

No. 725,969.

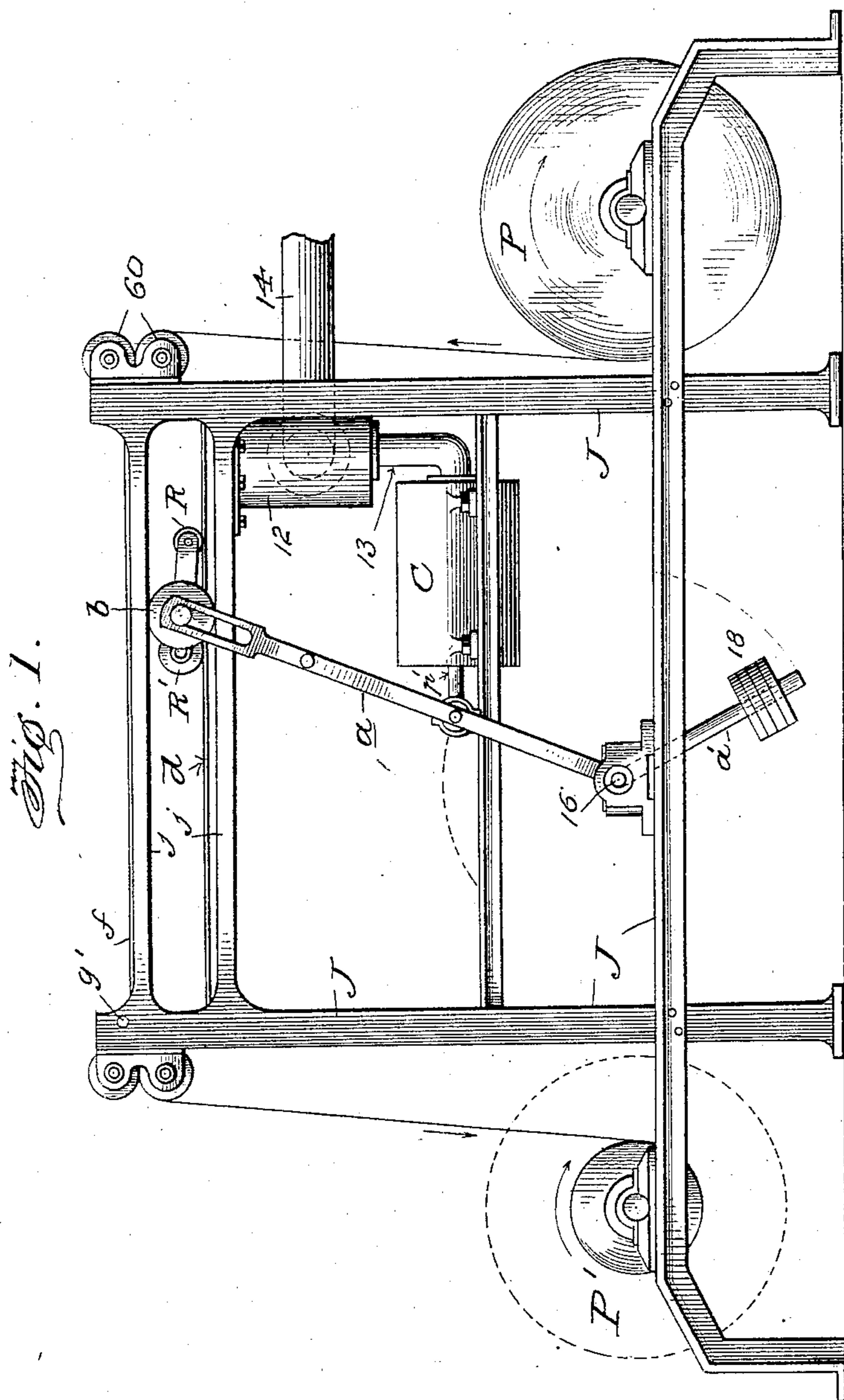
PATENTED APR. 21, 1903.

