

(No Model.)

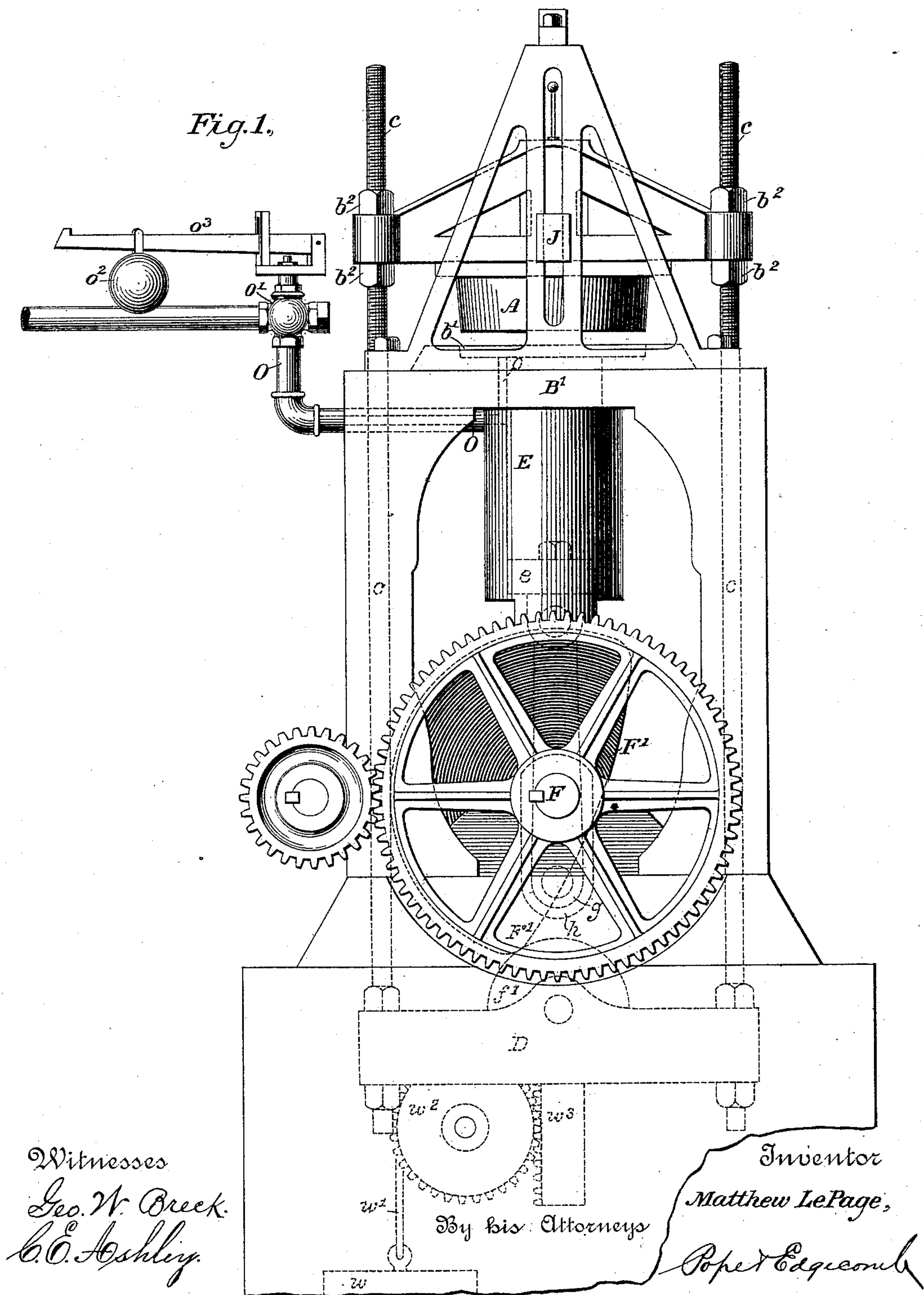
2 Sheets—Sheet 1.

M. LEPAGE.

PRESS FOR THE MANUFACTURE OF SHEET METAL GOODS.

No. 333,871.

Patented Jan. 5, 1886.



