

929,757.

3 SHEETS—SHEET 1.



Roy G. Gray
H. J. Cathroe

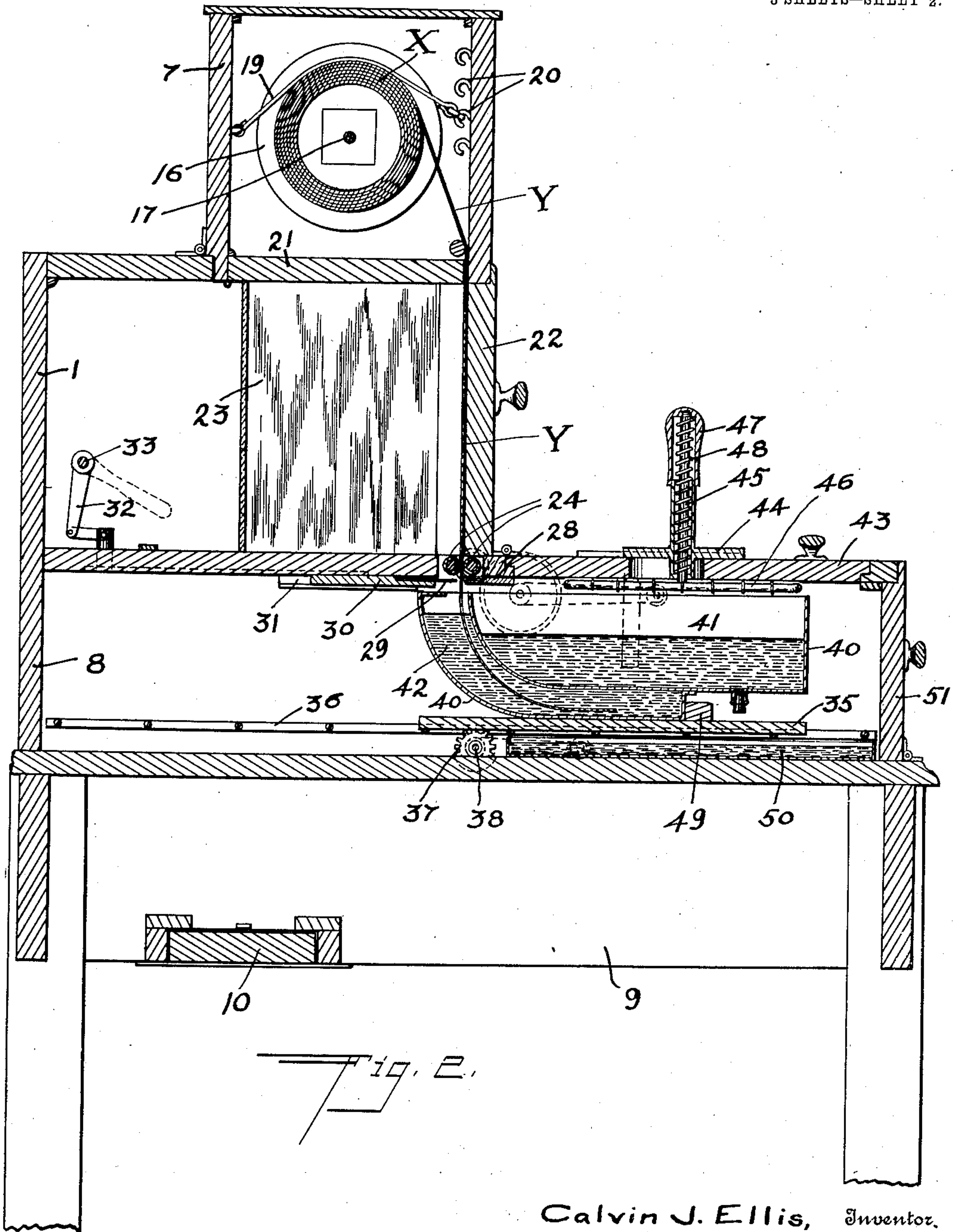
By *David O. Barnell,*
Attorney.