A. JARAY.  
PHOTOGRAPHIC PRINTING APPARATUS.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

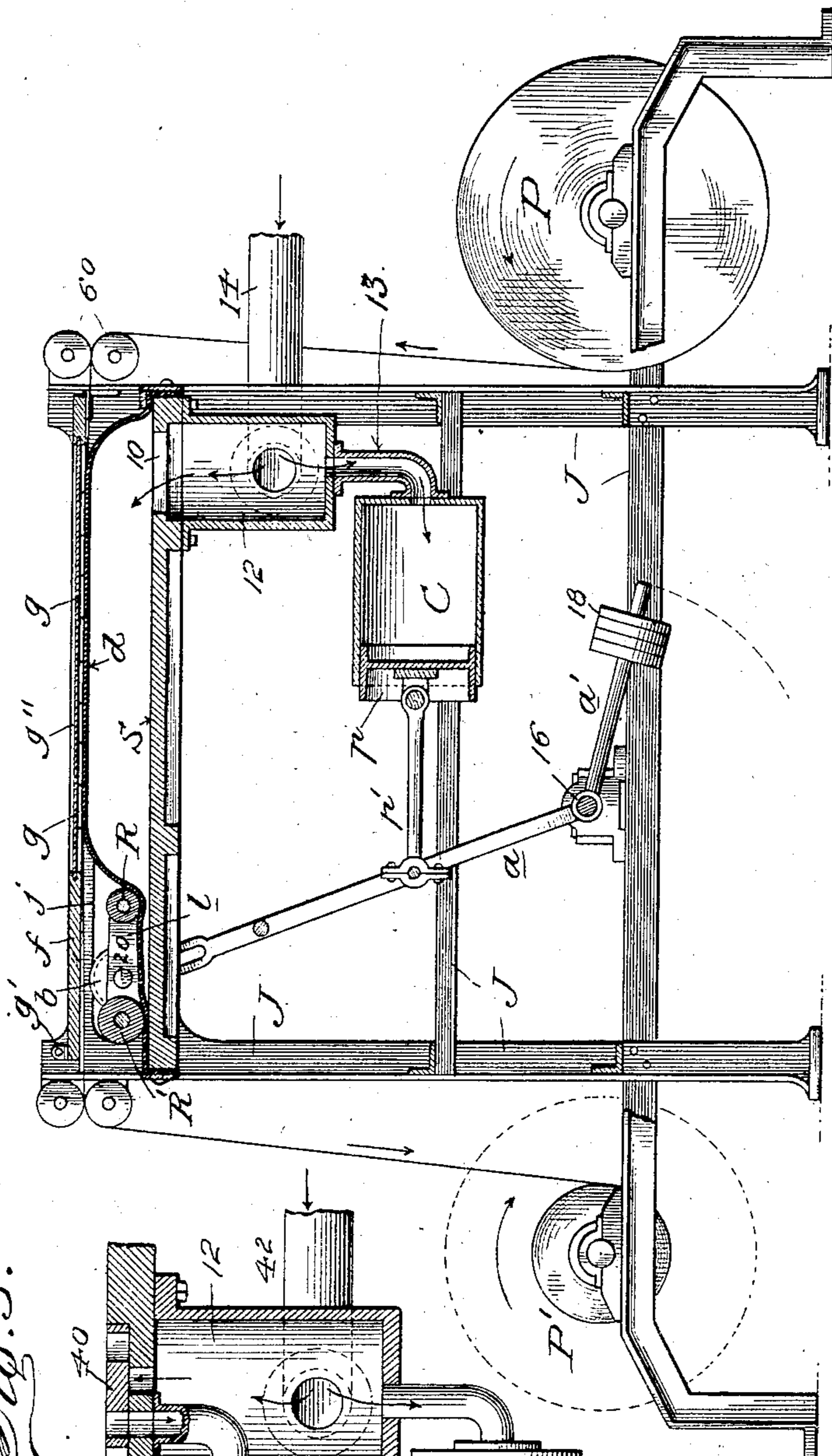
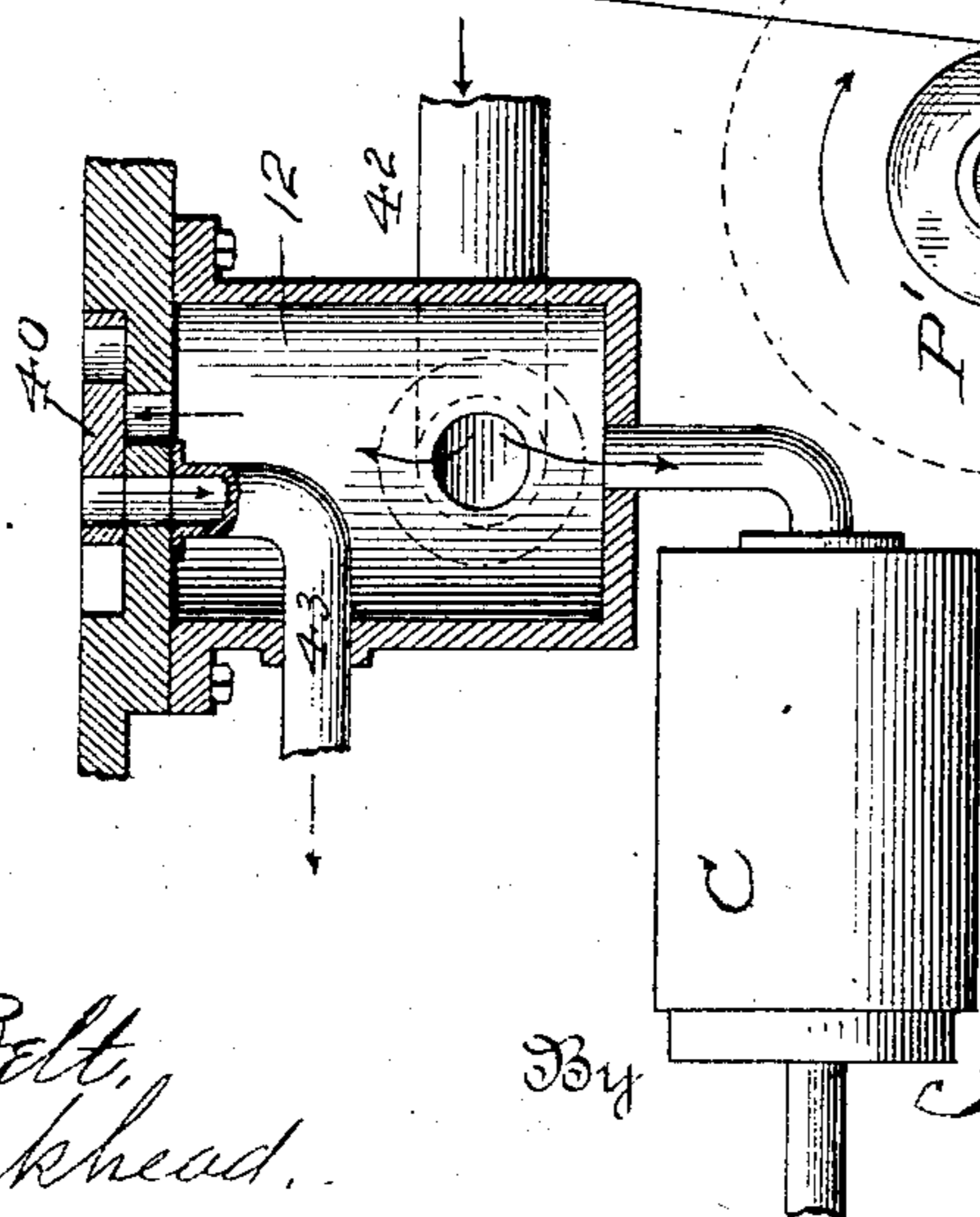


Fig. 3.



