

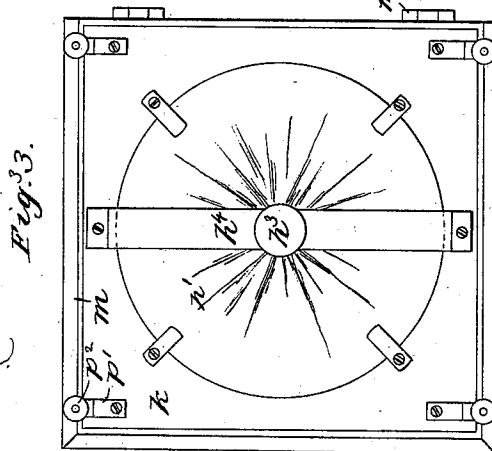
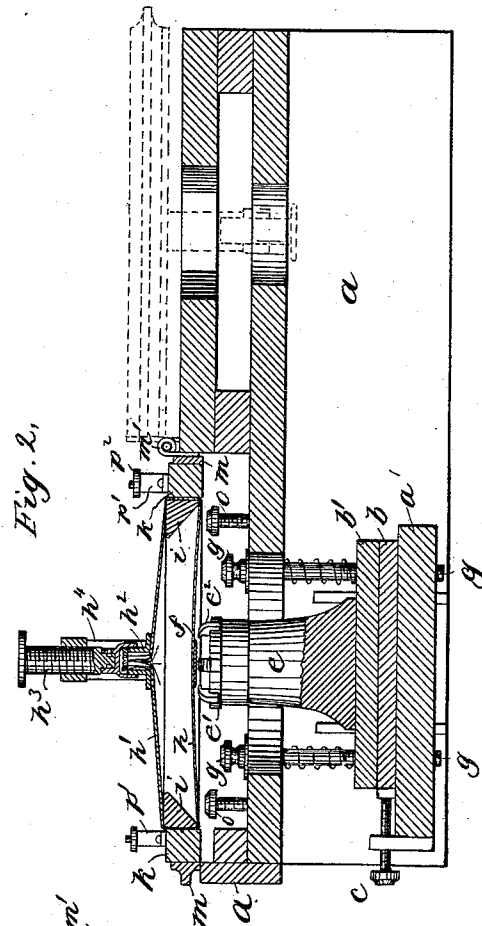
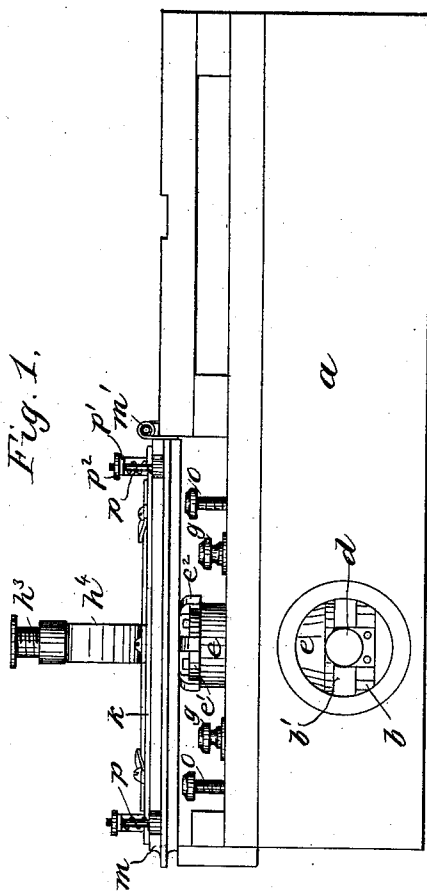
(No Model.)

2 Sheets—Sheet 1.

J. JACOBSON.
PRINTING APPARATUS.

No. 373,236.

Patented Nov. 15, 1887.



Witnesses.
Jas. J. Maloney.
W. C. Hill.

Inventor,
John Jacobson,
by J. P. Livmore
Att'y.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

