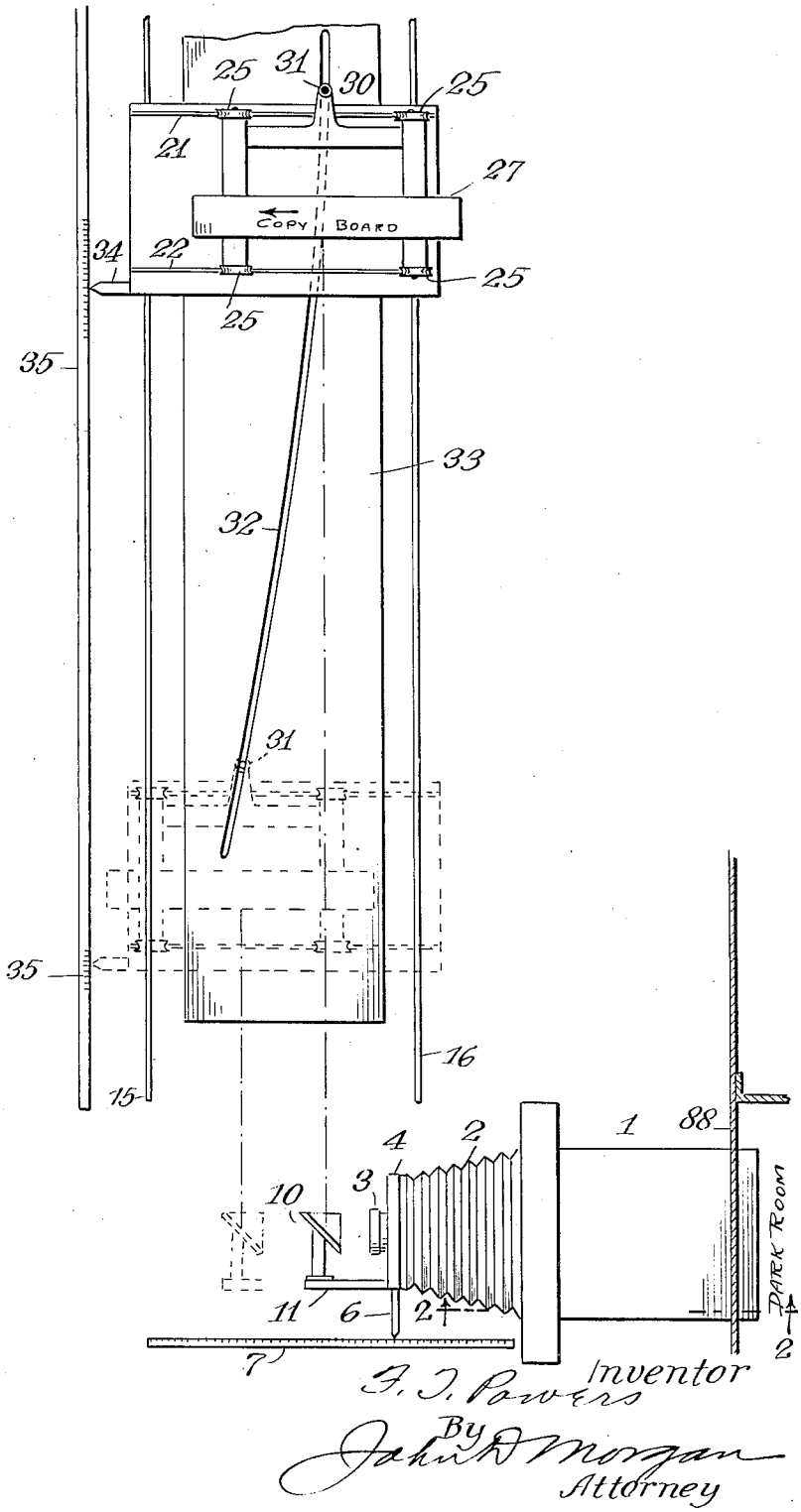
Feb. 7, 1928. 1,658,057

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PHOTOGRAPHIC APPARATUS

Original Filed Feb. 19, 1918 4 Sheets-Sheet 1

Fig. 1.



