

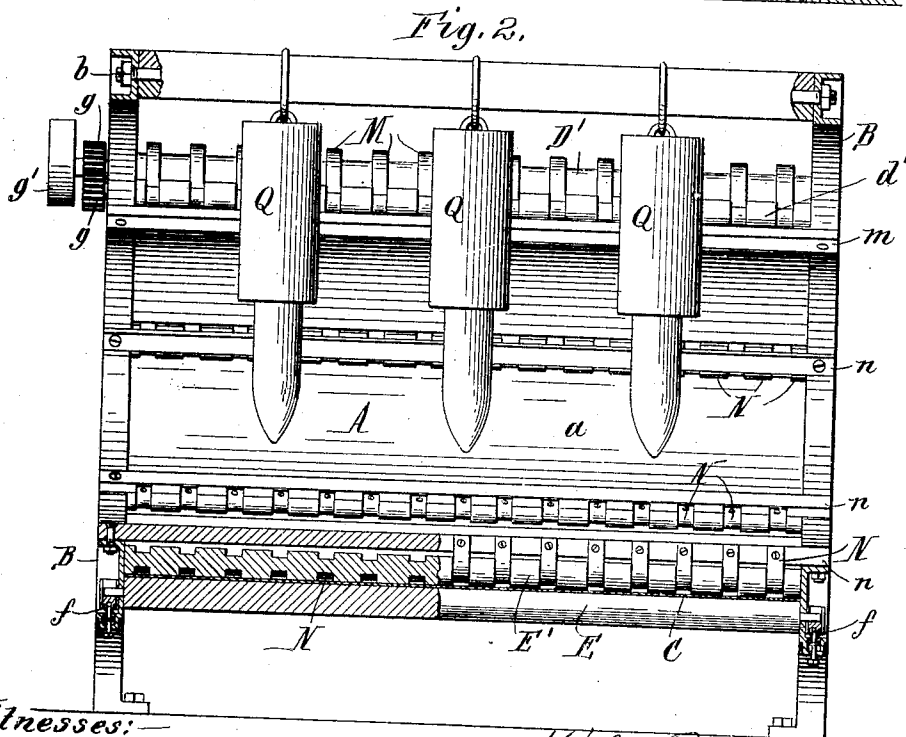
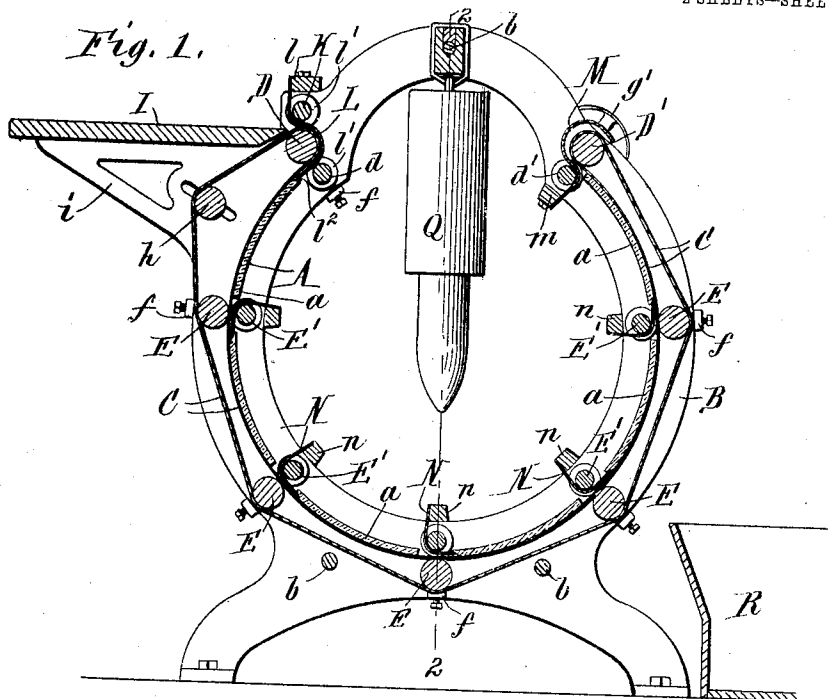
No. 857,952.

PATENTED JUNE 25, 1907.

W. T. MEAD.  
PHOTOGRAPHIC PRINTING MACHINE.

APPLICATION FILED JAN. 18, 1906.

