing-frame be released, so that it can slide down out of exposure.

Any printing-frame may be used in this machine provided it is fitted to slide in the ways 54; but for special purposes we have designed a novel frame which forms the subject-matter of a copending application and which is shown in plan in Fig. 2 and in longitudinal cross-section in Fig. 1. It consists of two rectangular frames 14 and 15, the former externally and the latter internally rabbeted, as shown, so that one rabbeted edge will fit inside the other. The negative 20 is held between them by binding-screws 8, by means of which the two frames are fastened together. A back 17 is fitted to the inside of the upper frame, between which and the negative the paper is confined. A bar 16 is hinged to the top of the upper frame and has a spring 19 attached to its under side, which bears against the top of the back 17 when it is turned down. This bar is held down by a lock or catch 22. The back has a thumb and finger piece 18, by which it may be handled. One of the ends of the frame has a slot 21 of a little more than the width and thickness of a negative, so that the plate may be withdrawn and another inserted through it without taking the two halves apart. This exchange is effected by loosening the binding-screws, so that the pinch on the negative will be relieved, when it will readily slide out through this slot. Through it another negative may be inserted, and after being accurately adjusted in position in the frame the screws can be tightened, when the frame is ready for use.

There are various modes of disposing of the printed picture after the termination of the exposure. It may be obscured by withdrawing it from its exposed position to a darkened one, or a shutter or screen may be interposed between the light and the negative, or the negative may remain in position and the light may be extinguished, which in this case would simply involve breaking the circuit. We regard all these methods of effecting obscuration of the print as equivalents of each other, and more or less of our apparatus is available to coöperate with means for effecting obscuration in any of these ways. Hence we do not restrict ourselves to the specific means shown for effecting obscuration, as it may be accomplished in other ways.

In this development of our invention we have adopted a screw as the most practicable style of an actuating member for imparting the traversing movement of the releaser from the time-gage to the frame-holder, but inasmuch as we regard this invention as a primary



one, we do not restrict ourselves to the screw alone for that purpose. We have shown the printing-chambers arranged in series in a straight line, which seems most convenient; 5 but this mode of arrangement is not essential, for they can be arranged in a circle and be equally efficient. In the latter case a rotating annulus could be substituted for the straight screw or a gear, the releaser being provided 10 with a proper engaging device to coöperate therewith. An endless chain could be substituted for the straight screw, if desirable.

The invention is operated as follows: The negatives from which it is proposed to make 15 prints are first carefully cleaned and adjusted in the printing-frames. The paper for the prints having been accurately cut to the desired size to fit the frames is preferably kept in the bunch or pack, face downward, secluded 20 from dust as much as possible. All the time-gages are supposed to be loose on rod 40 and the shutters down over the chambers, so that no light from the lamps in the chambers will escape into the room to interfere with the sen- 25 sitized paper if exposed. The room in which the machine stands is kept dark, light to enable the operator to attend to his duties being admitted through a colored medium in the usual way. The various negatives are prop- 30 erly numbered or inscribed with a descriptive title, and a corresponding number or title is placed on a card, or label and inserted in the pocket 90 over the chamber assigned to this particular negative. The operator from 35 experience estimates the approximate length of exposure required for each negative and sets the time-gages 39 so that their pointers will mark these various exposure periods on the scales 53. Each printing-frame being 40 charged with paper is then placed in position in the slideways at the bottom of the slope. The screw being started, each printing-frame is pushed up into position over the chamber 11, and in doing this the bar 24 will be shoved 45 out from under the releaser 29, which then drops into engagement with the screw, as in Fig. 1. Concurrently with this the frame- 50 holding catch 50 will have snapped over the lower corner of the printing-frame, as shown in the two right-hand sections of the machine shown in Fig. 2. Each of the frames being 55 so set, the screw propels all the releasers toward the frame-holders 50, which are successively disengaged from their respective frames by the impact of tappet 52 against the lip 47 of the frame-holder. Instantly the 60 frame and shutter descend under the force of gravity and the impulse of spring 26; but the grip of the releaser-nut on the screw is not broken until the shutter has reached a point where the bar 24 contacts with the 65 under side of the releaser and forced it upwardly and off the screw, which action occurs just as the shutter closes the chamber or at the finish of its descent. When this occurs,

weight 37 acts to pull the releaser back against the time-gage or stop 39, the same sliding on the bar 30 and the lifting-bar 24 of the shutter, thus leaving the releaser in position 70 for a new operation. In its descent the printing-frame descends and stops against the ledge 7 of the table, while the shutter is arrested by ledge 91 striking against the front wall of chamber 11. In their descent the shutter and 75 frame maintain end to end contact to the exclusion of all light from the chamber entering the room.

