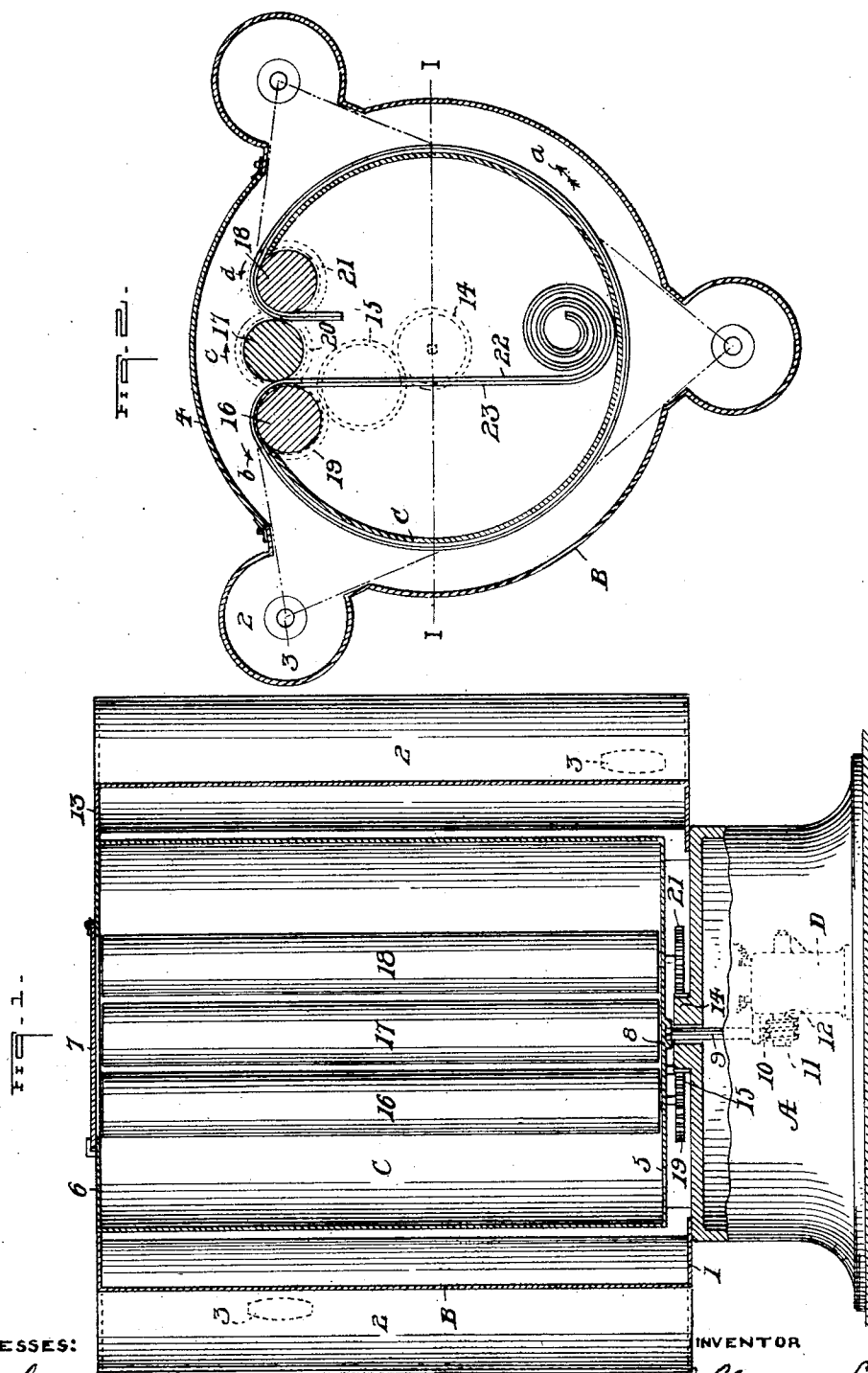


PRINT MACHINE.