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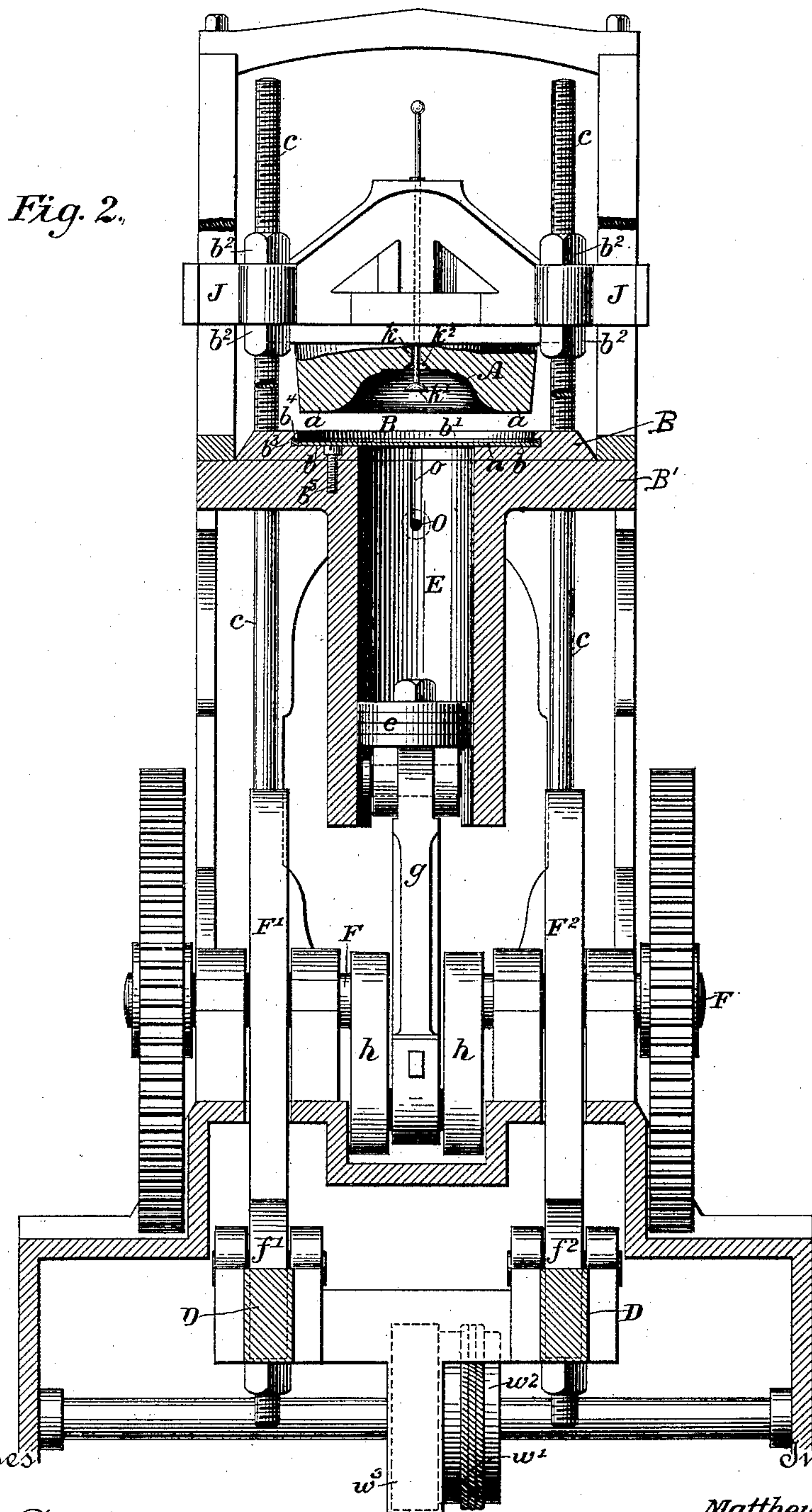
2 Sheets—Sheet 2.

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No. 333,871.

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Witnesses

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# UNITED STATES PATENT OFFICE.

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## PRESS FOR THE MANUFACTURE OF SHEET-METAL GOODS.

SPECIFICATION forming part of Letters Patent No. 333,871, dated January 5, 1886.

Application filed April 16, 1885. Serial No. 162,451. (No model.)

### *To all whom it may concern:*

Be it known that I, MATTHEW LEPAGE, a citizen of the United States, residing in Woodhaven, in the county of Queens and State of New York, have invented certain new and useful Improvements in Presses for the Manufacture of Sheet-Metal Goods, of which the following is a specification.

The invention relates to the class of apparatus employed for forming metal articles by forcing sheet-metal blanks into the required forms and shapes by pressure.