C. J. ELLIS.
 PHOTOPLANOGRAPH.
 APPLICATION FILED DEC. 15, 1908.

929,757.

Patented Aug. 3, 1909.

3 SHEETS—SHEET 2.



Calvin J. Ellis, Inventor.

Witnesses:

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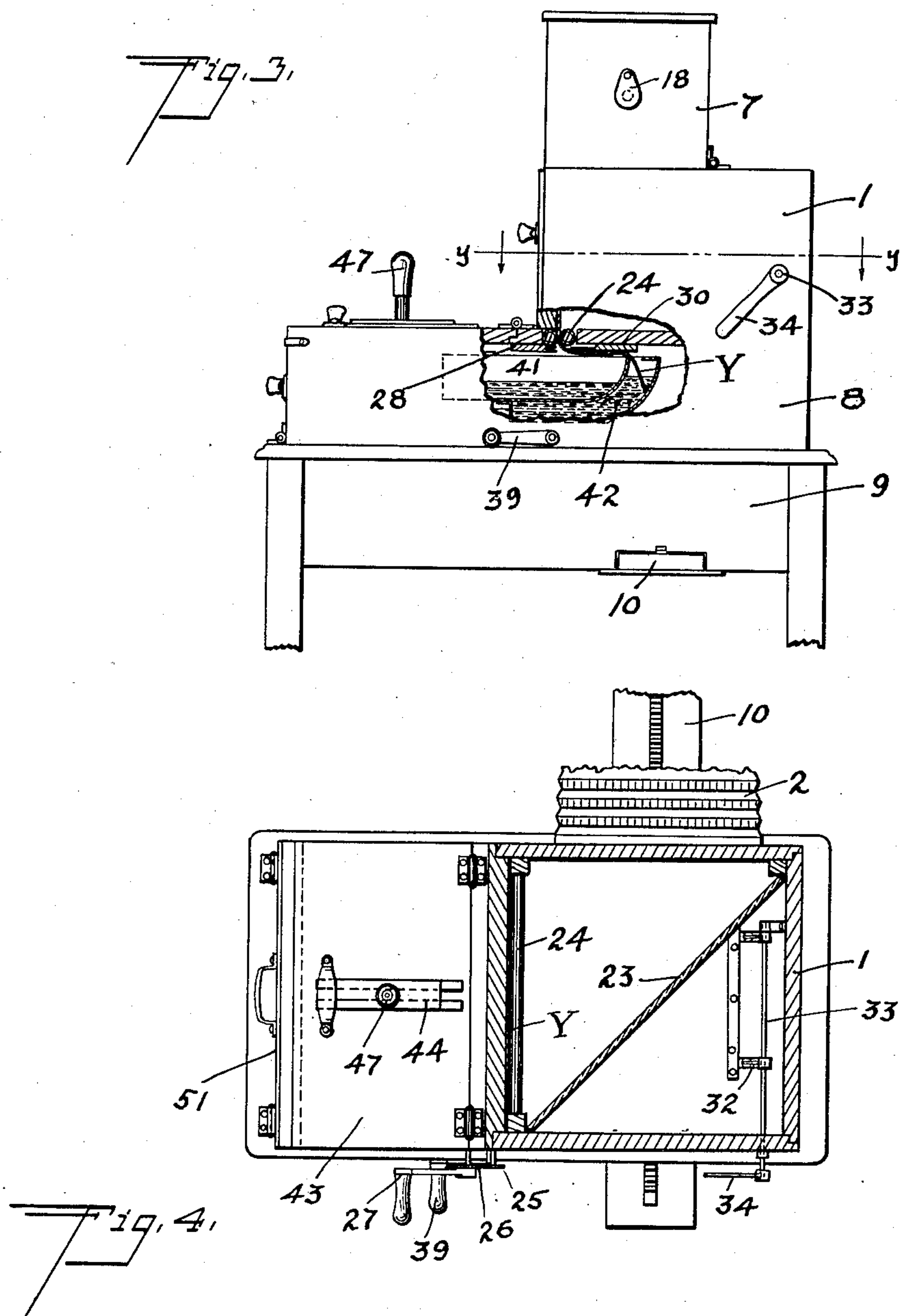
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PHOTOPLANOGRAPH.
APPLICATION FILED DEC. 15, 1908.