Patented June 21, 1910.

3 SHEETS—SHEET 1.

**962,128.**



**WITNESSES:**

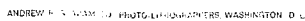
J. B. Hoffman;  
A. J. J. J. J.

INVENTOR

For want of Claim, &c.  
by Edward A. Lawrence  
his ATTORNEY

**962,128.**

3 SHEETS—SHEET 2.

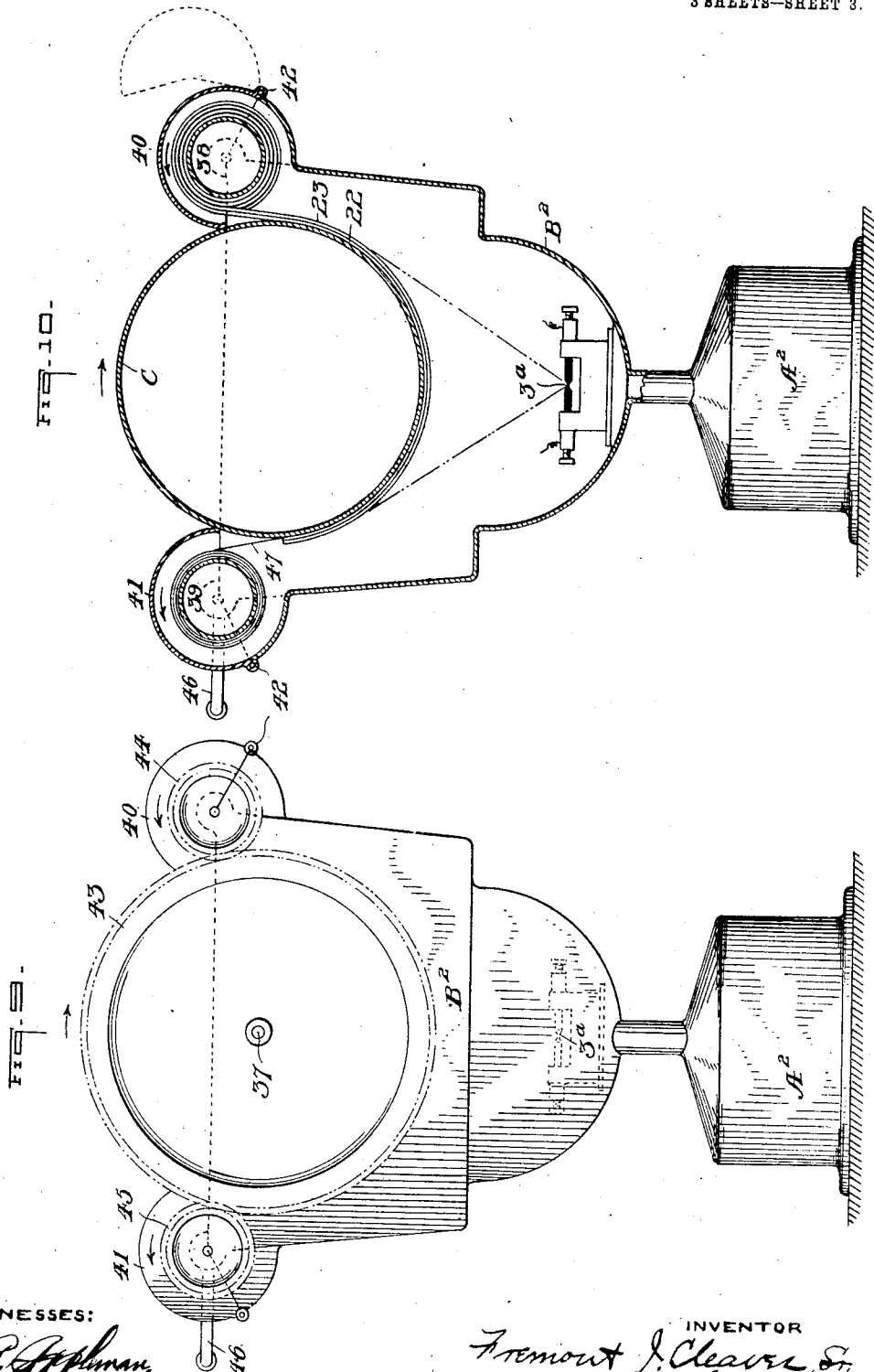


F. J. CLEAVER, SR.  
PRINT MACHINE.  
APPLICATION FILED JAN. 29, 1909.

962,128.

Patented June 21, 1910.

3 SHEETS—SHEET 3.



WITNESSES:

*J. R. Lyphman,*  
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*Att*

ATTORNEY

# UNITED STATES PATENT OFFICE.

FREMONT J. CLEAVER, SR., OF BALDWIN TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA, ASSIGNOR OF ONE-THIRD TO J. B. COLLINS AND ONE-THIRD TO SAMUEL L. H. MORRIS, OF ALLEGHENY COUNTY, PENNSYLVANIA.

## PRINT-MACHINE.

962,128.

Specification of Letters Patent. Patented June 21, 1910.

Application filed January 29, 1909. Serial No. 474,899.

*To all whom it may concern:*

Be it known that I, FREMONT J. CLEAVER, Sr., a citizen of the United States, and residing in the township of Baldwin, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Print-Machines, of which the following is a specification.

My invention consists in new and useful improvements in machines for making prints or reproductions from drawings, tracings, negatives and other originals, and which may be used in connection with either natural or artificial light. In general it is composed of an element adapted to support the original and sensitized fabric, such as blue print paper, and a printing element, such as an electric arc or other source of light. To effect a continuous process of reproduction of the original on the sensitized fabric, I prefer to cause either the supporting element or the source of illumination to move, while the other element remains stationary, or both elements may move in relation to each other. I show means for causing the original and