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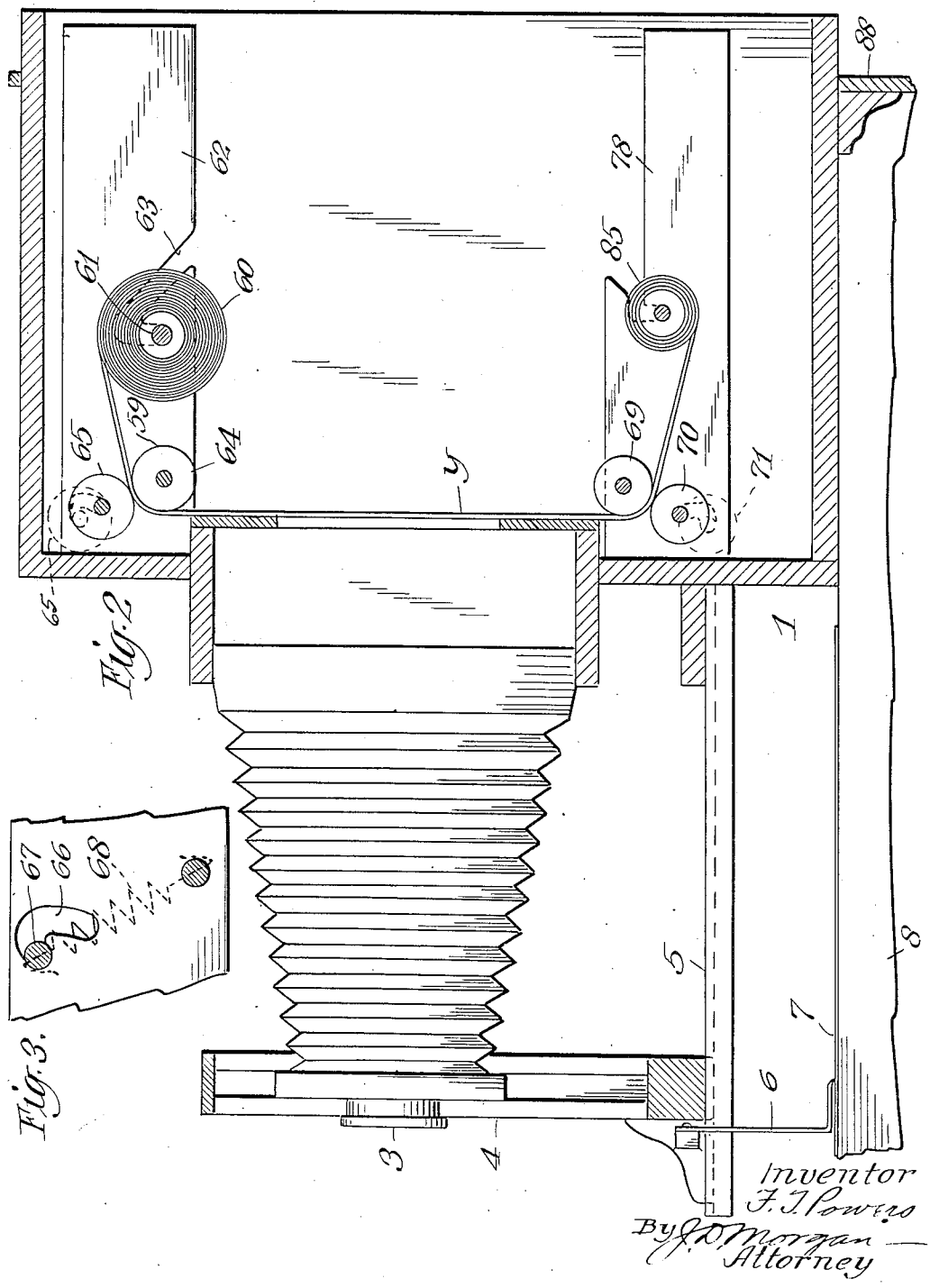


Fig. 2

Fig. 3.

