(No Model.) 2 Sheets—Sheet 1.

# E. HUBBARD.

## PRESS FOR MAKING VESSELS FROM FIBROUS PULP.

No. 495,039. Patented Apr. 11, 1893.

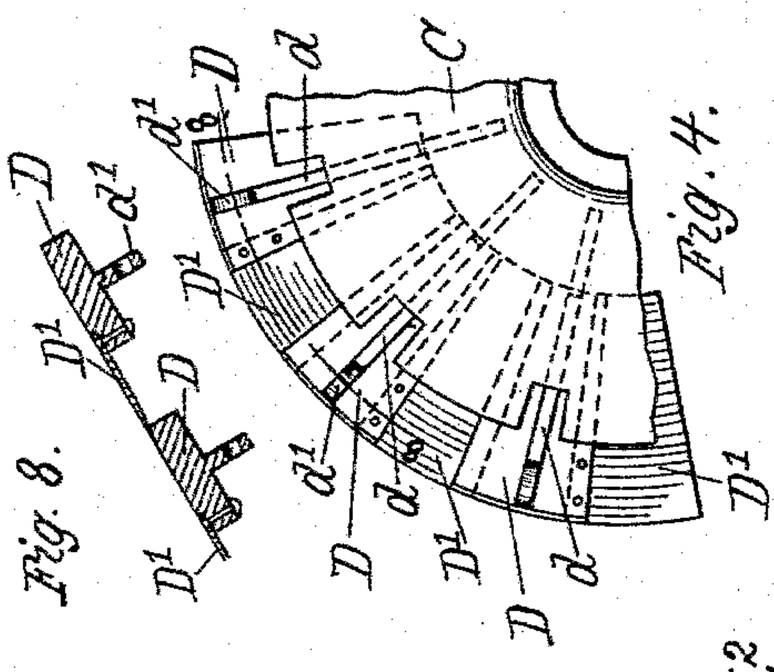



Fig. 4.

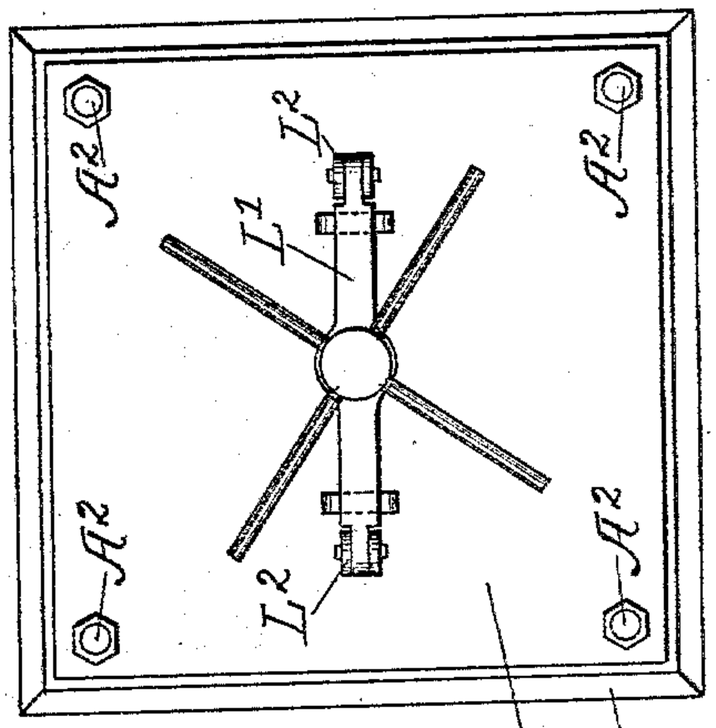



Fig. 3.

Fig. 8.

Fig. 5.