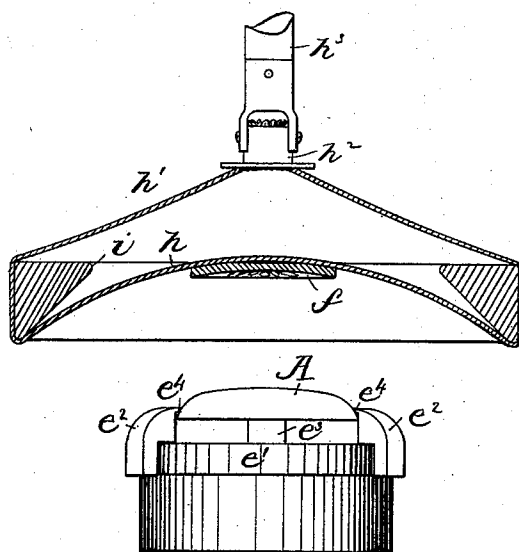
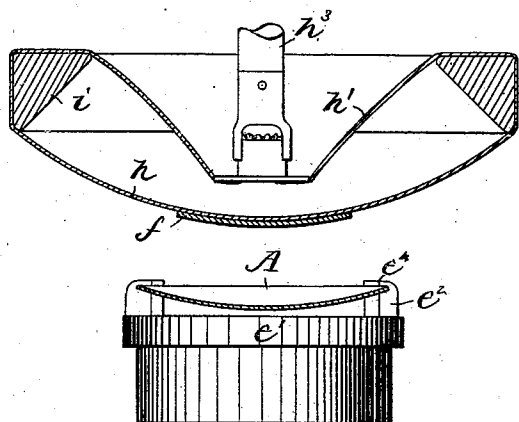


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN JACOBSON, OF BOSTON, MASSACHUSETTS.

PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 373,236, dated November 15, 1887.

Application filed March 21, 1887. Serial No. 231,707. (No model.)

To all whom it may concern:

Be it known that I, JOHN JACOBSON, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Printing Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates, especially, to a printing apparatus of that kind in which a somewhat soft or yielding printing or impressing device is used, and in which the printing depends for its excellency upon the perfect uniform contact between the printing surface and the surface to be printed. Among such printing devices may be mentioned the well-known rubber stamps or the gelatine printing-surfaces used in producing lines and shadings on stone, zinc, &c.

The invention consists, mainly, in a flexible elastic bed or platen upon which the printing device is mounted, the same being composed of sheet rubber stretched over a frame of suitable shape, and having connected with it or made as a continuation of it a second diaphragm properly arranged to inclose an air-tight chamber between it and the first-mentioned diaphragm, combined with means for changing and adjusting the position of the second or regulating diaphragm for the purpose of varying and adjusting the curvature of the first-mentioned or bed-forming diaphragm. A change in position of the regulating diaphragm—such as a movement toward or movement from the bed-forming diaphragm—will cause a uniform air-pressure to act upon one or the other surface of the latter, thus curving the same uniformly, and by properly adjusting the regulating diaphragm any desired curvature may be given to the bed-forming diaphragm.

The invention is shown embodied in an apparatus having means for holding and adjusting the position of the article to be printed or decorated, and also means for facilitating the operation of the bed and printing device.

Figure 1 is a side elevation of an apparatus embodying this invention in proper position to print a convex article; Fig. 2, a longitudinal section thereof; Fig. 3, a plan view of a portion thereof, and Figs. 4 and 5 sectional details showing the bed in different positions.

The apparatus may be used to produce an impression on an article having a curved surface—such, for instance, as a cover of a watch-case or a watch-crystal, or the surface of a plaque, or any similar article having a concave or convex surface upon which it is desired to imprint or produce an impression of any kind.

The apparatus is shown as supported on a suitable frame-work, *a*, having a base-piece, *a'*, supporting a double platform, *b b'*, the portion *b* of which is movable lengthwise of the frame *a* on the base *a'* by an adjusting-screw, *c*, (see Fig. 2,) and the portion *b'* of which is movable on the portion *b* in a direction at right angles to the movement of the latter by an adjusting-screw, *d*. (See Fig. 1.)

The upper portion, *b'*, of the platform is provided with an upright, *e*, which supports and is provided with a suitable holder for the article to be printed, and by the two movements of the portions *b b'* of the platform the said upright *e* and article supported on it may be moved in any desired direction in the horizontal plane, in order to bring the article to be printed into the exact position desired with relation to the printing device *f*.

The holder *e'* for the article to be printed is shown as a circular platform having radially-moving jaws *e''*, which engage the edges of the article to be printed, such jaws being operated in any suitable manner, and being in construction substantially the same as any of the well-known forms of chucks or face-plates used in lathes for holding the articles to be turned by the lathe.

The base *a'* and platform and uprights supported thereon are shown as vertically adjustable by means of screws *g*, in order to bring the article to be printed to the required height.