As many chambers may be arranged in a series as it is possible for an operator to tend, and the only limit to the capacity of a 80 series is the dexterity of the operator. After all the time-gages have been accurately adjusted no examination of the print during exposure is permitted, for this would interfere with the time limit of exposure. There- 85 fore all the operator is required to do is to clean the plate, put in the paper, set the frame, and pass to the next frame, which has finished exposure and has fallen back to be recharged. As fast as the prints are removed 90 from the frames they may be temporarily stored in the receptacles 5 5 5, over the chambers, or in any other way where they will be properly protected from light. No expert skill is requisite to tend the machine 95 after all parts have been put in adjustment for successful operation. As each section or chamber and its accessories is independent of every other, it is entirely feasible to print 100 from a diversity of negatives requiring variable periods of exposure at the same time and produce uniform pictures. If slight variations in the intensity of the prints are required, they can be instantly provided for 105 by a slight movement of the time-gage either to the right or left on the scale 53.

The graduated scales 53 are not indispensable parts of the apparatus, but may be employed for convenience in adjusting the positions of the adjustable stops or time-gages 110 39 39. When the proper duration of exposure of a given negative has been once ascertained, the indication on the scale may be marked on that negative or otherwise recorded in connection with the speed of the 115 driving-screw and the power of the light in the illuminating-chamber. Thus when a negative has been withdrawn and stop 39 has been changed to accommodate a different negative it may be reset for renewed use by means of 120 its record on scale 53 without experimental test.

We therefore claim as our invention, and desire to secure by Letters Patent, the following: 125

1. A photoprinting apparatus consisting of a printing-chamber, a printing-frame, a time-gage for determining the period of exposure, means for obscuring the print at the finish of the exposure, a reciprocating member adapt- 130



ed to travel between the time-gage and the obscuring device and to actuate the latter, and a prime mover with which the reciprocating member is adapted to detachably engage, combined and arranged to operate substantially in the manner described and for the purposes set forth.

2. A photoprinting apparatus consisting of a printing-chamber, a printing-frame, a time-gage for determining the period of exposure, means for withdrawing the print from the chamber at the finish of the exposure, a reciprocating member adapted to travel between the time-gage and the print-retractor and to actuate the latter, and a prime mover with which the reciprocating member is adapted to detachably engage, combined and arranged to operate substantially in the manner described and for the purposes set forth.

3. A photoprinting apparatus consisting of a printing-chamber, a printing-frame, a time-gage for determining the period of exposure, means for obscuring the print at the finish of the exposure, a reciprocating member adapted to travel between the time-gage and the obscuring device and to actuate the latter, and a rotating screw with which the reciprocating member is adapted to detachably engage, combined and arranged to operate substantially as described.

4. A photoprinting apparatus consisting of a printing-chamber, a printing-frame, a time-gage for determining the period of exposure, means for withdrawing the print from the chamber at the finish of the exposure, a reciprocating member adapted to travel between the time-gage and the print-retractor and to actuate the latter, and a rotating screw with which the reciprocating member is adapted to detachably engage, combined and arranged to operate substantially as described.

5. In a photoprinting apparatus, a printing-chamber having a slideway across its open end so inclined that a printing-frame will slide therein by gravity, a printing-frame and a shutter adapted to slide therein, a holder to support the frame in the printing position, and means connected therewith for releasing the frame at the limit of the exposure, substantially as specified.

6. In a photoprinting apparatus, a printing-chamber having a slideway across its open end so inclined that a printing-frame will slide therein by gravity, a printing-frame and shutter adapted to slide therein, and close said open end, means for determining the period of exposure, a frame-holder and a releaser, combined and adapted to operate substantially as described and set forth.

7. In a photoprinting apparatus, the combination with a printing-chamber and a movable shutter adapted to close the same, of a printing-frame, a frame-holding device and a frame-releasing device, the former being under the control of the latter, an actuating-

screw with which the releaser coöperates, and means under the control of the shutter whereby its closing movement will disengage the releaser from the screw, substantially as specified.

8. In a photoprinting apparatus, the combination with a rotating screw having a predetermined constant motion, of a frame-holder and a disengageable releaser, an adjustable stop associated with the releaser for determining the extent of its travel, and a scale with which the stop registers to indicate length of exposure, substantially as specified.