929,757.

Patented Aug. 3, 1909.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

CALVIN J. ELLIS, OF OMAHA, NEBRASKA, ASSIGNOR TO THE CAMERAGRAPH COMPANY, A CORPORATION OF ARIZONA TERRITORY.

PHOTOPLANOGRAPH.

No. 929,757.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed December 15, 1908. Serial No. 467,711.

To all whom it may concern:

Be it known that I, CALVIN J. ELLIS, a citizen of the United States, and a resident of Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Photoplanographs, of which the following is a specification.

My invention relates to machines for exposing, developing and fixing photographic films or other fabric chemically sensitized to the action of light, and more particularly to photo-planographs or machines for use in producing for commercial purposes direct photographic copies of drawings, legal documents and the like.

It is the object of my invention to produce a machine of this class of simple, durable and inexpensive construction, in which a supply of the sensitized material is carried in the machine in the form of a roll, manually operatable mechanism being provided by which sections of the sensitized material may be intermittently moved into position for exposure, thence passed into a developing bath, thence to a fixing bath, the developed section severed from the strip or band leading to the roll, and the severed prints then manually removed from the fixing bath for final washing and drying.

My invention is embodied in the various mechanical devices and combinations of means by which the sensitized material is manipulated and the exposure thereof facilitated.

In the accompanying drawings, which illustrate a machine constructed according to my invention, Figure 1 is a side elevation of the machine, Fig. 2 is a transverse section thereof on the plane of the line $x-x$ of Fig. 1, Fig. 3 is a front elevation, partly in section, and Fig. 4 is a sectional plan view, the section being on the plane of the line $y-y$ of Fig. 3.

In the construction shown I provide a camera consisting of a casing 1, provided at its rearward side with a bellows 2 connecting with a lens-board 3 carrying a lens 4, the lens-board being slidably mounted on a foldable bed-plate 5 and adjustable longitudinally thereof by means of a rack and pinion device, in the ordinary manner. The bed-plate may be provided on the side with a scale or series of graduations 6 for use in adjusting the lens to predetermined positions with relation to the casing 1.

Above the casing 1 and in hinged connection therewith is a casing 7 adapted to contain a supply of sensitized material in the form of a roll. Below the casing 1 is arranged a casing 8 for containing the developing and fixing bath mechanism, and said casing 8 is mounted on a table 9 by which the body of the machine is raised to a convenient height above the floor. In the lower part of said table are arranged guides in which is slidably held a bar 10 which extends rearwardly from the table, below the camera bellows, and is connected with the frame 11. The legs of said frame 11 are provided with rollers, as indicated, and on the upper part of the frame the object-board 12 is hinged thereto in such a manner that the same stands normally in a vertical position in front of the camera lens but may be tilted to a horizontal position, as indicated by the dotted lines in Fig. 1, for convenience in securing thereon the objects to be photographed or copied. The bar 10, adjoining the table 9, is provided with a rack and pinion device, actuated by means of a crank 13, by which the bar may be moved longitudinally to vary the position of the object-board relative to the camera. A scale or series of graduations 14 may be placed on the side of the bar 10 for convenience in setting the same to predetermined positions. By the joint use of said graduations and the graduations 6 on the bed-plate 5, the camera may be adjusted to make predetermined degrees of enlargement or reduction without the necessity of directly focusing the same for each object copied. To support and steady the rearward end of the bed-plate 5, a leaf 15 is hinged thereto in such a manner that it may be turned down and rest upon the bar 10, as shown.