sensitized fabric to traverse the zone of illumination, feeding the same from darkness to darkness, the exposure being timed so that the proper reproduction is effected. As a practical embodiment of this process, I have illustrated a supporting surface, preferably curved, exposed to the illumination, across which the original and sensitized fabric is caused to pass. A convenient form of said supporting surface is that of a cylinder which may be rotated to assist in the exposure and facilitate the movement of the original and sensitized fabric thereover. To enable originals of great length to be reproduced, I provide means for storing the same in darkness, continuously feeding the same across the zone of illumination, and, after reproduction, storing the original and now printed fabric in darkness until it is convenient to remove the same for fixing. Means are also provided for reproducing an original which is of too small length or area to permit of the use of the continuous process.

In the accompanying drawings, Figure 1 is a vertical section of the vertical type of

my machine along the line I—I in Fig. 2; Fig. 2 is a horizontal section of the same; Fig. 3 is a perspective of the supporting element, here shown as a cylinder; Fig. 4 is a vertical section along the line IV—IV in Fig. 5 of the horizontal type of my machine, and Fig. 5 is a side elevation of the same, partially broken away to show the construction; Fig. 6 is a detail in elevation of a modified roll arrangement; Fig. 7 is a plan view thereof, and Fig. 8 is a horizontal section of the same; Fig. 9 is an end elevation of a modified form of my machine, and Fig. 10 is a vertical section of the same.

The following is a detailed description of the drawings, which, however, are merely illustrative of the practical embodiment of the principles of my invention and not intended to limit the same to the constructions shown.