9. The combination of the shutter with the screw and releaser and means located between the shutter and releaser whereby the closure of the shutter will disengage the releaser from the screw, substantially as specified.

10. In a photoprinting apparatus, the combination of a printing-chamber, a shutter for closing the same, a printing-frame, and a device for holding the frame in the printing position, of a screw-propeller, a releaser adapted to be operatively actuated by the screw, and means connected with the shutter for disengaging the releaser from the screw at the finish of an exposure, substantially as specified.

11. In a photoprinting apparatus, of the character described, the combination with a rotating screw and a disengageable nut adapted to travel thereon when in engagement therewith, of a printing-frame, means under the control of the nut for releasing the frame from its printing position, and means for disengaging the nut from the screw at the finish of the exposure, substantially as specified.

12. In a photoprinting-machine, a screw adapted to rotate at a constant speed, a printing-frame, a printing-chamber and means intermediate the screw and printing apparatus for terminating the exposure at a predetermined moment, substantially as specified.

13. In a photoprinting apparatus, the releaser pivoted and slidable upon a bar and provided with a sectional nut for engagement with a screw, in combination with the frame-holder and an adjustable stop associated with the releaser for determining the extent of its travel, substantially as specified.

14. The combination with the screw and releaser, of means for effecting their disengagement at the finish of an exposure, and means for returning the releaser to the starting-point of its traverse preparatory to another operation, substantially as specified.

15. The combination with the printing-chamber, slideway, printing-frame and shutter, of a frame holder and releaser, and provisions whereby said frame holder and releaser will be put into operative service by the act of pushing the frame up into the printing position, substantially as specified.

16. In a photoprinting apparatus, an inclined slideway for a printing-frame, a printing-chamber depending from said slideway,



and a printing-frame and shutter arranged contiguously and adapted to slide therein by gravity, substantially as specified.

17. In a photoprinting apparatus, the combination with a printing-frame, a printing-chamber, and a retaining device for holding the frame in position for printing, of a screw-propeller and a device for releasing the frame, said releasing device being adapted to be operatively actuated by the screw, substantially as specified.

18. In a photoprinting apparatus, the combination with a printing-frame, a printing-chamber and a retaining device for holding the frame in position for printing, of a screw-propeller, a frame-releaser adapted to be operatively actuated by the screw, and means for breaking engagement between the screw and releaser at the finish of an exposure, substantially as specified.

19. In a photoprinting apparatus, the combination with a printing-chamber, printing-frame and means for predetermining the period of exposure, of an actuating member and means under control of said member for obscuring the print at the finish of the exposure, substantially as specified.

20. In a photoprinting apparatus, the combination of a printing-chamber, a printing-frame and a shutter adapted to slide across and cover an opening in said chamber, a time-gage, a frame-retainer and a frame-releaser between the time-gage and the retainer, a propeller for actuating the releaser and means for moving the printing-frame and shutter successively from the exposed to the obscured position, substantially as specified.

21. In a photoprinting apparatus, the combination of a printing-chamber having an exposure-opening, a printing-frame and means for moving it over said opening from the exposed to the obscured position, a chronometric

device for determining the length of exposure, means for holding the picture-frame in exposure and means for retracting it from that position at the end of the time limit, substantially as specified.

22. In a photoprinting apparatus, the combination of an inclined printing-table having a printing-chamber located beneath it and opening therethrough, and fitted with frame-guides, a printing-frame and shutter adapted to slide across said opening to successively close the same, with means for holding the frame in exposure, means for determining the duration of the exposure, and means for retracting the plate from the exposed position, substantially as specified.

23. In a photoprinting apparatus, the combination of a printing-chamber, printing-frame, frame-holder, frame-releaser, a propeller for actuating the releaser, means for predetermining the duration of exposure, and means for setting the releaser, substantially as specified.

24. In a photoprinting apparatus, a propeller having a constant motion, a movable releasing device actuated by said propeller, a chronometrical stop adjustable independently of said propeller but in coöperative relation therewith for regulating the period of exposure, a printing-chamber, printing-frame and frame-holder for holding the frame in the printing position adapted to be unlocked by the releaser at the limit of its traverse, and means for obscuring the print at the end of the exposure, substantially as specified.

Signed by us, at North Bennington, Vermont, this 30th day of September, 1902.

HAWLEY C. WHITE.  
ALVIN H. MALLISON.

Witnesses:

AGNES R. WHIPPLE,  
GRACE L. NEWTON.