2 SHEETS—SHEET 1.



Witnesses:  
R. W. Ransier  
E. A. Volk

Willard T. Mead, Inventor,  
by Wilhelm Parker Ward,  
Attorneys

No. 857,952.

PATENTED JUNE 25, 1907.

W. T. MEAD.  
PHOTOGRAPHIC PRINTING MACHINE.

APPLICATION FILED JAN. 18, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

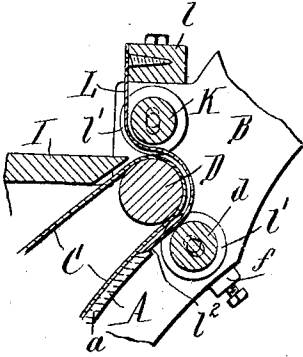


Fig. 5.

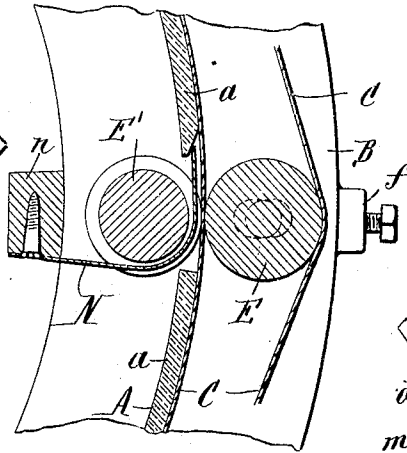


Fig. 4.

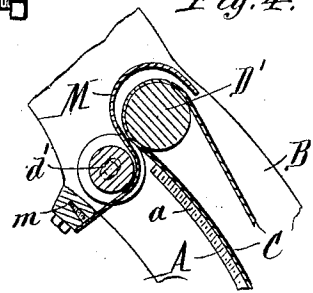


Fig. 6.

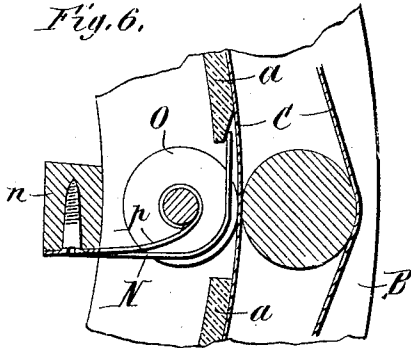


Fig. 8.

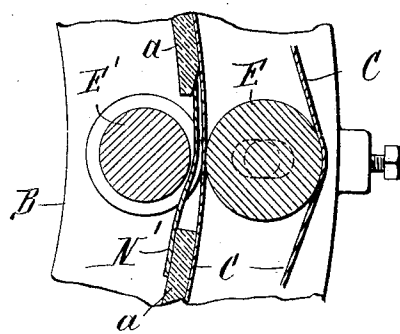


Fig. 7.

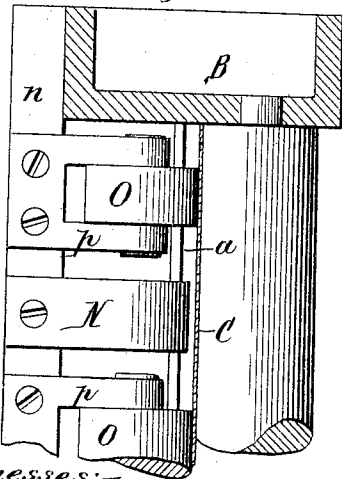
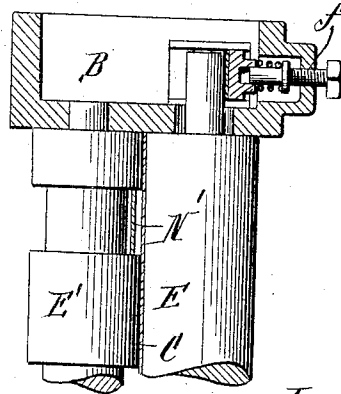


Fig. 9.



Witnesses:-  
R. W. Rumsar  
E. A. Volk.

Inventor,  
Willard T. Mead  
By Wilhelm, Parker Hard,  
Attorneys

# UNITED STATES PATENT OFFICE.

WILLARD T. MEAD, OF BUFFALO, NEW YORK.

## PHOTOGRAPHIC-PRINTING MACHINE.

No. 857,952.

Specification of Letters Patent..

Patented June 25, 1907.

Application filed January 18, 1906. Serial No. 296,644.