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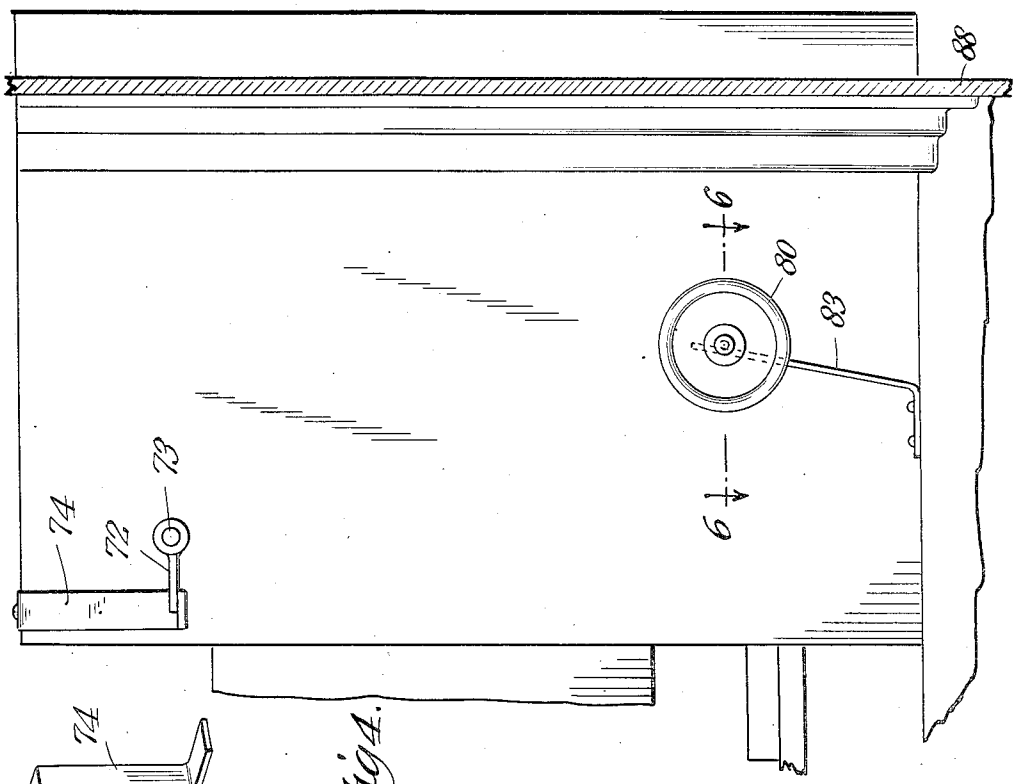


Fig. 4.

Fig. 5

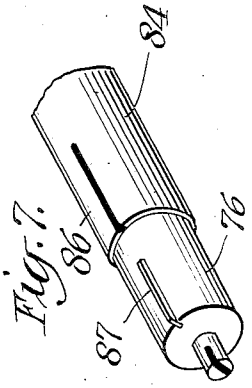


Fig. 7.

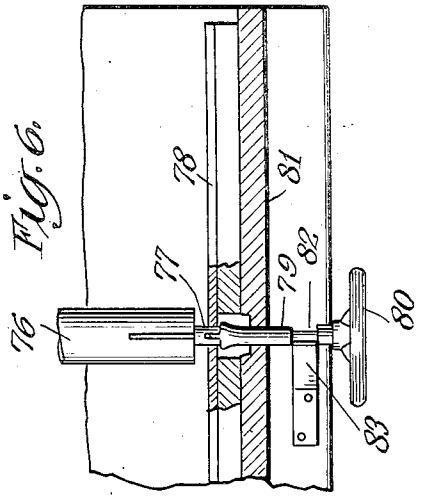


Fig. 6.

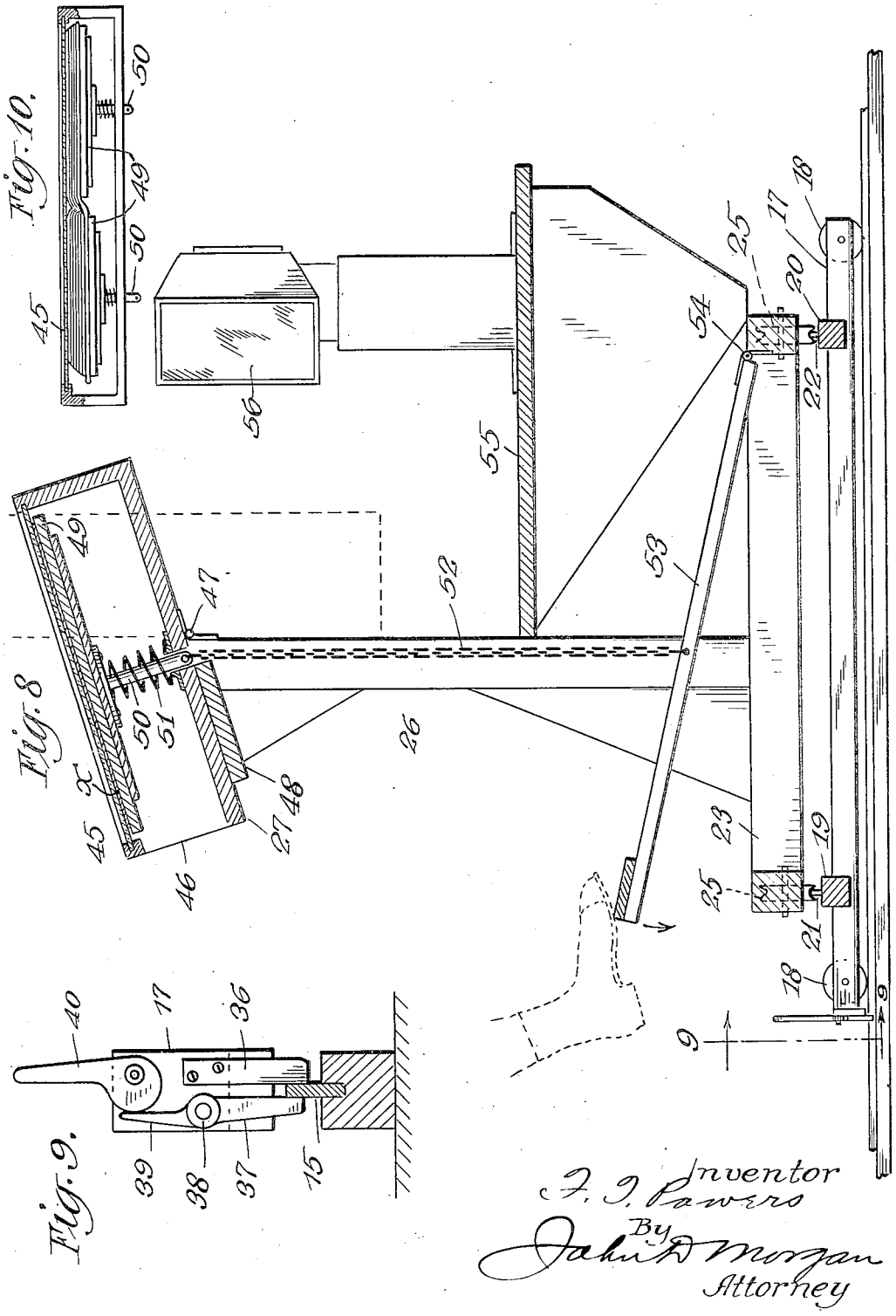
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Original Filed Feb. 19, 1918 4 Sheets-Sheet 4