Referring first to Figs. 1, 2 and 3, A represents the base which may be of any suitable design, shown in the drawings as inclosed. B is the casing of any general contour, such as a vertical cylindrical body, mounted on base A by means of its annular bottom 1 which also serves to prevent the entrance of light from below. 2, 2, represent one or more cylindrical offsets in the perimeter of casing B, three of such offsets, equally spaced apart, being shown in Fig. 2. Said offsets are closed at top and bottom to exclude outside light and their interior walls may, if desired, be polished or lined with reflecting material. In each of said offsets are mounted one or more sources of illumination, such as electric arc lamps, 3, 3. Any other source of artificial light, found convenient, may be substituted. I prefer to stagger the corresponding lights in the several offsets to distribute the illumination evenly throughout the casing B, and the walls of said casing may be polished or lined with reflecting material, if desired, to aid in such distribution. The casing B may be provided with one or more hinge sections, 4, which may be swung open to admit natural light to the interior of the casing B as a source of illumination, when desired. C is the print supporting element which is preferably rotata-

bly mounted in casing B, as shown in the drawings. It is here shown as a cylinder having a permanent bottom 5 and an annular top 6 provided with a central opening which is provided with a hinged trap 7 which may be locked shut. 8 is a socket, internally squared, axially fixed to the bottom 5 of cylinder C and adapted to fit down over the correspondingly squared end of a vertical shaft 9, journaled in base A, when the cylinder is mounted in the casing, as shown in Fig. 1. It is evident that the cylinder C will rotate with said shaft 9. 10 is a gear wheel rigidly mounted on the lower end of shaft 9 and meshing with worm 11 on shaft 12 of dynamo D mounted in base A. Any other convenient source of power may be substituted for said dynamo, if desired. The upper end of cylinder C is supported in proper vertical alinement by annular top 13 of casing B which also serves to prevent the entrance of light from above into said casing when the cylinder C is in place. 14 is an annular gear rigidly mounted on the top of base 1 and concentric with shaft 9 which it surrounds. 15 is a gear journaled on the under face of bottom 5 of cylinder C and adapted to mesh with gear 14 when said cylinder is mounted in the casing B, so that when the said cylinder is rotated by shaft 9, the gear 15, while traveling around with said cylinder, will be caused to rotate by its engagement with the fixed gear 14. Intermittent gears of any desired type may, if desired, be substituted for gears 14 and 15 to give a step by step rotation to rolls 16, 17, and 18, to be described, instead of a continuous rotation. 16, 17 and 18 represent three parallel rolls vertically mounted in a cutaway portion of the perimeter of cylinder C. The lower ends of the axial shafts of said rolls are extended down through the bottom 5 of the cylinder and provided with rigidly mounted, intermeshing gears 19, 20 and 21. The gear 19 of roll 16 also intermeshes with gear 15 so that said rolls, 16, 17 and 18, are rotated by the dynamo D. The upper ends of the axial shafts of the rolls 16, 17 and 18 may be journaled in annular cover 6 of the cylinder. 22 represents the original, tracing or other negative and 23 the sensitized fabric. It will be seen that the cylinder C may be introduced into the casing B and brought into operative connection with the rotating mechanism described, or removed from said casing at will.

The operation of the machine is as follows. A roll of sensitized fabric, 23, with the original, 22, superimposed thereon, is introduced into the interior of the cylinder C and the end brought out between rolls 16 and 17, then led around the face of the cylinder C and reintroduced into the interior of said cylinder between the rolls 17 and

18. The trap 7 in the top of cylinder C is closed and locked, and the cylinder introduced into the casing B, the socket 8 engaging the end of shaft 9 and the gear 15 intermeshing with fixed gear 14. The lights 3, 3, are now turned on and the dynamo D started. The assemblage of the motive parts is such that the cylinder C rotates in the direction of the arrow *a* in Fig. 2, while the rolls 16, 17 and 18, respectively, rotate in the directions of the arrows *b*, *c* and *d*, the rolls 16, 17 and 18 being sufficiently close together to properly feed the original and sensitized fabric between them, from the cylinder, around the face thereof in the zone of illumination, and into the cylinder again. The printed fabric and original are stored in the interior of the cylinder C where they may remain until it is convenient to remove the print for the fixing process. The rate of rotation of cylinder and rolls is regulated so that the sensitized fabric is exposed to the illumination for the proper period required for satisfactory reproduction of the original. Where natural light is used as the printing agent, the electric lights 3, 3, are not turned on, but the sections 4 of the casing B are opened to admit natural light. The rate of rotation is regulated so that the original and sensitized fabric are exposed for the necessary period to the light.