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# UNITED STATES PATENT OFFICE.

ALFRED JARAY, OF LONDON, ENGLAND.

## PHOTOGRAPHIC-PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 725,969, dated April 21, 1903.

Application filed September 22, 1902. Serial No. 124,378. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED JARAY, a subject of the King of England, residing at London, England, have invented new and useful  
5 Improvements in Photographic-Printing Apparatus, of which the following is a specification.

This invention relates to certain new and useful improvements in apparatus for printing  
10 photographs from negatives, and particularly to a mechanism whose prime object is to obtain a close and uniform contact of the printing paper or material over or against the entire surface of the negative, whereby is  
15 eliminated all danger of the existence of air bubbles or portions between the contacting surfaces of the negative and printing paper or material.

My invention consists, essentially, in a  
20 mechanism including an elastic or flexible diaphragm and means for admitting a fluid-pressure to inflate the diaphragm and cause it to force the sensitized sheet or surface into uniform and intimate contact with the sur-  
25 face of the superposed negative, said fluid-pressure also and concurrently actuating a prime mover or motor that in turn transmits movement to a rolling device which serves as a valve and is adapted to travel along the  
30 diaphragm, which closely follows the valve and presses the sensitized paper or material in wave-like form against the negative.

The invention also consists of the parts and the constructions, arrangements, and combinations of parts which I will hereinafter describe and claim.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate like parts  
40 throughout the several figures, Figure 1 is a side elevation of a photograph-printing machine embodying my invention and showing the elastic diaphragm deflated. Fig. 2 is a vertical longitudinal sectional view of Fig. 1,  
45 showing parts of the frame broken away and showing the diaphragm inflated to force the sensitized sheet against the surface of the negative. Fig. 3 is a modification to be referred to.

50 In the art of printing photographs on a sensitized sheet or surface from a negative it has heretofore been difficult to hold the paper or

sensitized material in such intimate relation with the negative that a close contact is made uniformly over the entire surface of the nega- 55  
tive, as there are frequently confined portions of air interposed between the surfaces of the negative and paper or other sensitized surface. To overcome this objection, I have devised a simple form of apparatus which effects  
60 the required uniformity of close contact, displacing the portions of interposed air by a sort of rubbing action and causing the air particles to be moved away in one direction.

In carrying out my invention I construct a  
65 suitable main frame J of appropriate material and desired configuration and provide it with means for supporting the paper rolls or drums P P', from one of which the sensitized paper or material is unwound and fed  
70 to the glass negative or film and after being printed upon is wound upon the second drum P', preparatory to the succeeding operations of toning, fixing, &c. The frame J, in fact this whole device, may form a part of an or- 75  
ganized machine for automatically developing a plate, printing from the developed plate or negative, toning, fixing, washing, &c., the print, the operations being continuous and carried on in a dark room in substantially the  
80 customary manner and the printing effected by light from reflectors suitably disposed to throw the light-rays upon the negative; but the present invention is not limited in its use to such a combined organized machine, as it  
85 may be used as an independent machine or apparatus and the printing done by natural as well as artificial light. In the drawings and for the purpose of simplicity I have disclosed only such parts of the machine as are  
90 identified with the present invention.

In the upper part of the main frame is disposed a surface plate S, and above this is a frame f, adapted to hold, by any suitable and well-known means, the glass plates, films, or  
95 negatives g. This plate-holding frame is hinged, as at g', to enable it to be raised at will for the inspection of the glass plates, films, or negatives and the sensitized surface below. By detaching its pivotal or hinged connection  
100 or by any other well-known method the plate-holding frame may be detached for such manipulation as the negatives may require.