Within the casing 7 a spool 16 is revolvably supported by means of a small shaft 17, the front end of which extends through the casing and is covered by a pivoted plate 18 which may be pushed aside and the shaft withdrawn from the casing to release the spool. An elastic band 19 is attached to a hook at one side of the casing and passed over the roll X of sensitized material on the spool, the other end of the band being connected with one of a number of hooks 20 disposed at the other side of the casing. Said elastic band serves as a brake to prevent too free a movement of the spool, and the braking tension may be varied by engaging the band with

different ones of the hooks 20. For inserting or removing the spool of sensitized material, access to the casing is afforded by turning the same back onto the top of the casing 1 and then opening the door 21 in the casing bottom, said door being hinged as shown in Fig. 2.

The strip Y of sensitized material from the spool 16 is carried out of the casing 7 through a slot at the edge of the door 21 opposite the hinges thereof, and is passed down through the camera casing 1 at one side thereof, adjoining the door 22 therein. A mirror 23 is disposed in a diagonal position in the camera casing, as shown in Fig. 4, to deflect the light rays from the lens so that the focal plane thereof coincides with the strip Y of sensitized material. The mirror also serves to reverse the image projected by the lens, so that the same will be produced on the print in a positive or normal position instead of the negative or reversed position in which it is projected by the lens.

At the bottom of the camera casing 1 the strip of sensitized material passes between a pair of feed-rollers 24, which are preferably covered with resilient material such as rubber, so as to firmly grip the sheet. On the front end of one of said feed-rollers is a pinion 25 which meshes with a gear 26 provided with a crank 27 by which the same may be turned. The relative sizes of the gear and pinion are preferably made such that for each revolution of the crank 27 the feed-rollers will be turned sufficiently to move the strip of sensitized material downward the width of the exposed portion thereof.

Immediately below the feed-rollers is arranged a cut-off device comprising a metallic bar 28 having a longitudinal slot or kerf in the edge thereof, and a knife-blade 29 adapted to enter said slot or kerf. The knife-blade 29 is carried by a bar 30 which is slidably held in suitable guides 31 arranged at the front and rear sides of the casing, as shown. The bar 30 is connected with small cranks 32 carried by a shaft 33 arranged in the casing behind the mirror 23, as shown in Figs. 2 and 4. On the front end of said shaft 33 is a small crank or handle 34 by which the shaft may be rocked to cause a reciprocating motion of the knife-blade, so that the same may be thereby forced into and withdrawn from the kerf in the bar 28, to cut off the exposed sections of sensitized material.

In the casing 8 is a shelf 35 which is slidably supported on guides 36 arranged at the front and rear sides of the casing near the bottom thereof. In the bottom of said slidable shelf are set racks which are engaged by pinions 37 carried on a shaft 38, said shaft being journaled in the casing and the front end thereof carrying a crank or handle 39 by which the shaft may be rotated. By means

of said crank, shaft, pinions and racks the shelf 35 may be moved longitudinally of the casing for a distance slightly less than the length of the shelf.

On the slidable shelf 35 is disposed a pan 40 in which are formed compartments 41 and 42 for containing the fixing and developing fluids, respectively. The compartment 41 is simply an open pan or tray of a size sufficient to permit the sections of sensitized material to lie flat therein. The compartment 42 is a relatively deep, narrow pocket, the opening to which adjoins one end of the fixing-fluid compartment, extending downwardly from said opening and, in the construction shown, curving around underneath the pan, the end thereof forming a shoulder which engages a stop 49 disposed on the upper side of the slidable shelf. The arrangement of the parts is such that when the slidable shelf is at one extreme of its movement as shown in Fig. 2, the opening to the developing fluid compartment 42 is immediately below the feed-rollers 24.

