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J. H. STARK & C. G. BARCUS.

PHOTOGRAPHIC PRINTING APPARATUS.

APPLICATION FILED MAY 26, 1903. RENEWED MAY 4, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

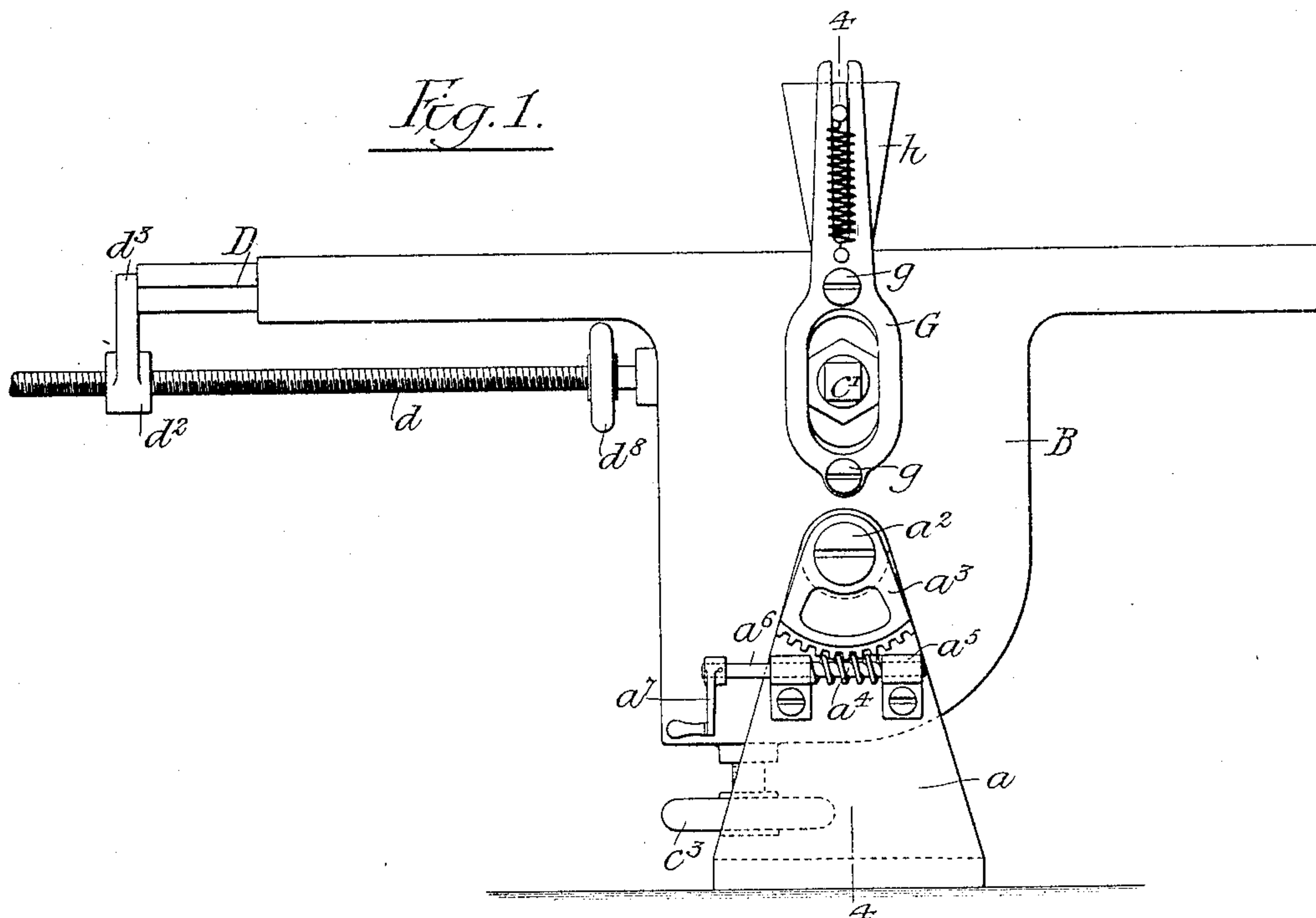
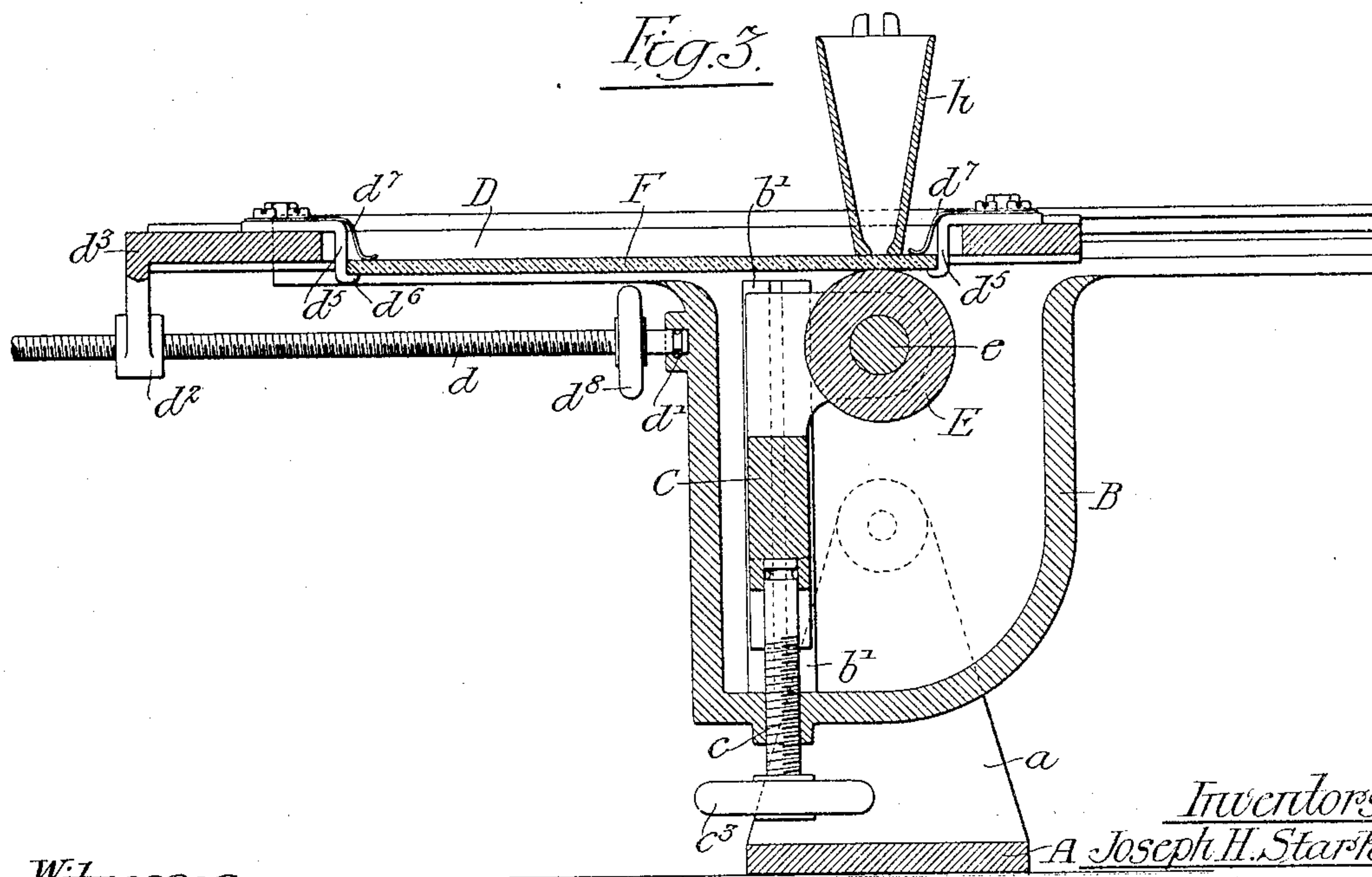