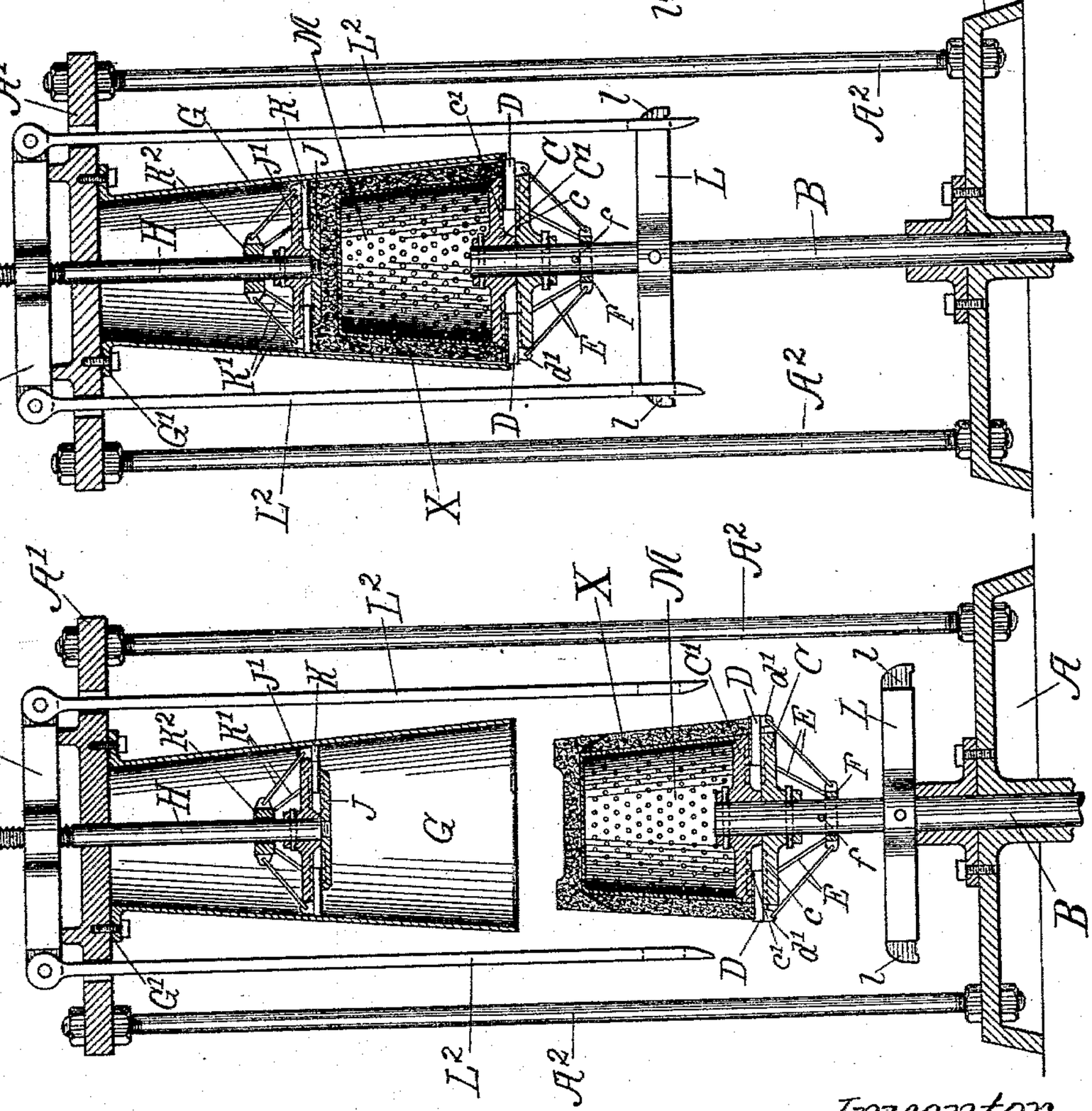



Fig. 2.




Fig. 1.




Witnesses
E. T. Wray.
Jean Elliott.