Patented Feb. 7, 1928. 1,658,057

UNITED STATES PATENT OFFICE.

FRANK T. POWERS, OF NEW YORK, N. Y., ASSIGNOR TO POWERS PHOTO ENGRAVING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PHOTOGRAPHIC APPARATUS.

Substitute for application Serial No. 218,059, filed February 19, 1918. This application filed July 24, 1923. Serial No. 653,618.

The invention relates to photographic apparatus, and in certain respects more particularly to apparatus which is especially adapted for copying work.

Objects and advantages of the invention will be set forth in part hereinafter, and in part will be obvious herefrom, or may be learned by practice with the invention; such objects and advantages being attained through the means and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, herein referred to and constituting a part hereof, illustrate one embodiment of the invention, and together with the description serve to explain the principles thereof.

Of the drawings:—

Fig. 1 is a plan, largely diagrammatic, of a mechanism embodying the invention;

Fig. 2 is a vertical, longitudinal section on an enlarged scale, through the camera shown in the lower left hand corner of Fig. 1, taken substantially on the line 2—2;

Fig. 3 is a fragmentary elevation, partly in section and further enlarged, of the throw off for the feed rolls for the sensitized web;

Fig. 4 is a fragmentary elevation of the rear of the camera, that is, the right hand end in Fig. 2, showing certain controls for the feeding mechanism for the sensitized web;

Fig. 5 is a detail of the gauge or stop shown at the top of Fig. 4;

Fig. 6 is a horizontal, sectional detail, on the line 6—6 of Fig. 4;

Fig. 7 is a perspective, fragmentary detail of a part of the roller actuating and controlling mechanism of Fig. 6, shown on a larger scale;

Fig. 8 is a view, partly in vertical elevation and partly in vertical section, of the copy holding mechanism;

Fig. 9 is a fragmentary view, on a further enlarged scale, partly in elevation and partly in section, of the clamp or lock for the copy holder, and is taken substantially on the line 9—9 of Fig. 8; and

Fig. 10 is a fragmentary detail showing the copy holder adapted to hold a book.

In certain kinds of photographic work, and more especially in photographic copying for process and other reproduction, and for other kinds of work, it is essential that the originals be enlarged or reduced with great accuracy and precision, that the work be exactly centered and that it be absolutely sharply focused. As ordinarily practiced these operations require much careful scrutiny, thought and labor and they consume a great deal of time on the part of skilled and highly paid operatives, and frequently the performance of one operation disturbs the arrangements or positioning previously made in effecting one of the others. By the present invention the foregoing functions or operations are simultaneously performed or effected by simply bringing the camera and copy holder to indicated and corresponding positions. Furthermore, by this invention, such positioning, sizing, centering and focusing of the work is practically instantaneous and simultaneous, and requires no fine adjustments by the operator. The invention provides not only for the rapid and certain performance of the functions just described in connection with the making of a single exposure, but provides also for rapid replacement or changes in the copy and in the sensitized surface within the camera, and thus provides for making successive exposures one after another with great rapidity, as well as expediting the time required for making a single exposure. Other advantages of the invention will be pointed out in part hereinafter, the same cooperating with or flowing out of the foregoing, while other and further advantages will be obvious to those skilled in the art.