Fig. 3.



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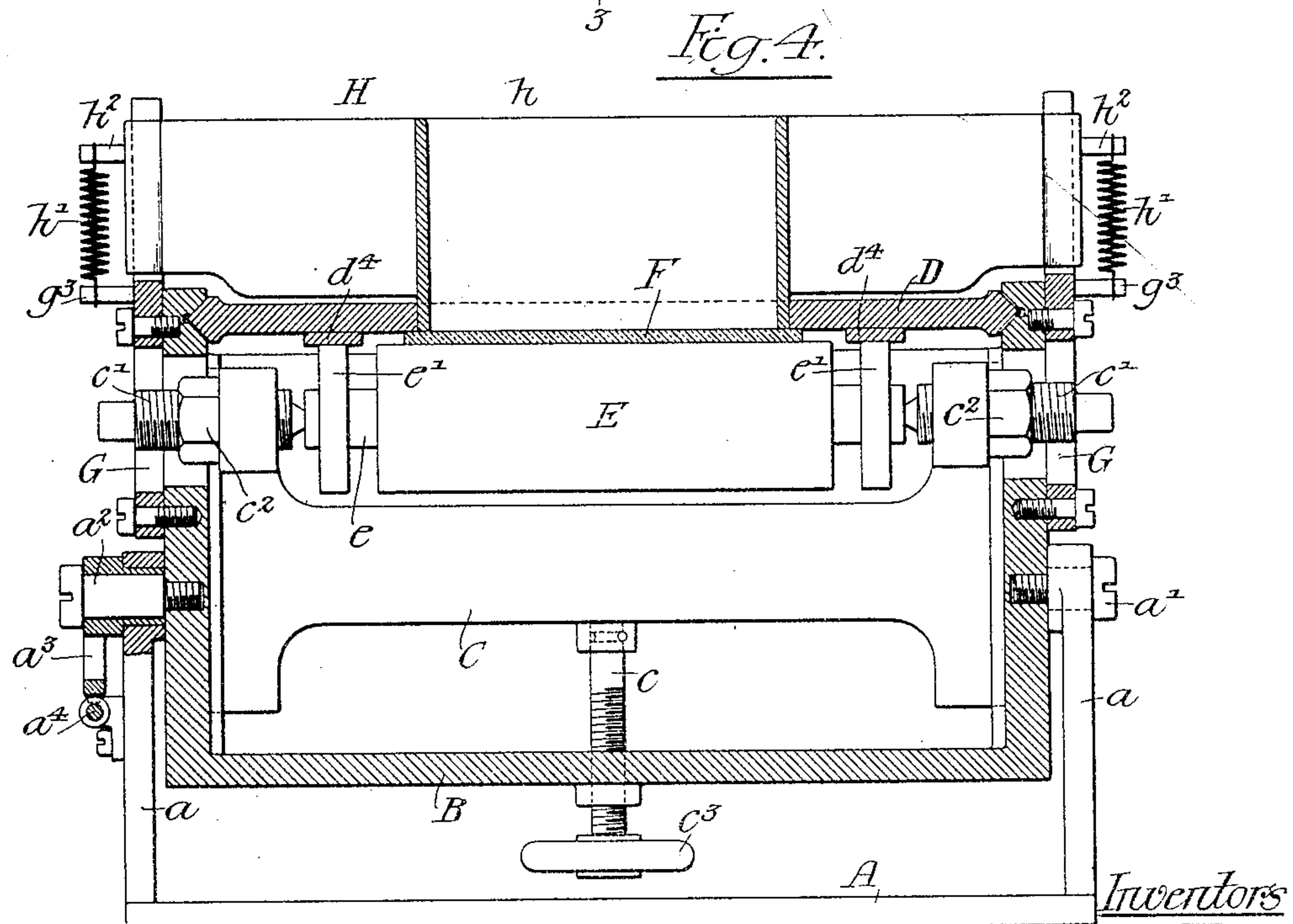
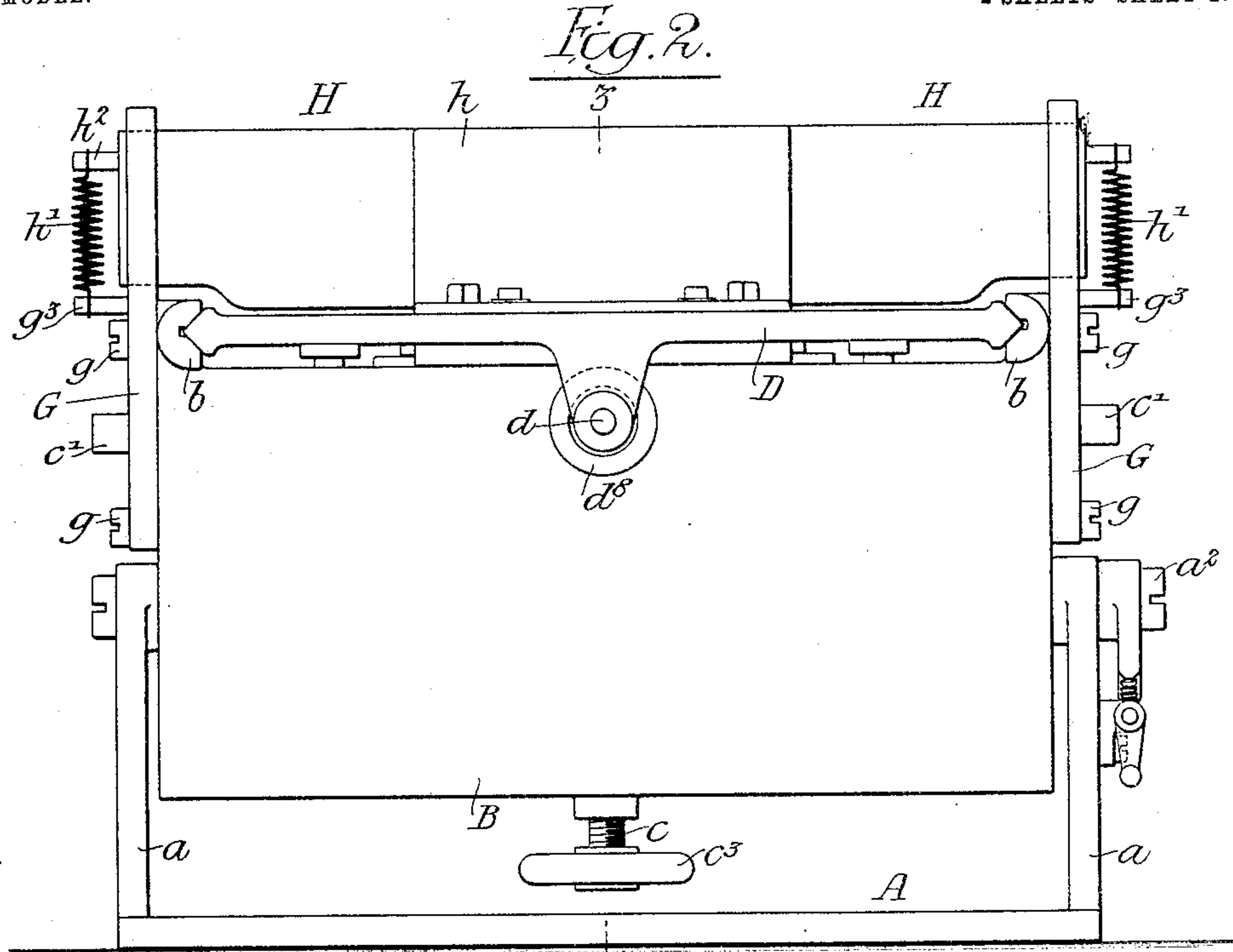
Howson & Howson