Through the surface plate S is made an

opening 10, and in line vertically below this opening and bolted or otherwise attached to the said plate is a cylinder or chamber 12, into which leads a pipe 14 from a bellows, pump, or other air-compressing device, (not shown,) and from the lower portion of the chamber 12 a pipe or passage 13 leads to one end of a cylinder C, in which operates a reciprocating piston *p*, which is caused to travel in one direction by the fluid-pressure admitted through the supply-pipe 14.

Upon the surface plate S and having its edges appropriately secured is a flexible envelop, bag, or sheet *d*, which I hereinafter refer to as a "diaphragm." It is preferably of an elastic character and is made substantially air-tight about the edges. One end portion of this diaphragm lies above and in such relation to the opening in the surface plate S that the admission of air or pressure to the chamber below causes the diaphragm to be inflated and to press the sensitized surface uniformly and closely against the adjacent face of the negatives to insure the best results in printing from the latter.

Upon the main frame below the horizontal plane of the cylinder is appropriately mounted a transverse shaft 16, upon which is a lever *a*, which is preferably bent something on the order of a bell-crank, said lever having a short arm *a'*, to which a weight 18 is attached. The long arm of this lever extends upwardly and has mounted in its upper end, which is slotted, a shaft 20, carrying grooved wheels *b*, one at each end, which are designed to travel in the trackway formed by the spaced guide-rails *j* of the main frame. The shaft 20 also carries a lever *l*, fulcrumed between its ends on the shaft and having its opposite ends provided with rollers R R', one preferably somewhat larger than the other and both of which are designed to travel upon the upper surface of the inflatable diaphragm in the manner and for the purpose I will hereinafter indicate.

In addition to the foregoing the piston-rod *p'* is pivotally connected to the lever *a* at a point between the fulcrum of the latter and the upper end of the lever.

In the operation of the apparatus, assuming air to be the fluid-pressure employed for inflating the diaphragm, the air is alternately admitted to and exhausted or expelled from the elastic diaphragm by some such air-compressing device as a bellows, pump, &c., (not shown,) but from which leads the pipe 14. The air entering the chamber 12 is divided, a portion passing to the cylinder C to actuate the piston in a outward direction, and another portion passes through the opening in the surface plate and acting upon the elastic diaphragm to expand and inflate the latter. The normal position of this diaphragm and of the lever *a* and its adjunctive parts is shown in Fig. 1, and when the air is admitted to the diaphragm and cylinder, as before indicated, the piston begins to move outward in

the cylinder C, thereby rocking the lever *a* about its fulcrum and causing the rolling valve, which is formed by the rollers R R', to begin its travel along the upper surface of the diaphragm, so as to successively uncover portions of the diaphragm and expose the same to the action of the fluid-pressure admitted from beneath one end, and thus cause the diaphragm to press uniformly and closely and with a forward rolling action against the superposed negatives and effectively eliminate by a sort of forward squeezing action any portions of air which may be contained between the surfaces of the diaphragm and negatives. When the air is admitted to the diaphragm or into the space between the same and the surface plate S, the diaphragm and roller R are forced upward, thereby rocking the lever *l* about its fulcrum and depressing the roller R', so that it will hold the deflated portion of the diaphragm closely upon the surface plate and allow the fluid-pressure to inflate the other portions of the diaphragm, as shown in Fig. 2. The negatives *g* are appropriately fixed to a glass plate *g''*, through which light, natural or artificial, is admitted when and where required. The admission of the fluid-pressure causes the parts to assume the position in Fig. 2, which shows the diaphragm about fully inflated and the roller-valve at about the end of its outward travel, and to deflate the diaphragm and return the parts to normal position the air-pressure upon the piston and diaphragm is relieved, which may be done in several ways—as allowing the bellows to expand if a bellows is used for compressing the air, or giving a return movement to the piston if a pump is used for the purpose—when the weight upon the lever *a* now acts to return the parts to the position of Fig. 1. As the withdrawal of the air or fluid may be accomplished in various ways, it will be understood that the invention is not limited to any particular method or arrangement of parts. In Fig. 3 is one modification which accomplishes the desired purpose and wherein a slide-valve 40, with ports, is designed to alternately cover and uncover the ends of admission and exhaust pipes 42 43, communicating with the chamber. This valve may be actuated by any well-known arrangement so that its movements may be timed in relation to the movement of the roller-valve and other parts.