Referring in detail to the embodied form of camera, the camera body 1 is shown, having connected therewith the usual extensible and contractible bellows 2, the lens 3 being carried by a support 4 at the front end of the bellows. The lens supporting frame 4 is slidable to and fro upon guideways 5, in a well-known manner, to focus the camera.

Means are provided for indicating the focus for different distances of the copy or other object to be photographed, and as embodied a pointer 6 is supported from the frame 4, the pointer cooperating with a scale

7 fixed to the stationary frame 8. The foregoing cooperates with the size indicating or determining means on the copy carrier in a manner which will be explained hereafter. In the embodied form the invention is shown with a reversing prism 10, carried on a suitable support 11, in either fixed or adjustable relation with respect to the lens 3.

In the embodied form of copy holder, means are provided for expeditiously and accurately moving the copy holder toward and from the camera and for positioning it for any desired size or copy, and cooperating therewith means for automatically preserving the centering of the copy with respect to the camera at whatever distance it may be therefrom.

In the embodied form of the foregoing described means, two tracks 15 and 16 are provided preferably in fixed relation to the focal plane of the camera, that is, to the sensitized surface within the camera upon which the picture is taken. Mounted to run on the track 15 and 16 is a carriage 17, provided with wheels 18. The carriage 17 is provided with cross frames 19 and 20, upon which are tracks 21 and 22. Mounted on the carriage 17 is a cross carriage 23 provided with wheels 25, running on the tracks 21 and 22. The carriage 23 is provided with uprights 26 which support the copy holder 27.

In the embodied form of centering means for the copy holder there are provided means cooperating with the mechanism just described and traveling or moving the copy board transversely in either direction simultaneously with its movement toward or from the camera, thereby keeping the copy always centered in the camera notwithstanding the movement of the lens and prism for focusing. Referring to the embodied construction in detail, the carriage 23 is provided with a bracket 30, which extends outwardly and downwardly. Bracket 30 is preferably provided with a roller 31, engaging with suitable guiding means, such as a slot 32 formed in a board or other suitable member 33 extending longitudinally between the tracks 15 and 16.

Means are provided for indicating the positions of the copy board for the various desired sizes of reproduction. In the embodied form thereof, a pointer 34 is fixed on the carriage 17, and cooperates with a scale 35, extending along beside the tracks 15 and 16. The scales 7 and 35 will be correspondingly or cooperatively marked. That is, if a reduction to one-eighth is desired, this figure or other equivalent mark, is made at the proper point on both the scales 7 and 35, and by bringing the respective pointers 6 and 34 to these positions, the copy will be correct in size and will be in focus and absolutely centered without any examination or adjustment of the image or of the mechanism by an operator.

Means are provided for holding the copy at the desired point, and in the embodied form thereof there is provided on the carriage 17 a locking device engaging and disengaging with one of the tracks 15 or 16. As embodied, a fixed jaw 36 extends down from the carriage 17 on one side of the track 15, and one the other side of the track is a cooperating jaw 37, which is pivoted at 38 upon the carriage 17. The jaw 37 is provided with a tail 39, with which cooperates a camming lever 40 (Fig. 9). When the lever is thrown in one direction, the jaws 36 and 37 are opened, and when thrown in the other direction, to the position shown in Fig. 9, the jaws bite the track and hold the carriage 17 firmly and accurately in the desired position.

Referring to the embodied construction, the copy holder is pivotally supported upon the uprights 26, to rock between the copy receiving and discharging position, and the exposing or photographing position. A glass or other transparent surface 45 is mounted in the frame 46 of the pivoted copy holder, the copy x being pressed against the glass 45 when in the exposure or photographing position. The support for the copy holder is shown as one or more hinges 47. Upon the uprights 26 there is preferably provided an inclined, horizontally disposed shelf 48, whereon the copy frame 46 rests when swung back into position to receive and discharge copy. The copy holder may be rocked, after the copy has been inserted, from this full line position shown in Fig. 8 to the dotted line position shown in the same figure to be photographed, and is rocked back to the full line position for the removal of the used copy and the presentation at the glass 45 of the new copy.