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JOSEPH H. STARK AND CHARLES G. BARCUS, OF PHILADELPHIA,
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PHOTOGRAPHIC-PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 776,436, dated November 29, 1904.

Application filed May 26, 1903. Renewed May 4, 1904. Serial No. 206,367. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH H. STARK and CHARLES G. BARCUS, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Photographic-Printing Apparatus, of which the following is a specification.

Our invention relates to certain improvements in apparatus for printing from a plate by means of solar or other light; and it consists more particularly in an improved machine for printing directly upon the sensitized surface of a cylindrical roll from a flat plate or negative containing the image whose likeness it is desired to reproduce.

The object of the invention is to provide a device by the use of which it shall be possible to form an image or series of images upon the sensitized surface of a cylindrical roll, which roll after being subjected to suitable treatment shall be available for printing in any of the well-known ways. This object we secure as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of our improved printing-machine. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional elevation taken on the line 3 3, Fig. 2; and Fig. 4 is a sectional elevation taken on the line 4 4, Fig. 1.

In the above drawings, A is the supporting-base of the machine, carrying two upwardly-projecting standards a , provided at their upper ends with bearings for the accommodation of trunnion-screws a^1 and a^2 for the support of the main framework or casing B of the device. The trunnion-screw a^2 has fixed to it a segmental rack a^3 , whose teeth are engaged by a worm a^4 , supported in bearings a^5 on the standard a , the worm-shaft a^6 being extended and provided with a crank-handle a^7 , whereby it may be revolved in order to swing the trunnion-screw a^2 and with it the casing B. This casing may be described as consisting of a box or inclosed portion having at the sides of its upper part guideways

b for the accommodation of the plate-carrying frame D, which is free to slide therein, such sliding motion, however, being controlled by means of the screw d , movably held to the casing B by a pin d^1 , as shown in Fig. 3, and passing through a threaded nut d^2 , supported on a projection d^3 of the frame D.