Where the tracing or other original is too short or small in area to permit of the continuous process just described, I may fix the original, superimposed on the sensitized fabric, upon the face of the cylinder C by means of longitudinal clamps 24, 24 which are attached to the face of the cylinder C by means of their resilient ends which engage the ends of the cylinder, and which clamps may be slid laterally to any desired position or distance from each other. Where the tracing or other original, 22, is so creased or roughened as to normally affect the print, a sheet 25 of transparent material may be superimposed upon the original 22 to prevent the reproduction of the defects of the original.

In Figs. 4 and 5, the casing B' is shown mounted horizontally on a base or pedestal A', but two offsets, 2, 2, being shown provided in which are seated the arc lights 3, 3, or other sources of light. 26 represents a reflector of any convenient character in the bottom of casing B' between the offsets 2, 2, to reflect the light on to the surface of the cylinder C. The portion 4 of the casing B' which is hinged to be swung upwardly to admit natural light or to furnish access to the interior of the casing, may support a drawing board or table 27. Any convenient means may be provided to support the cylinder C horizontally in casing B'. For instance, one end of the casing B', such as 28, may be permanently closed and provided

with an axial journal for a short shaft 9<sup>a</sup> whose inner end is squared to engage the socket 8 on the closed end 5 of cylinder C. The other end, 29, of the casing B' may be hinged at the bottom so as to be swung down to admit the cylinder C and have at its center a journal box 30 for the short shaft 31 rigidly attached to the center of trap 7 of the cylinder C. An annular gear, 14<sup>a</sup>, may be mounted rigidly on the interior face of the end 28 of casing B' concentric with shaft 9<sup>a</sup>, intermeshing with gear 15 on the fixed end 5 of the cylinder C thus imparting rotation to the rolls 16, 17 and 18, as above described.

In Figs. 6, 7 and 8 I have shown a modification of the roll mechanism wherein the original and sensitized fabric are not drawn from the interior of the cylinder and fed back into the same after the printing, but the same are fed from roll to roll across the face of the cylinder. 16<sup>a</sup>, 17<sup>a</sup> and 18<sup>a</sup> are three rolls mounted in the cutaway portion of the cylinder C. The lower ends of the axles of rolls 16<sup>a</sup> and 17<sup>a</sup> may be journaled in apertures in the bottom 5 of the cylinder, while the lower end of the axle of roll 18<sup>a</sup> is squared and seated in a correspondingly squared recess in annular plate 32 whose axial shaft 33 is journaled vertically in the bottom 5 of the cylinder and has rigidly mounted on its lower end a gear 34 which is arranged to mesh with idle gear 15 on base A, as in Fig. 2, or idle gear 15<sup>a</sup> on permanent end 28 of casing B', as in Fig. 5. The upper ends of the axles of rolls 16<sup>a</sup>, 17<sup>a</sup> and 18<sup>a</sup> are removably mounted in spring latch journal boxes 35, 35 and 35 in plate 36 which is horizontally fixed in the interior of casing C adjacent to the cutaway portion of said casing. The roll 18<sup>a</sup> is arranged to rotate in the direction of the arrow *a* in Fig. 8. The operation of this form of roll arrangement is as follows. The length of original and sensitized fabric is mounted on the roll 17<sup>a</sup> and the said roll introduced into the interior of the cylinder C through the trap 7, the lower end of the axle of said roll being stepped into the proper aperture in bottom 5 of cylinder C, and the upper end of said axle being stepped into the proper journal box 35. Sufficient of the original and sensitized fabric are now unrolled from said roll 17<sup>a</sup> to pass out between rolls 16<sup>a</sup> and 17<sup>a</sup>, around the exterior face of cylinder C and be attached, by means not shown, to the roll 18<sup>a</sup>. The machine is now started, rotating the cylinder C in the direction shown in Fig. 2 and the roll 18<sup>a</sup> in the direction of the arrow in Fig. 8. The rotation of the roll 18<sup>a</sup> will draw the original and fabric around the face of the cylinder, unwinding the same from roll 17<sup>a</sup> and storing the completed print on the said roll 18<sup>a</sup>, the rolls 16<sup>a</sup> and 17<sup>a</sup> rotating as shown by the