Inventor.
Elbert Hubbard
By Burton W. Burton
his attys

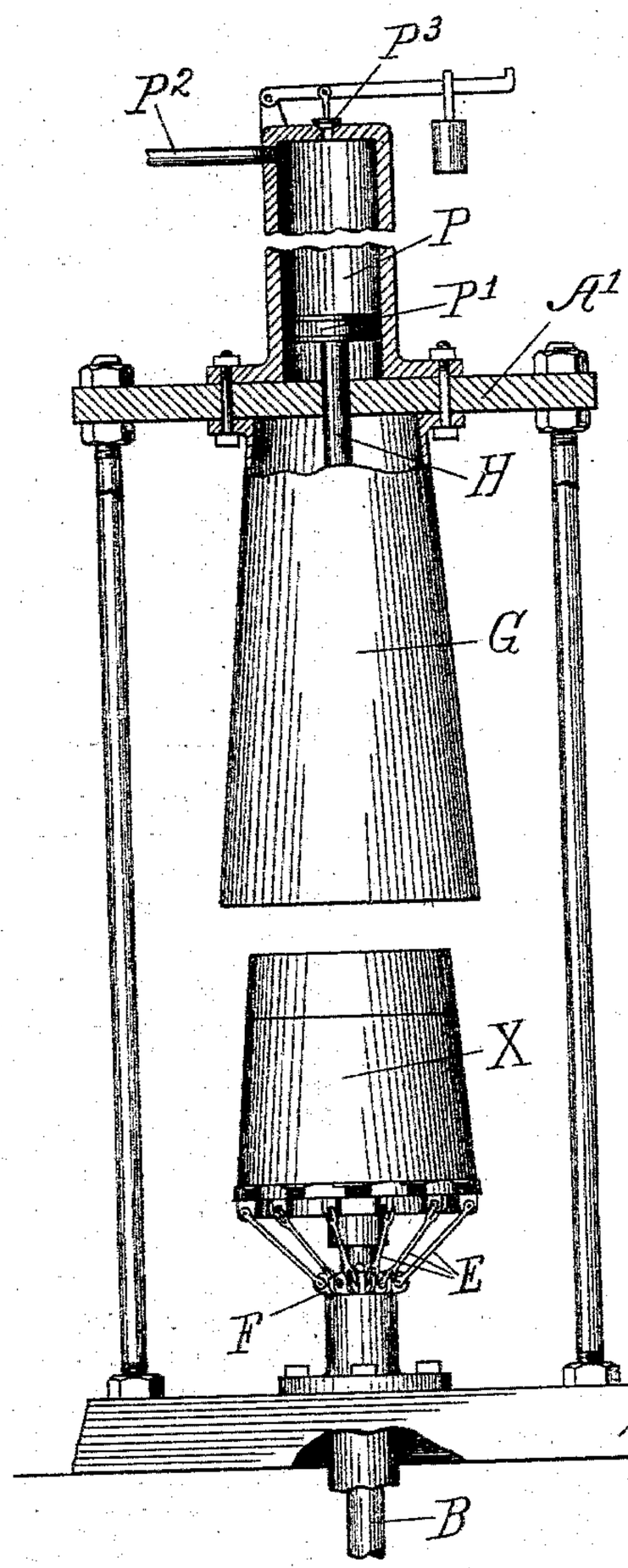
(No Model.) 2 Sheets—Sheet 2.

# E. HUBBARD.

## PRESS FOR MAKING VESSELS FROM FIBROUS PULP.

No. 495,039. Patented Apr. 11, 1893.

Fig. 6.