As shown in Fig. 3, there are guides b^1 upon the interior of the sides of the box-like portion of the casing B, and these extend in a direction substantially at right angles to the ways b , said guides being provided for a frame C, which carries trunnion-screws c^1 for supporting a roll E. These trunnion-screws preferably pass through threaded projections of the frame C and are provided with jam-nuts c^2 , whereby they are retained in any adjusted position. The outer ends of said screws are squared for the reception of a wrench and project through slots or openings in the casing B, so as to be accessible when it is desired to insert or remove one of the rolls E. An adjusting-screw c movably engages the lower portion of the frame C and passes through a threaded opening in the bottom of the casing B, having fixed to it a small hand-wheel c^3 , whereby it may be turned to move said frame.

The roller E is provided with a supporting-shaft e , whose ends are recessed for the reception of the trunnion-screws c^1 , and there are fixed to said shaft wheels e^1 , whose peripheries are comparatively rough, being designed for engagement with similarly-roughened strips b^4 , fixed to the under side of the frame D. As shown in Fig. 3, this frame is provided with angle-strips d^5 , extending along the ends of the opening for the accommodation of a plate F to be printed from, said strips being provided with a flange d^6 along their lower edges, upon which the said plate rests. Spring-pieces d^7 are employed to yieldingly hold the plate F in position within the frame. To the exterior of the sides of the casing B are held two guide-standards G, by means of screws g , the lower portion of said standards

being in the present instance made open, so as to permit the passage and movement of the trunnion-screws c' . The upper ends of the standards are slotted for the accommodation of a flat piece H, whose ends enter and are guided therein, and this piece carries at substantially its central portion a light hopper or box h , which while being substantially rectangular in section decreases from its outer opening toward its inner end. Said inner end rests upon the plate F to be printed from, and the box h fits closely the suitably-formed opening for it made in the frame D. It will therefore be seen that the opening in the frame has a width equal to the length of the light hopper or box and a length substantially the same as the length of the plate to be printed from, the width of the said plate being but slightly greater than the length of the light-box.

In using our improved form of printing apparatus the surface of the roll E is provided with a light sensitive coating of such composition that exposure to diffused light for a short time does not deleteriously affect it, and the roll is put in position after the frame D has been either removed or run out of the way, the trunnion-screws c' being adjusted so that it is free to turn. The plate F is then placed in position in the frame D, and in order to do this the light-box h is lifted upwardly or, if desired, removed, so that the plate may be slipped under the springs d^7 and permitted to rest upon the edges d^6 of the supporting-strips d^5 . The light-box is held tightly in position upon the plate by means of springs h' , each of which extends between a pin h^2 , projecting from the piece H, and a pin g^3 , fixed to the standard G. The screw c is then turned by means of the hand-wheel c^3 , thereby moving upwardly the frame C and the roll E, so as to bring the surface of this latter into intimate contact with the under or film side of the plate F, it being noted that the wheels e' are also brought into intimate contact with the strips d^4 of the frame D. The exposed upper surface of the plate on both sides of the light-box h is then loosely covered with a light-excluding cloth, and a strong light, either from an arc-lamp or directly from the sun, is allowed to pass into the light-box h . Such light passing through the plate F chemically acts upon the substances comprising the coating of the roll E, and the plate d is caused to uniformly move under the light-hopper by turning the wheel d^8 , and since the strips d^4 upon the frame D are in contact with the rough peripheries of the wheels e' said wheels and the roller E are caused to turn at such a rate that there will be no slipping of the said roll and the plate F, there thus being transferred to the roll the image carried by the plate F.

It will be understood that the plate or negative is previously prepared in such manner

that its length will be equal to the circumference of the roll E, so that the ends of the image or design upon the plate will register with each other upon the roll. After the printing the roll E is removed from the apparatus and developed in the well-known manner, there thus being produced a picture upon said roll which may be etched or otherwise prepared for use in printing on paper or textile material.

We claim as our invention—

1. The combination in a photographic device for printing on a cylindrical surface, of means for carrying a plate to be printed from, means for directing a body of light through the plate and onto a cylindrical surface to be printed upon along the line of contact between the plate and said surface, and means for moving the plate over said surface to be printed upon, substantially as described.

2. The combination in a photographic-printing device, of means for carrying a plate to be printed from, means for moving the plate over the surface of a roll to be printed upon, with means for directing a body of light through the plate and onto the roll along the line of contact between the plate and the roll, substantially as described.