Means are provided for yieldingly holding the copy firmly in position, such means being readily retractable, preferably by the foot of the operator or otherwise, so as to leave both hands free to handle the copy. As embodied, a plate 49 is fixed upon a stem 50, a helical spring 51 being coiled about the stem. Attached to the stem 50 is a chain or other suitable connection 52 to a foot lever 53, which is pivoted at 54 upon the carriage frame 23. The operator can place his foot upon the lever 53, as shown in Fig. 8, and the plate 49 will be retracted against the pressure of the spring 51, when the copy x will be removed and fresh copy inserted. Thereupon the operator removes his foot and spring 51 will press the copy firmly and smoothly against the glass 45. The point of juncture of the stem 50 and connection 52 is kept substantially at or closely contiguous to the pivot point of the copy holder, so as to avoid putting such strain on the spring 51 as to disturb the copy between the time of

its insertion and its removal through the use of the lever 53.

Means are provided by the invention for using books in the copy holders, and in Fig. 10 the plate 49 is shown bi-partite, with independent spring mountings and actuating means therefor at either side to accommodate different thicknesses on either side of the book, as will be clearly understood from Fig. 10. In turning from one page of the book to another, it will not be necessary to remove the book, but merely to ease back the plates 49 with the foot lever 53, insert a blade or other convenient device between the leaves of the book, and by movement thereof shift the intervening leaf or leaves across and permit the plates 49 to again press the book against the glass 45.

Means are provided by the invention for keeping the illuminating means in definite relation to the copy notwithstanding changes in position of the latter, so as to maintain a uniform intensity of illumination, and thus retain accurate control of the time of exposure. As embodied, a support 55 for a lamp or lamps 56 is provided upon the carriage 23, the lights being thus always at a desired or predetermined fixed distance from the copy x throughout all changes in position both longitudinally and transversely of the copy holder.

In accordance with one feature of the invention, and as embodied, there is provided within the camera a web of light-sensitive material for receiving successive exposures, one after another, so that it is only necessary to feed forward the web y, for the space or distance occupied by an exposure between the successive exposures. In connection therewith, means are provided for readily inserting an unexposed roll, for removing an exposed roll, or a portion thereof, and for threading the web through the camera.

As embodied a roll 60 of sensitized film, paper or other suitable material is carried upon a shaft or mandrel 61, the shaft 61 being rotatably supported in side frame pieces 62. In the frame pieces 62 are provided slots 63, preferably primarily upwardly and then downwardly disposed or directed, so that the roll 60 may be easily and readily lifted into position, and will then remain therein until intentionally removed.

The web or strip y of light sensitive material is presented at, and guided past, the focal plane or plane of exposure of the camera by suitable means. The embodied form thereof comprises in part a pair of cooperating guide and feed rollers 64 and 65. The roller 64 is preferably maintained in fixed position, the roller 65 being spring-pressed thereagainst and also movable toward and away therefrom to facilitate the introduction of a new web or strip y into the camera.

The embodied form of means for effecting these functions comprises a pair of slots 66 (Figs. 2 and 3) formed in the frame plates 62, the pintles 67 of the roller 65 projecting through the respective slots 66. The pintles 67 are acted upon by springs 68, which tend to press the roller 65 resiliently toward the roller 64 with the strip y therebetween. When the roller 65 is lifted upward by the operator it will pass to and be held in the position shown in Fig. 3, thereby maintaining the rolls 64 and 65 in separated position while the strip is threaded therethrough and when the roll 65 is drawn slightly upwardly and to the right in Fig. 3 it will pass to the spring-pressed feeding position shown in Fig. 2.

A device may be provided to mark the locations of the exposures, such as a point 59 on roller 64, so that the exposures may be located on the strip previous to development if desired.

A second pair of rolls 69 and 70 are shown cooperating with the web y upon the opposite side of the place of exposure in the camera, and these rolls preferably are similar in operation and construction to the rolls 64 and 65, already described. The means for holding off the roll 70 during the threading through of the web, and permitting it to press resiliently against the web during the feeding forward thereof, are indicated generally by reference numeral 71 in Fig. 2.

Means are provided by the invention for accurately measuring and positioning the successive exposures made upon the sensitive web y and in the embodied form thereof, there is provided on the exterior of the camera (Fig. 4) an arm 72 fixed on the shaft 73 of the roller 64. Cooperating with the arm 72 is a spring stop 74, (Figs. 4 and 5). The arm 72 normally engages the stop 74, and thus the strip y is held stationary. After an exposure is made, the operator presses back the spring 74 so as to clear the arm 72, which arm rotates with the forward feed of the strip or web y, but as the arm completes its rotation it engages again with the stop 74 after the web y has been fed forward just sufficiently for the next exposure.