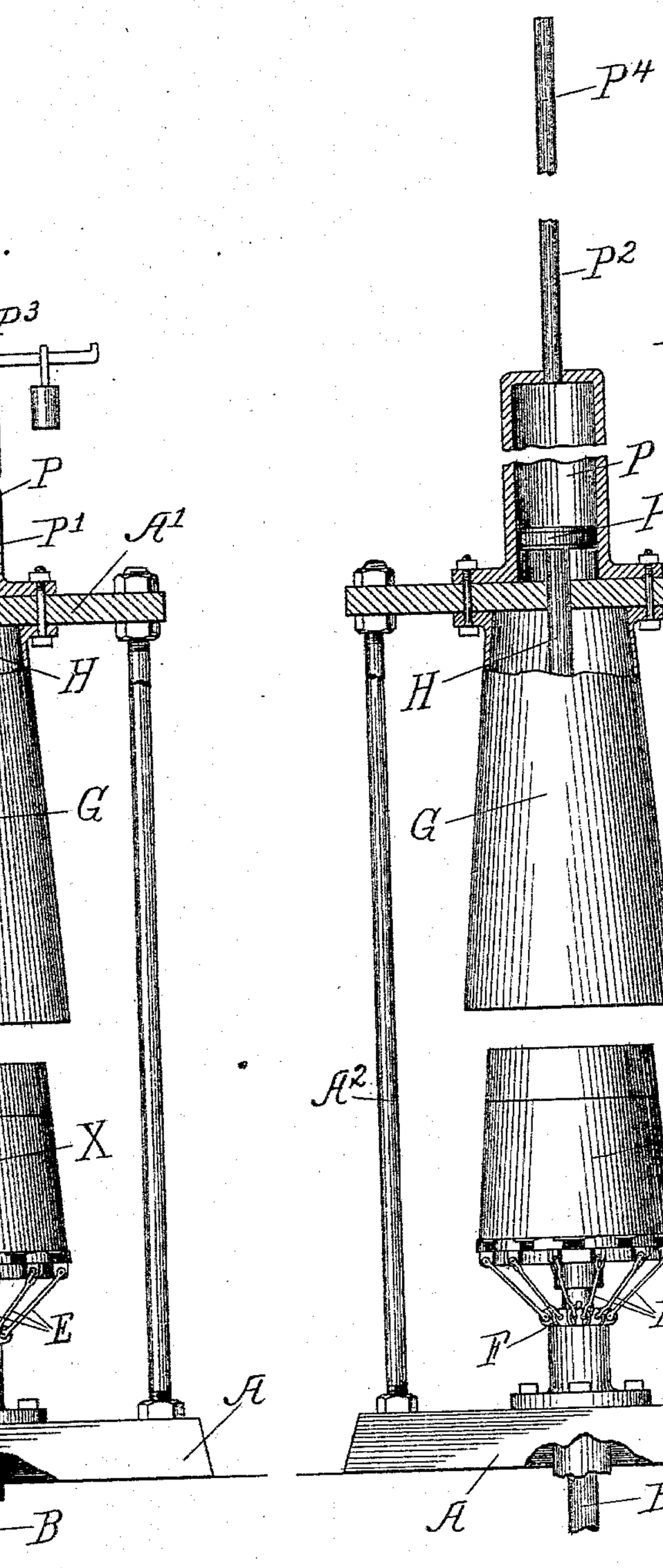
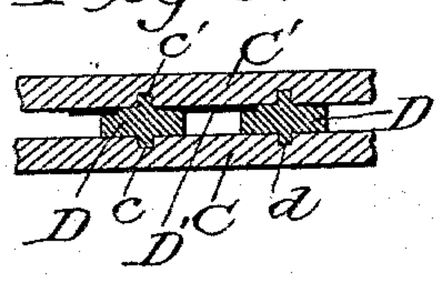




Fig. 7.




Fig. 9.




Witnesses.
E. T. Wray.
Jean Elliott.

Inventor.
Elon Hubbard
By Burton & Burton
his attys.

# UNITED STATES PATENT OFFICE.

EBER HUBBARD, OF CHICAGO, ILLINOIS.

## PRESS FOR MAKING VESSELS FROM FIBROUS PULP.

SPECIFICATION forming part of Letters Patent No. 495,039, dated April 11, 1893.

Application filed May 23, 1892. Serial No. 434,039. (No model.)

*To all whom it may concern:*

Be it known that I, EBER HUBBARD, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Presses for Making Vessels from Fibrous Pulp, which are set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention is designed to afford means for compressing to the requisite degree of compactness a vessel which may be primarily molded either in the machine or outside of it. The details which I have illustrated are especially adapted to compressing a vessel which has been primarily molded outside of the machine.

In the drawings, Figure 1 is a vertical axial section through my press, showing the blank or uncompressed vessel in its place on the form before it has been advanced into the compressing jacket. Fig. 2 is a similar view showing the vessel advanced into the jacket and about to receive compression by further advance. Fig. 3 is a top plan. Fig. 4 is a detail plan showing the structure of a radially expansible follower, the like of which I use to close the compression mold at the top and bottom. Fig. 5 is a detail side elevation of a link which connects a cross-head above to a cross-head below the mold proper for the purpose of affording means for compressing the bottom of the pail in one form of the press. Figs. 6 and 7 are side elevations of a press modified by the substitution of a different means of compressing the bottom, Fig. 6 being adapted to effect this result by reaction of compressed air, and Fig. 7, by hydraulic pressure, as by a water column in a stand-pipe. Fig. 8 is a section at the line 8—8 on Fig. 4. Fig. 9 is a section at the line 9—9 on Fig. 4.