3. The combination in a machine for printing from a flat plate, of a frame, a holder for the plate supported so as to be movable therein, means for supporting a roll having a light sensitive surface so that it will contact with the surface of the plate, means for directing light through the plate and upon the roll along the line of contact of said plate and roll, said light-directing device and the roll being stationary relatively to the plate, substantially as described.

4. The combination of a supporting-frame, means carried by said frame for rotatably supporting a roll having a sensitized surface, a holder for a plate to be printed from, movably carried by the frame and guided therein so as to be movable in a plane parallel to the axis of the roller, with means for moving the plate-holder, and means for directing light through the plate onto the roller, substantially as described.

5. The combination of a frame, means thereon for carrying a roller having a light sensitive surface, a light-hopper also carried by the frame, said hopper having an opening directed toward the surface of the roll, and means carried by the frame for supporting a plate to be printed from, so that said plate will extend between the roll and the light-hopper, and means for moving the plate over the surface of the roll, substantially as described.

6. The combination of a main frame, a second frame adjustably carried by said main frame, means on the second frame for revolutely supporting a roll, a light-hopper carried by the main frame and having an opening ex-

tending parallel to the axis of the roller, a plate-holder also carried by the frame having means for supporting a plate to be printed from between the plate-holder and the roller, with a device for moving the plate-holder relatively to the main frame so as to cause the roll to revolve, substantially as described.

7. The combination of a main frame, having means for carrying a roll to be printed upon, a plate-holder, means for supporting a plate therein parallel to the axis of the roll, and wheels attached to the roller-shaft and placed to contact with the plate-holder whereby movement of said holder will cause revolution of the roll, substantially as described.

8. The combination of a main frame, a second frame carried thereby, a shaft in the second frame for carrying a roller to be printed upon, and a wheel or wheels on said shaft, a plate-holder supported on the first frame, means thereon for carrying a plate to be printed from, in such position that it will contact with the surface of the roll, said plate-holder having portions coacting with the wheel or wheels on the shaft whereby movement of said plate-holder will cause revolution of the roll, substantially as described.

9. The combination of a main frame, having means for carrying a roll provided with a sensitive surface, a movable holder for carrying a plate to be printed from, said holder being constructed so as to cause the plate to contact with the surface of the roll, means for supporting said main frame upon a horizontal axis, and means for turning said frame on said axis, substantially as described.

10. The combination of a main frame, a second frame guided therein having means whereby its position may be adjusted, a shaft for a roll to be printed upon carried by the second frame, a plate-holder carried by the main frame and constructed to support a plate in contact with the roll, and a device connecting the plate-holder and the main frame whereby said holder may be caused to move and thereby cause the plate carried by it to pass over the surface of the roll, substantially as described.

11. The combination of a main frame having means for carrying a roll with a sensitized surface, a light-box having an opening parallel to the axis of the roll, a plate-holder having means for carrying a plate between the

roller and the light-box, and means for retaining said light-box in yielding contact with the surface of said plate, and means for moving the plate over the surface of the roll, substantially as described.

12. The combination of a main frame, a light-box carried thereby, a second frame carried by the main frame and provided with means for supporting a roll, a plate-holder having means for supporting a plate between the light-box and the roll, with means for moving said roll toward and from the plate, and means for moving the plate over the surface of the roll, substantially as described.

13. The combination of a main frame, a second frame adjustably carried thereby, a pair of bearings on the second frame, a shaft supported in said bearings for carrying a sensitized roll, said holder being movable in a plane parallel to the axis of the shaft, a light-box extending through an opening in the holder and having an opening also parallel to the axis of said shaft, said parts being arranged so that the plate to be printed from is carried by the holder between the light-box and the roll, substantially as described.

14. The combination of a base having standards, a main frame supported upon said standards so as to be free to move on a horizontal axis, a set of guides on the main frame, a second frame movable in said guides and provided with means for carrying a roll with a light sensitive surface, means for adjusting the position of the second frame, a second set of guides on the main frame, and a plate-holder movable therein constructed so that it will support a plate in contact with the surface of the roll, a light-box having an opening extending parallel to the axis of the roll, a plate carried between said light-box and the roll, and a third set of guides carried by the main frame, with means connected to the light-box and extending into said guides controlling the direction of motion of said box, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOSEPH H. STARK.

CHARLES G. BARCUS.

Witnesses:

RALPH W. EBY,

J. R. MARTIN.