In carrying out the invention a female die of the shape desired is employed, as in the more common methods of stamping, and the blank from which the article is to be made is secured in position against the same. A suitable fluid—water, for instance—is forced against the exposed surface of the blank. The fluid is confined in some suitable manner, and as great a degree of pressure as may be necessary or desirable is applied thereto. It is a principle well understood that each particle of a liquid exerts and receives equal pressures in all directions; hence it follows that equal surfaces of the sides of a vessel containing a liquid under pressure receive equal pressures. The same degree of pressure, therefore, will be exerted upon every portion of the blank, and it will be thus forced to the surface of the die without danger of any excess of pressure being expended upon any part or portion, as is the case where a solid follower is employed.

When the blank is first placed in position against the forming-die, it is evident that a quantity of air will be inclosed. It is necessary that opportunity should be afforded for such air to escape as the metal is forced toward the surface of the die, and yet it is desirable that there be no opening in the surface of the die when the metal comes in contact therewith. To secure this result it is preferred to construct the die with a narrow opening, through which there extends loosely a guide-rod carrying at its inner end a section of the die. Normally this section stands in a forward position away from the opening into which it fits, and the air readily escapes through the opening for the rod as the metal is forced

forward. The metal coming in contact with the movable section of the die carries it back into its proper position, and when the metal has come into contact with the surface of the die the section will be in a position to completely close the opening.

When the metal has been forced into the proper form, it is desirable that an escape should be afforded for the fluid; otherwise the machinery might be injured. For this reason it is preferred to employ an escape or safety valve which will yield to an excess of pressure and permit the fluid to escape when the amount of pressure required to form the metal is exceeded.

In the accompanying drawings, Figure 1 is an elevation of the apparatus, and Fig. 2 is a transverse section of the same.

Referring to the figures, A represents a die, which, in the present example, is formed into the proper shape for stamping wash-basins. The face of this die is constructed with a lateral extension, *a*. Beneath the die A there is placed a stationary receiving or clamping plate, B, having formed in its upper surface an opening, *b'*, adapted to receive the die A. The face or lateral projection *a* is parallel with the bottom surface, *b*, of the opening *b'*.

It is designed that the blank from which the article is to be stamped shall be placed above the clamping-plate B, and that the die A shall then be drawn downward, securely clamping the plate or blank around its edges. It is essential, moreover, that the surfaces *a* and *b* should be true and fit together accurately upon either side of the blank, so that the fluid which is designed to be forced against the lower side of the blank may not escape between the blank and the surface *b*. The plate B is carried in a supporting-plate, B', to which it is secured by screws *b''*, or in any other convenient manner. The plate may then be replaced by other plates adapted to the different dies A which it may be desired to employ. An annular groove, *b'''*, is formed at the base of the opening *b'*, for receiving a packing, *b''''*. The lower side of the support B' is prolonged into a cylinder, E, which is designed to contain the fluid. A piston, *e*, is driven to and



ro within the cylinder. During its upward movement the piston forces the fluid upward against the blank. It will be evident, thus, that two operations must be performed—first, the clamping of the blank by bringing the die A against the clamping-plate, and, second, the driving of the piston *e*.

The first end is accomplished in the following manner: The die A is supported upon each side by movable rods, as represented at *c c c*. These rods extend through suitable openings in the plate B' to a beam or plate, D. Two cams, F' and F<sup>2</sup>, are carried upon a shaft, F, which is constructed to be revolved in any suitable manner. The cams are employed for forcing the plate D, and thus the die A, downward at the proper moment. This is accomplished by applying to each cam a bearing or friction wheel, as shown at *f'* and *f<sup>2</sup>*, against which the cams strike. The wheels *f'* and *f<sup>2</sup>* are securely mounted upon the plate D, and as the shaft is revolved the frame D will be alternately forced downward and permitted to rise, which latter it will do by virtue of the weight *w*, which is supported by a cord, *w'*, wound upon the drum *w<sup>2</sup>*. Any other suitable method of raising the frame D may be employed. The drum *w<sup>2</sup>* is geared to a rack-bar, *v<sup>3</sup>*, secured to the plate D. Suitable guides, J J, are applied to the die A, for assisting in retaining it in its proper lateral position. The position of the die with reference to the plate B is rendered adjustable by nuts *b<sup>2</sup>*, turning upon the rods *c*, in a manner well understood.