The sensitized paper or printing material extends from the supply drum or roller and between rollers 60 and thence along the apparatus beneath and close to the negatives, so as to be interposed between the diaphragm and negative when the former is inflated. It is moved forward by some appropriate and well-known paper-feed mechanism (not shown) when the diaphragm is deflated.

The apparatus shown and described is capable of modification without materially altering the general principle or operation of

the invention. Therefore I do not wish to be understood as confining myself to the precise means shown for carrying out the objects of the invention.

5 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

10 1. In an apparatus for printing from negatives, an inflatable member, a member traveling in contact with the first-named member and permitting successive portions of said member to be inflated, and means for admitting a fluid-pressure to the inflatable member.

15 2. In an apparatus for printing from a negative, the combination of means for positioning the negative; an expansible member and means for admitting a fluid-pressure to one side thereof, to cause said member to be expanded; and a member acting upon the opposite side of the expansible member and exposing successive portions of the latter to the fluid-pressure.

25 3. In an apparatus of the character described the combination of an elastic diaphragm and means for producing opposing pressures thereon, one of said pressure means movable relative to the diaphragm and adapted to relieve the pressure upon successive portions thereof to enable the opposing pressure to expand the diaphragm and force the sensitized sheet against the negative gradually from one edge toward the other.

30 4. In an apparatus for printing from negatives the combination of an elastic diaphragm; means for admitting a fluid-pressure to one side thereof; means for supporting a negative or negatives in relation to the diaphragm; and a traveling pressure member engaging the opposite side of the diaphragm and adapted to remove the pressure from successive portions of one side of the diaphragm to enable the pressure upon the opposite side to force successive portions of sensitized surface in contact with the negative.

45 5. An apparatus for printing from negatives, comprising an elastic diaphragm; means for admitting a fluid-pressure to one side thereof; means for supporting negatives in

relation to the diaphragm; and a roller-valve adapted to travel upon the opposite side of the diaphragm and to uncover successive portions thereof to enable the opposing fluid-pressure to expand the diaphragm and force the sensitized paper with a gradual advancing pressure against the negative. 55

6. An apparatus for printing from negatives comprising a surface plate; an elastic diaphragm thereon; means for supporting negatives above the diaphragm; means for admitting a fluid-pressure to one side of the diaphragm; a guided traveling valve movable over the other side of the diaphragm and consisting of a rocking lever and rollers at the ends thereof; and connections actuated by the fluid-pressure to move said valve simultaneously with the expansion of the diaphragm. 65

7. An apparatus for printing from negatives comprising a main frame having a guide and trackway, and a surface plate; an elastic diaphragm fitting over the surface plate and attached at the edges; an air-pressure chamber and means connecting it with one side of the diaphragm; a weighted lever fulcrumed on the main frame; a rolling valve device carried by the upper end of the lever and consisting of grooved guide-wheels, a rocking lever and rollers at the ends of the latter said rollers gradually uncovering successive portions of the diaphragm to permit the air-pressure to expand the diaphragm and force the interposed sensitized sheet in close and uniform contact with the negative; a cylinder connecting with the air-chamber; and a piston movable in the cylinder and having a rod connecting with the weighted lever whereby the rolling valve device is actuated in unison with the expansion of the diaphragm and by the same fluid-pressure. 80

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses. 90

ALFRED JARAY.

Witnesses:

ERNEST F. FOTHERGILL,  
SIDNEY JOHN SUTER.