In the operation of the machine, after the section of sensitized material has been exposed in the camera casing, the pan 40 being in the position shown in Fig. 2, the feed-rollers 24 are actuated by means of the crank 27 and the exposed section is thereby pushed down edgewise into the developing fluid contained in the compartment 42. After a sufficient time has elapsed to complete the developing action of the fluid, the slidable shelf 35 which carries the pan is moved toward the other end of the casing by means of the crank 39 and rack and pinion devices before described. By said movement of the pan the developed section of material is drawn out of the compartment 42 and over into the fixing fluid in the compartment 41, as will be apparent by reference to Fig. 3 which shows the positions of the parts when the movement is partly completed. The knife-blade 29 is then actuated by means of the crank 34, as described, and the print or developed section of material severed from the section which is in the exposure position. The pan is then moved to its original position shown in Fig. 2 and a further section of the material may be fed into the developing fluid and the development thereof proceed simultaneously with the fixation of the preceding print.

It will be noted that when the section of material is cut off it will fall, face upward, upon the surface of the fixing fluid. To insure the complete and uniform immersion of the print in the fixing bath, I provide a means for pressing the same down into the fluid, as follows: On the lid 43 of the casing 8, and covering a slot therein, is disposed a slidable plate 44 which is held in suitable guides extending parallel with the slot, as shown. Passing vertically through said plate and the slot in the lid, is a stem 45, on the lower end

of which is carried a horizontally extending wire frame 46. On the upper end of the stem 45 is secured a handle 47, and a coil spring 48 is disposed around the stem within the handle and the guide stem which extends up from the plate 44, the said spring normally holding the immersing-frame 46 up against the lower side of the lid 43. With the pan 40 in the normal position shown in Fig. 2, the prints may be immersed in the fixing bath by pressing the handle 47 downward, thereby engaging the immersing-frame with the print and forcing the same below the surface of the fluid. By moving the slidable plate longitudinally of the slot in the lid the immersing-frame may be made to reach any part of the pan.

After the prints have been immersed in the fixing bath for a sufficient time, the lid 43 may be raised and the prints manually removed from the machine. In the bottom of the casing 8 below the immersing-frame is disposed a pan 50 which serves to catch any drip from the said frame when the pan 40 is moved to the other end of the casing. The said pan 50 may also be filled with water and used as a rinsing bath for the prints before removing them from the machine, the lid 43 being raised and the prints changed by hand from the pan 40 to the pan 50. To facilitate removal of the pans 40 and 50 from the casing when it is desired to clean or empty them, a door 51 is provided in the end of the casing, as shown. The said door 51, the lid 43, door 22 and all other openings to the casing are made with rabbeted or shouldered edges in order to prevent the entrance of light to the casing.

In the foregoing description it has been assumed that the development and fixation of the prints is to be done in separate baths, but, in case a sensitized material is employed which is of a nature permitting combined development and fixation, the combined developing and fixing fluid may be placed in the receptacle 42 and the receptacle 41 used to contain a washing or rinsing bath, without departing from the spirit of my invention.

It should be noted that, by the form of the developing fluid receptacle, only a relatively small surface of the fluid is exposed to the air, so that deterioration of the fluid by oxidation is reduced to a minimum. It should also be observed that by pushing the sensitized material edgewise into the developing fluid, completely immersing the same without there being anything in contact therewith to prevent free access of the fluid to the sensitized surface, the print may be uniformly developed and as good results obtained as by manipulation of the material by hand.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a machine of the class described, the combination with means for storing and exposing a strip or band of sensitized material, of means for feeding said strip in a substantially vertical plane, a developing-fluid receptacle arranged below said feeding means, a fixing-fluid receptacle adjoining the same, means for moving said receptacles in a substantially horizontal plane whereby the fixing-fluid receptacle may be brought beneath the feeding means, and means arranged between the feeding means and receptacles for cutting off sections of the sensitized materials.