The second part of the operation—namely, the movement of the piston *e*—is accomplished by means of a piston-rod or pitman, *g*, connecting the piston with a double-crank arm, *h*, carried upon the shaft F. The piston will, it is evident, be moved forward and back alternately for each revolution of the shaft. The parts are so organized that the blank will be clamped in position immediately before the piston *e* commences to rise, so that before the fluid is placed under pressure the blank *n* will be firmly held in front of the die, and the fluid will be prevented from subsequently escaping at the upper end of the cylinder. A sufficient stroke is given to the piston to force the fluid upward, carrying the plate or blank before it, until the blank is formed to the surface of the die A.

For the purpose of allowing the air to escape from the space between the surface of the die and the blank *n*, as the latter is forced upward, an opening, *k*, is formed through the die, and a section, *k'*, is cut to fit an opening or seat, *k<sup>2</sup>*, formed in the die. This section is carried upon the end of a rod, which is loosely movable through the opening *k*. The die-section *k'* is of greater diameter than the opening *k* for the rod, so that it cannot be drawn or forced outward through that opening, but is capable of being fitted accurately within the opening or seat *k<sup>2</sup>*. Normally the rod and section project into the opening in the die A; but as the metal blank is forced upward, the latter, by

striking the section, carries it upward, meanwhile permitting the air to escape through the opening *k*. When, however, the blank has reached the surface of the die, the opening or seat *k<sup>2</sup>* will be closed, and a perfectly-smooth surface will be afforded to the blank by the surface of the section *k'*. It is evident that when the blank *n* has been brought into perfect contact with the surface of the die the further movement of the piston *e* will be prevented, since the fluid is practically incompressible. For the purpose, however, of preventing the piston from being thus arrested, provided it has not completed its forward stroke, an outlet-opening, *o*, is made for the escape of the fluid from the cylinder. This opening leads from the upper end of the cylinder through its wall into a pipe, O, which is normally closed by any convenient form of valve or stop-cock, *o'*. This is constructed to yield only to a pressure greater than that which is normally required for forcing the metal into the die; but when a predetermined pressure is exerted, then the fluid is allowed to escape through the pipe O and the escape-valve. The valve may be constructed to allow the fluid to flow back into the cylinder when the pressure is relieved by the downward movement of the piston.

The amount of pressure required for stamping different metals and metals of different thickness varies, and for the purpose of adjusting the valve to yield to any required amount of pressure an adjustable weight, *o<sup>2</sup>*, is carried on an arm, *o<sup>3</sup>*, which controls the movements of the valve. When it is desired to stamp tin blanks, for instance, the weight may be adjusted toward the fulcrum, so that if the pressure of the fluid exceeds that required for stamping the tin the fluid may escape through the valve. The fluid, it will be noticed, is forced upward, and the stamping is in the reverse direction from that employed in the usual methods. This method is adopted to prevent the fluid from escaping from the cylinder.

It is evident that other fluids than water may be employed, and that the form of apparatus may be modified without departing from the spirit of the invention.

In another application of even date herewith I have described and claimed the method or process for forming sheet-metal articles herein described.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a forming female die for the manufacture of sheet-metal goods, an opening through the wall of the same, a movable section for closing said opening, means for holding a metal blank before said die, a fluid-compartment closed by such blank, and means for placing a fluid contained in said compartment under pressure, thereby forcing the blank to enter said die, and to place said section in said opening.

2. The combination, substantially as herein-



before set forth, with a female die, of means for clamping a metal blank against said die, means, substantially such as described, for forcing said blank into said die by fluid-pressure, an opening for permitting the air to escape in front of the blank as it approaches the surface of the die, a movable section of the die fitting into said opening, and a rod extending through said opening, to which said section is attached.

3. The combination, substantially as hereinbefore set forth, with a die and means for supporting the same, of a receiving-plate for the same, a fluid-chamber beneath said plate, a piston for placing a fluid in said chamber under pressure, a revolving shaft, a pitman connecting said shaft with said piston, one or more cams carried by said shaft, and bearing-surfaces for said cams upon the support of said die, whereby said die is caused to approach said receiving-plate and be held in contact

therewith during a portion of the revolution of said shaft, and while said piston is operated to place the fluid under pressure while said die is so held.

4. The combination, substantially as hereinbefore set forth, with a die for forming sheet-metal goods, having an air-outlet through its walls, of a fluid-chamber, means, substantially such as described, for forcing metal blanks into said die by the direct pressure of a fluid contained in said chamber, and means for permitting the escape of such fluid when a predetermined degree of pressure is exceeded.

In testimony whereof I have hereunto subscribed my name this 14th day of April, A. D. 1885.

MATTHEW LEPAGE.

Witnesses:

JAMES COCHRAN,  
CHARLES A. TERRY.