I will first describe the structure shown in Figs. 1 to 5 inclusive, wherein the bottom is adapted to be compressed at the will of the operator by mechanism operated by hand, independently of the other compressing mechanism, although this is not the preferred form of my press.

A is a base, to which a top plate A′ is connected by upright rods $A^2$ $A^2$ $A^2$ $A^2$, at the four corners.

B is a vertical rod which extends up through the base A, and carries at its upper end a table, upon which, in the operation of the machine, the inner form for the vessel and the vessel itself to be compressed are supported. This rod B preferably extends through a hydraulic ram, as the source of power for compressing, but may be operated longitudinally by any suitable means not illustrated. The table referred to comprises two disks C C′, both pinned fast to the upper end of the rod B. One of these disks has its hub extended toward and abutting against the other, leaving an annular space around the hub between the disks for the purpose of accommodating the radial adjustable sectors which constitute the expansible follower hereinabove mentioned; and the approximate faces of the disks C C′ have the radial grooves *c* and *c′*, respectively, for the purpose of affording guidance to the sectors D D D &c. Said sectors have the radial ribs *d*, adapted to enter said grooves and obtain guidance therein. The width of the sectors is such that when they abut laterally edge to edge, exclusive of certain overlapping flanges hereinafter described, as when they are withdrawn farthest toward the center, they do not protrude beyond the peripheries of the disks C and C′, more than the minimum thickness after compression of the body of the vessel to be formed. They are provided at one edge with a fin or thin flange D′, projecting from one edge at the upper surface, and sharply beveled on the under side of the projecting portion, and the opposite edge is beveled to correspond to the sharp bevel of the projecting flange; and the width of these fins or flanges is such that when the sectors are protruded from the center to the utmost degree that is necessary in order that the edge of the uncompressed vessel may be covered, the said fins still overlap each the proximate edge of the adjacent sector. The ribs *d*, which project from the upper surface of the sectors, are cut away to the full extent that the sector may, in any event, project beyond the periphery of the upper disk C. Each of the sectors has a lug *d′*, projecting from the lower side at the outer end, preferably in the plane, and as a continuation, of the downwardly projecting rib *d*, and from these several lugs links E E E &c. are connected to the collar F on the rod B, below

the lower disk C', so that by sliding the collar up and down on the rod B, the said sectors may be pushed out, or drawn in, to expand or contract the follower. I have thus far described the lower follower only. The upper follower is of precisely similar construction with respect to the stem or rod which pertains to it, which will be hereinafter described.

G is a jacket of metal which is secured at its upper end to the top plate A', having the exterior flange G' for the purpose of being so secured.