2. In a machine of the class described, a fluid container, a second fluid container adjoining the same, means for feeding a strip of sensitized material into the first fluid container and holding one end of the strip in a fixed position adjoining the same, and means for moving said containers whereby the strip of material may be drawn out of the first container and into the second container.

3. In a machine of the class described, a casing, a slidable shelf disposed in said casing, a receptacle carried on said shelf, said receptacle having two adjoining compartments formed therein, a rack carried on the shelf, a pinion engaging the rack, and a shaft carrying said pinion and extending outside of the casing for actuating the slidable shelf to impart a translatory movement to the receptacle for the purpose set forth.

4. In a machine of the class described, a casing adapted to contain a roll of sensitized material and having a chamber for exposing portions of said material, feeding means for drawing a strip of the sensitized material through said chamber, a developing-fluid receptacle disposed adjacent to said feeding means and adapted to receive the sensitized material directly therefrom a fixing-fluid receptacle adjoining said developing-fluid receptacle, and means for imparting a translatory movement to the said receptacles for the purpose set forth.

5. In a machine of the class described, a casing adapted to contain a roll of light-sensitized material and having a chamber for exposing sections of said material, a pair of feed-rollers adapted to draw the said material through the exposing chamber, a cut-off device arranged adjacent to the feed-rollers, a fluid receptacle arranged adjacent to said feed-rollers and into which the material may be fed thereby, and means for moving said fluid receptacle whereby the same may be carried away from the material while a part of the same is held by said rollers.

6. In a machine of the class described, a casing, a fluid receptacle arranged in said casing, and a device for immersing materials in said receptacle comprising a frame arranged in proximity to said receptacle, a stem extending from said frame outside the

casing, and a spring arranged to hold the frame normally out of the receptacle but permitting the same to be inserted therein by movement of the stem.

5 7. In a machine of the class described, a casing adapted to contain a supply of light-sensitized material and having a chamber for exposing portions of said material to the action of light, means for feeding the material
10 through said chamber, developing-fluid and fixing-fluid receptacles arranged in proximity to said feeding means, means for imparting a translatory movement to said receptacles to change the relation thereof to the feeding
15 means, a cut-off device arranged between the feeding means and the receptacles, and means for immersing materials in one of the receptacles.

8. In a machine of the class described, a
20 casing adapted to contain a supply of sensitized material and having a chamber for exposing sections of said material to the action of light, means for feeding a strip of the sensitized material through the exposing chamber, a developing-fluid receptacle arranged
25 to receive the material from the feeding means, a fixing-fluid receptacle adjoining the developing-fluid receptacle, means for moving said receptacles whereby the fixing-fluid
30 receptacle may be brought into proximity to the feeding means, means arranged between the feeding means and receptacles for cutting off sections of the sensitized materials, and means for immersing materials in
35 the fixing-fluid receptacle.

9. In a machine of the class described, a casing, a slidable shelf disposed in said casing, a fluid receptacle carried on said shelf, said fluid receptacle having two adjoining compartments formed therein, means extending
40 outside the casing for actuating said shelf to impart a translatory movement to the fluid receptacle, and a pan arranged in a fixed position adjacent to the shelf for the purpose set forth. 45

10. In a machine of the class described, a casing adapted to contain a roll of sensitized material and having a chamber for exposing portions of said material, feeding means for drawing a strip of the sensitized material
50 through said exposing chamber, a developing-fluid receptacle disposed adjacent to said feeding means and adapted to receive the sensitized material therefrom, a fixing-fluid receptacle adjoining said developing-fluid
55 receptacle, a cut-off device arranged between the feeding means and the receptacles, means for moving the receptacles to bring either of the same into a position in proximity to the feeding means, means for im-
60 mersing materials in one of the receptacles, and a pan disposed in a fixed position in the casing for the purpose set forth.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses. 65

CALVIN J. ELLIS.

Witnesses:

D. O. BARNELL,
ROY G. KRATZ.