Means are provided for drawing forward and rewinding the strip or web y, and the embodied form thereof comprises the shaft 76 having pintles 77 journaled in supporting frames or plates 78 at the sides of the camera. One of the pintles 77 (Fig. 6) is slotted or kerfed at its end, to receive the tongued end of a longitudinally slidable shaft 79. Shaft 79 is provided with suitable turning means, such as a crank or hand-wheel 80. The shaft 79 is journaled in the camera wall, or other suitable support 81, to have the requisite longitudinal movement. Shaft 79 has formed therein an annular groove 82, into which presses a leaf spring 83, hold-

ing the shaft 79 in engagement with the pintles 77. If the spring 83 be pressed backwardly, shaft 79 may be moved longitudinally and the shaft or mandrel 76 may be removed and replaced, and after reengagement of pintles 77 with the shaft 79, spring 83 will cause them to always rotate together.

In Fig. 7 a hollow cylinder 84, which may be of pasteboard, metal, or other suitable material is shown as a support for the rewound roll of the sensitized web *y* after exposure. The tube 84 may be slipped upon the shaft 76. Tube 84 may have a slot 86 therein, engaging with a spline or feather 87 on the shaft 76 to cause the tube to rotate with the shaft, while permitting ready removal and replacement thereof.

In accordance with one feature of the invention, the interior of the camera communicates preferably permanently with the dark room, thereby obviating and avoiding the employment of plate or roll holders, and the transporting of the light sensitive rolls or plates to and from the dark room and camera before and after exposing. As embodied (Figs. 1, 2 and 4) the camera body 1 opens at the rear through the wall 88 of the dark room. Thus no closure is required for the end of the camera, which may be always open, and always accessible to the operator, who may remove the exposed roll 85 in whole or in part, and may carry it to the developing apparatus without any covering or protection, and just as the condition or exigencies of the work in the dark room may permit or require. If the use of a plate or plates at any time is requisite or convenient, they may be placed in the camera in the dark room and removed after exposure in the same free and unguarded manner as the strip or web *y* and developed in the dark room. It will be understood that the term "prism" will include any suitable reversing device.

The invention in its aspects is not limited to the precise constructions herein shown and described, nor to any particular details of construction, but changes may be made therein without departing from the principles of the invention, and without sacrificing its chief advantages.

What I claim is:—

1. A photographic mechanism including in combination a camera, a copy holder traveling to and from the camera to regulate the size of reproduction, the axis of the camera being at an angle to that of the copyholder, and means including a guiding device arranged along the path of travel of the copy holder toward and from the camera and a member cooperating with the copy holder for automatically causing the copy holder to travel transversely as it moves to or from the camera to keep the copy centered relatively to the camera.

2. A photographic mechanism including in combination a camera, a copy holder, means for guiding them independently and in transverse paths with respect to each other to change the size of an image, means operated automatically by the movement along one of said paths for moving the copy holder transversely to its path to preserve it in centered relation with respect to the camera in its different positions.

3. A photographic mechanism including in combination a camera, a copy holder, means for guiding them independently and in transverse paths with respect to each other to change the size of an image, means operated automatically by the movement along one of said paths for moving the copy holder transversely to its path to preserve it in centered relation with respect to the camera in its different positions and means along the pathway of both camera and copy holder for indicating the common distances of the copy and corresponding focus points of the camera.

4. A photographic mechanism including in combination a camera, a copy holder, means for guiding them independently and in transverse paths with respect to each other, means operated automatically by the travel of the copy holder for moving the copy holder transversely to its path to preserve it in centered relation with respect to the camera in its different positions.

5. A photographic mechanism including in combination a camera, a copy holder, means for guiding them independently and in transverse paths with respect to each other, means operated automatically by the travel of the copy holder for moving the copy holder transversely to its path to preserve it in centered relation with respect to the camera in its different positions and means along the pathway of both camera and copy holder for indicating the common distances of the copy and corresponding focus points of the camera.

6. A photographic mechanism including in combination a camera, a copy holder, means for guiding them independently and in transverse paths with respect to each other, means operated automatically by the movement along one of said paths for moving the copy holder transversely to its path to preserve it in centered relation with respect to the lens of the camera for the particular position of the copy holder along its path.

7. A photographic mechanism including in combination a trackway for a copyholder, a carriage running along the trackway, a trackway on the carriage disposed transversely to the first-mentioned trackway, a copy holder and its carriage running on the trackway on the first-mentioned carriage, a camera positioned at an angle to the first-

mentioned trackway, means for moving the camera transversely to said first-mentioned trackway to maintain it in focal relation with the copy holder, and means for moving the copy holder and its carriage upon said first-mentioned carriage to maintain the copy holder in centered relation to the camera.