*To all whom it may concern:*

Be it known that I, WILLARD T. MEAD, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Photographic-Printing Machines, of which the following is a specification.

This invention relates to machines for making photographic prints and is of that kind in which the negative, tracing or transparent original to be reproduced, and the sensitized print paper, or sheet, are pressed in proper relation against a printing or supporting bed or surface, and are caused to travel over said bed or surface while exposed to the light, by a traveling belt or apron. These machines are probably most commonly used for making prints from tracings.

The primary object of the invention is to produce a machine capable of rapid and economical operation which is suitable for producing large or continuous prints, or a number of small prints at one time, and is constructed to prevent any relative shifting or slipping of the original and sensitized sheet during the travel thereof over the printing bed or surface.

Another object of the invention is to improve such photographic printing machines in the respects hereinafter specified and pointed out in the claims.

In the accompanying drawings, consisting of two sheets: Figure 1 is a longitudinal sectional elevation of a photographic printing machine embodying the invention. Fig. 2 is a transverse sectional elevation thereof on line 2—2, Fig. 1. Fig. 3 is a detail section, on an enlarged scale, of the front end of the bed and adjacent feed rollers. Fig. 4 is a similar view of the rear end of the bed and feed rollers. Fig. 5 is a fragmentary section, on an enlarged scale, of one of the intermediate pairs of feed rollers and adjacent parts. Figs. 6 and 7 are respectively a fragmentary vertical and horizontal section, on an enlarged scale, showing a modification of the intermediate feed rollers. Figs. 8 and 9 are views similar respectively to Figs. 6 and 7 showing a modification of the guide devices.

Like letters of reference refer to like parts in the several figures.

A represents a supporting or printing bed or surface of glass, or other suitable transparent or light transmitting material, against which the flexible negative, tracing or origi-

nal and sensitized print sheet are pressed and over which they travel. The bed is preferably, though not necessarily, composed of a number of curved panes or panels *a* which are arranged to form a horizontal cylinder open at its upper portion, and are separated to provide spaces between them for feed rollers. The panels are secured, in any usual or suitable way, in end frames B of any suitable construction which are rigidly connected, as by tie-rods *b* and form the supporting structure of the machine. The segmental cylindrical bed made of a series of relatively narrow panels is much less expensive to make than a single-piece bed and is less liable to break under the changes of temperature to which it is subjected in use. This construction of the bed besides providing the spaces for the feed rollers, therefore decreases the cost of manufacture and maintenance of the machine.

C represents an endless traveling apron or belt which extends from end to end of the bed or cylinder for pressing the originals and sensitized sheets flat against the same and moving them thereover while exposed to the light. The apron, which is made of any suitable strong, flexible material, such, for instance, as canvas or duck, is looped around rollers D and D' which are arranged near the opposite ends of the bed, or at the opposite sides of the opening of the cylinder and are journaled at their ends in the end frames B. The inner portion or run of the apron, which is drawn against the bed or cylinder, passes between these rollers and co-operating feed rollers *d d'* which are arranged at the inner side of the apron and are journaled on the end frames of the machine. The inner portion or run of the apron also passes between a series of pairs, or sets, of feed rollers E E' located around the bed or cylinder in the spaces between the panels thereof. In the machine illustrated the outer portion of the apron is drawn against the outer sides of the outer rollers E and is guided thereby, but this outer portion of the apron could pass over any other suitable guide means. The inner and outer rollers of each pair are so disposed, respectively, inside and outside of the bed or cylinder as to hold the inner run of the apron snugly against the outer surface of the bed and prevent, as far as possible, the flattening of the apron between the panels of the bed or surface, and they are so constructed, or journaled and provided with pressure means,

that the rollers of each pair exert a pressure on, or yieldingly grip the inner run of the apron, and the rollers are caused to revolve with a peripheral speed equal to the speed of the apron, so that the original and sensitized sheet will be pressed against the apron and will be positively moved therewith over the printing bed or cylinder.

In the construction shown in Figs. 1—5 one roller of each pair, for instance, the inner rollers  $d$   $d'$  of the two end pairs and the outer rollers of the intermediate pairs, is journaled in movable spring-pressed journal boxes  $f$  of a construction, for instance, such as shown in Fig. 9. The rollers should be made with surfaces of a character best adapted to insure the proper gripping and feeding of the apron and originals and sensitized sheets.