The imprinting device *f*, which may, for example, be a soft-rubber die—such as commonly used in rubber stamps—is fastened to a flexible elastic bed, *h*, to which it may be connected by cement or otherwise, said bed being composed of a flexible elastic diaphragm drawn over a suitable frame, *i*, supported in an outer frame, *k*, having a vertical movement in a frame, *m*, hinged at *m'* upon the main frame *a* of the apparatus, so that said frame *m* may be raised up and inverted, as shown in dotted lines, Fig. 2, to afford access to the surface of the printing device, and also to the article to be

printed. The said flexible elastic bed h may be composed of a sheet of elastic rubber stretched with requisite tension over the frame i , and, as herein shown, gathered in over the upper part of said frame to form a second or regulating diaphragm, h' , the edges of the sheet being tightly tied together and held in a suitable socket, h^2 , connected with an adjusting device, h^3 . (Shown as a screw working in a frame or yoke, h^4 , fastened to the frame k at either side of the frame i .) By this construction a tight air-chamber is inclosed between the diaphragms h h' . Drawing the diaphragm h' away from the one h , by the adjusting device h^3 , tends to rarefy the air in the chamber and produce an unbalanced atmospheric pressure on the outer surface of the diaphragm h , giving it and the connected printing device f a concave curvature, as best shown in Fig. 4, and by pressing the adjusting-diaphragm h' toward the supporting diaphragm or bed h the air in the chamber will be compressed and will force the said diaphragm h outward into convex shape, as shown in Fig. 5. Thus by properly regulating the adjusting-diaphragm h' the supporting-diaphragm and printing device can be brought to the proper curvature to produce a uniform even contact between the printing device and the surface of the article to be printed, whether the latter be concave or convex, or of greater or less curvature, and a clear, sharp, and undistorted impression may thus be produced on a curved surface—a result which is difficult or impossible to attain from a printing device having a plane surface.

While a printing apparatus of this kind is especially valuable for producing impressions on curved surfaces, it is obvious it may also be used advantageously for printing on flat surfaces.

It is also not necessary that the curve of the printing-surface should be exactly the same as that of the surface to be printed, and for printing large surfaces it is desirable that the curvature should be slightly different, so that the surface will come in contact at the middle first, and then as the printing device is pressed down upon the surface to be printed the other parts will come in contact successively. For example, in printing a large flat surface the printing device should be made slightly convex, so that when pressed down it will touch at the middle first, and the line of contact will gradually spread to the outer edge of the contacting surfaces. The air-pressure at the rear of the printing-surface will produce a substantially uniform pressure over the entire printing-surface, and the effect will be similar to that of passing a roller over the rear surface of a printing device mounted on a somewhat flexible diaphragm—such, for instance, as a stretched fabric—except that the contact will be more uniform throughout the entire surface when the printing device is acted upon by air-pressure than when acted upon by any kind of

mechanical pressure derived from a solid roller or platen.

For printing on a large convex surface, the curvature of the concave printing device may be slightly less than that of the surface to be printed, and for printing on a large concave surface the surface of the printing device should be slightly greater than that of the surface to be printed, in order to effect a contact first at the middle and then progressively toward the outer edges of the surface to be printed.

It is obvious that the invention, so far as relates to a flexible bed combined with an adjusting-diaphragm and means for adjusting the same, is not limited to any specific construction of the apparatus in which it is used, although the apparatus shown is convenient and capable of producing work of high quality.

The bed-plate e' of the holder is shown as provided with yielding supports e^2 , which may be pieces of soft rubber, and the jaws e^1 have overhanging lips e^4 , against which the edges of the article A (see Figs. 4 and 5) to be printed are held, bringing the upper surface of the said article into the proper position with relation to the imprinting device. When the article has been brought to the proper position and the surface of the printing device provided with material to form the impression, the frame m is turned to the full-line position, Fig. 2, and then the frame k is pressed downward, bringing the printing device into direct contact with the surface of the article to be printed. The downward movement of the frame k and printing device may be limited by the adjustable stops o , and the said frame may be raised or retracted by springs p , bearing on the frame m and engaging brackets p^1 on the frame k . Stops p^2 limit the upward movement of the frame k .

By having the frame k movable in the frame m the printing device is guided in a direct line toward and from the surface to be printed, making a uniform impression, and the frame k and printing device are normally held at such height in the frame m that the printing device will not reach the surface to be printed when the frame m is turned on its hinges to the full-line position, since if the contact were made in such hinging movement the impression would not be direct and square, but would be more or less dragged or distorted.

When the frame i is circular, as shown, the curvature of the middle portion of the diaphragm h will be substantially spherical; but by making the said frame oval the curvature may be made to correspond with that of a convex or concave oval article.

It is not necessary that the upper part of the chamber above the diaphragm h should be made as a diaphragm, nor that the said chamber should contain air, as a liquid or any fluid would answer to transmit a uniform pressure to the diaphragm h , and thus produce a suitable curvature in said diaphragm when

the pressure on one or the other side thereof is increased.

I claim—

5 The combination of the printing device with a supporting-platen composed of a flexible elastic diaphragm and supporting-frame and a second elastic diaphragm on said frame, forming with the first a tight chamber, and
10 of the second diaphragm, and thereby gov-

erning the shape or curvature of the first diaphragm, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN JACOBSON.

Witnesses:

JOS. P. LIVERMORE,
JAS. J. MALONEY.