arrows. The rate of rotation is of course regulated by the time required for reproduction. When the full length of original and fabric has been unrolled from roll 17<sup>a</sup> and rolled upon roll 18<sup>a</sup>, the trap 7 in the top of cylinder C may be opened and the loaded roll 18<sup>a</sup> removed so that it can be stored away until it is desired to fix the print. A fresh roll 18<sup>a</sup> may then be installed and a loaded roll substituted for empty roll 17<sup>a</sup> and the printing process repeated.

In the modification shown in Figs. 9 and 10, the casing B<sup>2</sup> is supported horizontally on a vertical base or pedestal A<sup>2</sup>, and preferably open at the top, a portion of the cylinder C being left exposed for the use of natural light, when desired, or a swinging portion 4 may be provided as in the preceding figures which may be fitted, as in the case of Figs. 4 and 5 with a drawing board or table. The cylinder may be supported by means of its axial shafts, 37—37, the ends of the cylinder in this case being preferably permanent. Said shafts may be journaled in the ends of the casing B<sup>2</sup> in any convenient manner, preferably removably. 38 and 39 are spools removably mounted in closed cases 40 and 41, respectively, said cases communicating with the interior of casing B<sup>2</sup>. The tops of said cases are hinged as at 42 to enable the cases to be opened for the introduction and removal of the spools. 43 is an annular rack carried by the cylinder C which meshes with similar racks, 44 and 45 on the spools 38 and 39, respectively so that when the spool 39 is rotated, the cylinder and spool 38 rotate also. 46 is a crank removably attached to one end of the axial shaft of spool 39 which is prolonged outside the end of case 41 for that purpose. In the operation of this form of my machine, the original and sensitized fabric is neither first stored in nor fed into the interior of the cylinder C. The said original and fabric are first wound up on the spool 38, said spool is then mounted on its case 40 and the cover of said case closed. The free ends of said original and fabric are then led down across the face of the cylinder C and attached in some convenient manner, not shown, to the other spool 39. The lights 3<sup>a</sup>, 3<sup>a</sup>, are now turned on and the case 41 is closed. The crank 46 is then turned in the direction of the arrow in Fig. 9, rotating the spool 39 in the same direction, and the cylinder C and spool 38 in the directions indicated by their arrows, thus winding the original and fabric from the spool 38, across the face of the rotating cylinder C and onto the spool 39. When the spool 39 has received the entire length of the original and fabric, the rotation is stopped, case 41 is opened and the loaded spool 39 removed for storage or fixing of the print. A fresh loaded spool 38 may be sub-

stituted for the empty spool 38 now in case 40 and a fresh empty spool 39 placed in case 41, the crank 46 reattached and the process repeated. If it be desired to use natural light, the original and fabric are led from spool 38 up over the top of the cylinder C and attached to spool 39. A rotation of the spools and cylinder in directions opposite to those indicated in Fig. 9 will draw the original and fabric over the face of the cylinder exposed to the natural light and a print will result. Power may be, of course, applied to rotate the spools and cylinder if desired.