The apron can be driven by any suitable means, for example, in the machine illustrated, see Fig. 1, the rollers  $D'$   $d'$  at the rear end of the bed or cylinder are geared together by gear wheels  $g$  secured to their projecting journals and one journal is provided with a drive pulley or wheel  $g'$ . These rollers are thus positively turned in opposite directions and draw the apron taut against the bed or cylinder and move it rearwardly over the same. The intermediate rollers are driven at the same speed by the frictional engagement of the inner run of the apron with both rollers of each pair and of the outer run of the apron with the several outer rollers.

A roller  $h$  is shown in Fig. 1 over which the apron passes and which is adjustably mounted in the machine in any usual manner to tension the apron as may be necessary from time to time.

The machine is preferably provided with a feed table  $I$ , Fig. 1, at the front side of the bed or cylinder on which the originals and sensitized sheets are placed and adjusted to facilitate the proper feeding thereof into the machine. In the construction shown, this feed table is supported by projecting arms  $i$  on the end frames in front of the first pair of feed rollers  $D$   $d$  with its top substantially in the horizontal plane of the top of the outer roller  $D$ , and a supplemental feed roller  $K$  is provided above the roller  $D$  which is yieldingly pressed against the apron by spring-pressed journal boxes or in any other suitable manner. The original and sensitive sheets are placed on the feed table with their rear ends between the apron and supplemental feed roller  $K$  which grasp and feed them into the machine, and they are caused to pass around the roller  $D$  with the apron and enter between the apron and bed or cylinder by suitable guides  $L$ , consisting, in the construction shown, of S-shaped strips which are attached at one end to a cross bar  $l$  secured on the end frames  $B$ , and extend around the roller  $D$  through suitable peripheral grooves  $l'$  in the rollers  $K$  and  $d$ . The

free ends of the guide strips bear against the adjacent edge  $l''$  of the first panel of the bed or cylinder, which is preferably beveled, and prevent the original and sensitized sheet from curling inwardly between the inner roller  $d$  and the end of the bed or cylinder. Similar guide strips  $M$ , Fig. 1, attached to a cross bar  $m$  and extending between the last pair of feed rollers, and over the outer roller  $D'$  of said pair, are provided for guiding the original and sensitized sheet out around the rear end of the apron. Guide means of any other suitable construction could be used instead of the guides  $L$  and  $M$  described.

Guide strips  $N$  are also preferably provided between each pair of intermediate feed rollers  $E$   $E'$  to insure the proper passage of the originals and sensitized sheets across the spaces between the panels of the bed or cylinder. In the construction shown in Figs. 1 and 2 these guide strips are attached to cross bars  $n$ , arranged inside the bed or cylinder, and extend through grooves in the inner rollers to the beveled edges of the panels in rear of said rollers, while in Figs. 8 and 9 is illustrated a construction in which the guide strips  $N'$  are cemented or otherwise attached to one panel and extend across the intervening space to the next panel.

The feed rollers above described are continuous or extend across the bed or cylinder from side to side thereof, being journaled at their ends in the end frames  $B$ , but short rollers arranged at intervals across the bed or cylinder could be used instead for the inner feed rollers and also possibly for the outer rollers of the intermediate pairs. For instance, Figs. 6 and 7 show an arrangement of spaced short rollers  $O$  each journaled in a separate spring bearing arm  $p$  by which it is pressed against the apron.

Any suitable source of light within the bed or cylinder can be employed. Electric lamps are indicated at  $Q$  in Figs. 1 and 2, suspended within the bed or cylinder from a supporting cross bar at the upper part of the frame. The bed or cylinder being open at the top affords a ready escape for the heat generated by the lights.

$R$ , Fig. 1, represents a receptacle for receiving the originals and sensitized sheets which fall down from the discharge end of the apron. This or any other means for taking care of the tracings and prints as they discharge can be used.

The operation of the machine is as follows: The sensitized sheet is placed on the feed table with the sensitive side uppermost and the tracing or other transparent original is placed thereon and the ends of the two engaged between the supplemental feed roller  $K$  and the apron  $C$ . The original and sensitized sheet will be fed around the roller  $D$  at the front end of the bed or cylinder in between the apron and the bed or cylinder and