8. A photographic mechanism including in combination a trackway for a copyholder, a carriage running along the trackway, a trackway on the carriage disposed transversely to the first-mentioned trackway, a copy holder and its carriage running on the trackway on the first-mentioned carriage, a camera positioned at an angle to the first-mentioned trackway, means for moving the camera transversely to said first-mentioned trackway to maintain it in focal relation with the copy holder, and means for moving the copy holder and its carriage upon said first-mentioned carriage to continuously maintain the copy holder in centered relation to the camera.

9. A photographic mechanism including in combination a trackway for a copyholder, a carriage running along the trackway, a trackway on the carriage disposed transversely to the first-mentioned trackway, a copy holder and its carriage running on the trackway on the first-mentioned carriage, a camera positioned at an angle to the first-mentioned trackway, means for moving the camera transversely to said first-mentioned trackway to maintain it in focal relation with the copy holder, a trackway extending along and disposed obliquely with respect to said first-mentioned trackway and connection therefrom to the copyholder to maintain the copyholder in centered position with respect to the camera as the camera is moved to maintain a focused relation with the copyholder in its various positions along the first-mentioned trackway.

10. A photographic mechanism including in combination a trackway, a carriage running freely along the trackway, a copy holder mounted upon the carriage and movable transversely with respect thereto, and means for moving the copy holder to and maintaining it in a predetermined position with respect to its carriage for every position of the carriage along its trackway, a camera positioned at an angle to the trackway and means for moving the camera transversely to the trackway to focus the copy.

11. A photographic mechanism including in combination a trackway, a carriage running freely along the trackway, a copy holder mounted upon the carriage and movable transversely with respect thereto, and means for moving the copy holder to and maintaining it in a predetermined position with respect to its carriage for every position of the carriage along its trackway, a camera positioned at an angle to the trackway and means for moving the camera transversely to the trackway to focus the copy and means for fastening the carriage in position on the trackway.

12. A photographic mechanism including in combination a trackway for a copyholder, a carriage running along the trackway, a trackway on the carriage disposed transversely to the first-mentioned trackway, a copy holder and its carriage running on the trackway on the first-mentioned carriage, a camera positioned at an angle to the first-mentioned trackway, means for moving the camera transversely to said first-mentioned trackway to maintain it in focal relation with the copy holder, and means for moving the copy holder and its carriage upon said first-mentioned carriage to maintain the copy holder in centered relation to the camera and a copy illuminating light mounted on the copy holder carriage.

13. A photographic mechanism including in combination a trackway, a carriage running freely along the trackway, a copy holder mounted upon the carriage and movable transversely with respect thereto, and means for moving the copy holder to and maintaining it in a predetermined position with respect to its carriage for every position of the carriage along its trackway, a camera positioned at an angle to the trackway, and means for moving the camera transversely to the trackway to focus the copy and means for fastening the carriage in position on the trackway and a copy illuminating light mounted in fixed relation to the copyholder and movable therewith on said carriage.

14. A photographic mechanism including in combination a camera having its back fixed to a room wall and having a movable front with a lens and reversing device and a guide therefor, a trackway on the room floor disposed at right angles to the camera guideway, a carriage freely movable along the trackway, a copy holder mounted upon and movable at right angles to the carriage, and means for moving the copy holder to focus the copy and means for automatically maintaining it in a predetermined position upon its carriage with respect to the camera for every position of the carriage along its trackway.

15. A photographic mechanism including in combination a camera having its back fixed to a room wall and having a movable front with a lens and reversing device and a guide therefor, a trackway on the room floor disposed at right angles to the camera guideway, a carriage freely movable along the trackway, a copy holder mounted upon and movable at right angles to the carriage, and means for moving the copy holder to and maintaining it in a predetermined po-

sition upon its carriage with respect to every position of the carriage along its trackway and means for fastening the carriage in position upon its trackway.

16. A photographic mechanism including in combination a camera having its back fixed to a room wall and having a movable front with a lens and reversing device and a guide therefor, a trackway on the room floor disposed at right angles to the camera guideway, a carriage freely movable along the trackway, a copy holder mounted upon and movable at right angles to the carriage, and a track extending along but obliquely with respect to said first-mentioned trackway and connections therefrom to the copy holder for moving the copy holder to and maintaining it in a predetermined position upon its carriage with respect to every position of the carriage along its trackway.

In testimony whereof, I have signed my name to this specification.

FRANK T. POWERS.