I prefer to attach to the free end of the original and fabric a belt 47 which may be led across the face of the cylinder and attached to the spool 39 so that no portion of the fabric or print pass out onto the face of the cylinder until the lights are turned on. A similar belt may be attached to the inner end of the original and fabric so that the last portion of the same will have passed out of the zone of illumination when rotation of the spools ceases.

It is evident that, if desired, the cylinder C may be permitted to remain stationary and the original and fabric be fed across the surface thereof in the zone of illumination by means of the rolls 16, 17 and 18, or rolls 16<sup>a</sup>, 17<sup>a</sup> and 18<sup>a</sup>, or the spools 38 and 39, as the case may be, but I prefer to also rotate my cylinder to facilitate the operation. Any smooth surface, such as a plane, a curve or other convenient contour could be substituted for the cylinder. Also, if desired, the rolls or spools may be omitted and the original and fabric mounted on the revolving cylinder and thus exposed to the zone of light. This method is preferable where the original is too short to be subjected to my continuous method. In case the length of the cylinder or other supporting surface is not sufficient to accommodate the width of the original and fabric, they may be folded and first run through the machine with one side exposed and then reversed and run through with the other side exposed. It is also evident that the casing or light bearing element might be arranged to rotate while the original and sensitized fabric support remains stationary, without departing from the scope of my invention.

Many other changes in construction will occur to those skilled in the art, all of which are within the scope of my invention. I therefore do not wish to limit myself to the construction shown but claim broadly:—

1. In a print machine of the character described, a stationary outer casing, a rotary print support adapted to expose its outer surface within said casing, means for feeding the original and the sensitized fabric across the surface of said print support within said casing, and means mounted within said casing for illuminating the origi-

nal and sensitized fabric as the same are fed across said print support within said casing, for the purposes described.

2. In a print machine of the character described, a stationary outer casing, a cylindrical print support adapted to expose its outer surface within said casing, means for feeding the original and the sensitized fabric across the surface of said print support within said casing, means mounted within said casing for illuminating the original and sensitized fabric as the same are fed across said print support within said casing, and means for rotating said print support, for the purposes described.

3. In a print machine of the character described, a stationary outer casing, a cylindrical print support adapted to expose its outer surface within said casing, means for rotating said print support, means for feeding the original and the sensitized fabric across the surface of said support within said casing from the interior of said support into the interior of said support again, and means for illuminating the interior of said casing, for the purposes described.

4. In a print machine of the character described, a stationary outer casing, a cylindrical print support adapted to expose its outer surface within said casing, means for rotating said print support, means for feeding the original and the sensitized fabric across the surface of said support within said casing from the interior of said support into the interior of said support again, and means mounted in said casing for illuminating the interior thereof, for the purposes described.

5. In a print machine of the character described, a stationary outer casing, a cylindrical print support adapted to expose its outer surface within said casing, means for rotating said print support, means for feeding the original and the sensitized fabric across the surface of said print support within said casing from the interior of said support to the interior of said support again, and means for exposing the interior of said casing to illumination by natural light, for the purposes described.

6. In a print machine of the character described, an outer casing member, a print supporting member mounted within said casing member, means for rotating one of said members, means for feeding the original and the sensitized fabric across the exterior surface of said support within said casing, and means mounted within said casing for illuminating the original and sensitized fabric as the same are fed across said print support within said casing, for the purposes described.

7. In a print machine of the character described, an outer casing member, a print supporting member mounted within said casing

member, means for rotating one of said  
members, means for feeding the original  
and the sensitized fabric across the exposed  
surface of said support within said casing, a  
5 lateral compartment formed in said casing,  
and means mounted within said compart-  
ment for illuminating the original and sen-  
sitized fabric as the same are fed across said

print support within said casing, for the  
purposes described.

Signed at Pittsburg, Pa., this 26th day of 10  
January, 1909.

FREMONT J. CLEAVER, SR.

Witnesses:

E. A. LAWRENCE,

J. H. HARRISON.