will pass with the traveling apron between the intermediate feed rollers and will be exposed to the light while passing around the bed or cylinder, and will be discharged from the machine when they pass around the roller D' at the rear of the bed. The speed of movement of the apron is so regulated that the printing will be completed during the travel of the original and sensitized sheet from end to end of the bed or cylinder. The periphery of the bed or cylinder is large, thus enabling the exposure of a large original, or of a number of small originals at one time, and, as the movement of the apron is continuous, it is also possible to reproduce an original no matter of how great its length. The pairs of intermediate feed rollers are preferably separated distances less than the length of the smallest originals to be reproduced so that the front ends thereof and of the sensitized sheet will be grasped and fed forward by one pair of rolls before the rear ends thereof are released by the succeeding pair of rollers, and, as all of the rollers and apron move at the same speed, the original and sensitized sheet will be positively moved over the bed and held in exactly the same relation and there can be no slipping of the sensitized sheet on the original due to the friction of the latter on the bed or cylinder. Without the feed rollers for positively grasping and feeding the tracing and print paper there might be some slipping of one on the other, especially in the case of short pieces.

The preferred construction of the machine has been described, having the bed in the form of a transparent cylinder open at the upper portion with the source of light within the same, but manifestly the arrangement of a stationary bed and single traveling apron with the feed rollers between which the apron passes, to insure the proper movement of the originals and sensitized sheets without slipping, would be desirable regardless of the shape and character of the bed and apron and irrespective of whether the light for printing is transmitted through the bed or through the apron.

I claim as my invention:

1. The combination of a light-transmitting printing bed, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, and feed rollers which are located between the ends of said bed and between which the apron, original and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, substantially as set forth.

2. The combination of a stationary curved printing bed, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, and feed rollers which are located between the ends of said bed and between which the apron, origi-

nal and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, substantially as set forth.

3. The combination of a light-transmitting printing bed over which the original and sensitized sheet are passed while exposed to the light, said bed being in the form of a cylinder arranged with its axis substantially horizontal and open at its upper portion, a source of light within the cylinder, and feed rollers which are located between the ends of said bed and between which the original and sensitized sheet pass and by which they are positively moved over said bed, substantially as set forth.

4. The combination of a printing bed, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, and feed rollers arranged intermediate of the ends of the bed between which the apron original and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, substantially as set forth.

5. The combination of a printing bed composed of spaced panels over which the original and sensitized sheet are passed while exposed to the light, and feed rollers which are arranged in the spaces between the bed panels and between which the original and sensitized sheet pass and by which they are positively moved over the bed, substantially as set forth.

6. The combination of a printing bed composed of spaced panels, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, and feed rollers arranged in the spaces between the bed panels between which the apron original and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, substantially as set forth.

7. The combination of a curved printing bed composed of spaced light transmitting panels, a traveling apron which presses the original and sensitized sheet against the bed, while exposed to the light, and feed rollers arranged in the spaces between the bed panels between which the apron original and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, substantially as set forth.

8. The combination of a printing bed, a traveling apron which presses the original and sensitized sheet against said bed while exposed to the light, one or more rollers arranged between the ends of said bed and between which and said apron the original and sensitized sheet pass, said roller or rollers and apron acting to press said original and sensitized sheet together and feed them posi-

tively with said apron over the printing bed, substantially as set forth.

9. The combination of a printing bed, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, and feed rollers which are arranged between the ends of the bed and between which the apron original and sensitized sheet are yieldingly grasped and pressed together and by which the original and sensitized sheet are positively moved with the apron, substantially as set forth.

10. The combination of a printing bed composed of spaced panels, a traveling apron which presses the original and sensitized sheet against the bed while exposed to the light, feed rollers arranged in the spaces between the bed panels between which the apron original and sensitized sheet pass and by which the original and sensitized sheet are pressed against and positively moved with the apron, and guide devices in the spaces between the bed panels to prevent the original and sensitized material from leaving the bed, substantially as set forth.

11. The combination of a curved printing

bed, an endless traveling feed apron extending over said bed and passing around rollers near the opposite ends thereof, and guides partially surrounding said rollers for guiding the original and sensitized material around said rollers to introduce them between the apron and bed and discharge them therefrom, substantially as set forth.

12. The combination of a stationary curved printing bed, a traveling apron which presses the original and sensitized sheet against said bed while exposed to the light, one or more rollers arranged between the ends of said bed inside of the curve of said apron and between which and said apron the original and sensitized sheet pass, said roller or rollers and apron acting to press said original and sensitized sheet together and feed them positively with said apron over the printing bed, substantially as set forth.

Witness my hand, this 13th day of January, 1906.

WILLARD T. MEAD.

Witnesses:

C. W. PARKER,

EDWARD C. HARD.