H is a stem extending to the top plate A', and carrying at its lower end the upper follower which comprises the disk J at the end of the rod H, and the disk J' secured to the rod immediately back of the disk J, one of said disks having a hub projecting toward the other, so that there is left between them the annular space necessary for the sectors which constitute the expansible portion of the follower. These sectors K K, connected by the links K' K', to the collar $K^2$, operate in the same manner as the sectors already described of the lower follower. A cross-head L is secured to the rod B, below the lower follower, and a cross-head L' is located above the top plate A', and connected by links $L^2$ $L^2$, which are joined to the ends of the upper cross-head L', extend down through apertures in the top plate A', and are adapted to latch on the ends of the cross-head L, said links having each an aperture $l^2$ near the lower end, by which they are adapted to engage the noses *l*. The cross-head L' has a hub at the middle point of its length, which is apertured and threaded in said aperture, and the upper end of the rod H is exteriorly threaded and adapted to be screwed through the hub, and lever arms applied to the upper end of said rod to rotate the same and afford means for screwing the follower onto the end of the rod H, up or down as necessary in the process of compressing the pail, as follows:—The mechanism being in the position shown in Fig. 1, the inner form M, made of perforated sheet metal, is placed upon the upper disk C, which preferably has a rabbeted margin to receive and secure the said form, and the molded body X of the pail to be pressed is placed upon such form, or if, as may be the case, the body has been molded or shaped on the form, the form and the body together will be placed in the position indicated upon the lower follower, the sectors being extended by moving the collar F by hand up on the stem B to expand the margin sufficiently to afford support for the lower edge of the body X, but not so far as to cause the said sectors to project beyond the lower edge of the jacket G; and to prevent the possibility of this, a stop pin *f* may be put through the rod B, to prevent the collar F being removed farther up on the rod than necessary to expand the expansible margin of the follower to the desired extent. The rod B, being now actuated longitudinally, carries the lower follower and the vessel thereon up into the jacket G, wherein the upper follower which is kept expanded by the action of the weight of the ring $K^2$ through the links K', holding the sectors out against the wall of the jacket has been set at such positions that the bottom of the vessel will come into contact with it by the time the lower follower has entered the lower end of the jacket. The lower disk J of the upper follower is of a form corresponding to the bottom of the vessel, and if the vessel is to be formed with a chine, as shown in the drawings, this disk corresponds to the depression bounded by the chine. The vessel to be compressed is now completely inclosed within unyielding walls, and the force necessary to compress it to the desired degree of compactness, being exerted upon the rod B, forcing the bottom follower up into the jacket and carrying with it the vessel thereon, causes the vessel to be compressed laterally on account of the taper of the form into which it is being advanced, the sectors which form the margin of the follower being at the same time forced radially inward as the follower advances into the tapering jacket, so that they maintain perfect contact at their outer margins with the tapering jacket and completely cover the lower edge of the vessel. The links $L^2$ become engaged with the ends of the cross-head L, at about the instant at which the lower follower enters the lower end of the jacket G, and the subsequent upward movement of the rod B, and lower follower and form thereon, carries upward with it the upper cross-head L', and with it the upper follower. Thus, the upward movement of the form would not produce any compression of the bottom of the vessel, but such compression will be effected by the operator rotating the rod H, and screwing it down to the cross-head L', thereby forcing the upper follower toward the form to the extent necessary to produce a degree of compression of the bottom corresponding to that of the sides, which is caused by the advancing of the form into the tapering jacket. Obviously, other than hand power may be employed for this latter process, but under this construction, the compression thus produced upon the bottom is independent of the compression of the body or sides of the vessel. I prefer, however, to compress the bottom automatically with the compression of the sides, and for this purpose I prefer the structure illustrated in Fig. 6, wherein the cross-heads L and L', and the links $L^2$, are omitted, and there is secured upon the upper side of the upper plate A', a cylinder P, and the upper end of the rod H is provided with a piston P', which is adapted to play in the cylinder P. This cylinder is connected either with a liquid under static pressure to the degree necessary to properly compress the bottom of the pail, when exerted against the piston in the cylinder, or it may be connected with a compressed air cushion, having such tension that with the added ten-

sion, given by the advance of the piston into the cylinder to the extent which the form advances in the jacket G, in order to suitably compress the sides of the vessel, it will afford the proper pressure for the compression of the bottom. I have illustrated conventionally both of these modes of affording the yielding resistance to the advance of the pail against the upper follower necessary to compress the bottom.

In Fig. 6, the cylinder P may be charged with compressed air to any desired degree through the pipe $P^2$, and a safety valve $P^3$, set to the pressure which it is calculated is sufficient to properly compress the bottom, will determine absolutely that pressure, and the movement of the upper follower will be resisted by the air cushion until the limit of the safety valve is reached, and thereafter if the lower follower is still advancing into the jacket, the upper follower will yield before it an equal extent.

In Fig. 7, the pipe $P^2$ may be understood as leading to a water stand-pipe $P^4$, of such height as to afford the requisite pressure.

Any other means of affording a yielding resistance to the retreat of the upper follower up to a predetermined maximum, may be substituted for the air cushion or water column with the same result.

The advantages of this press over others heretofore employed, and the design of my invention is that the vessel produced or finished in this press has both the interior and exterior surface completely finished and smooth as the surfaces of the metal jacket and form between which it is compressed, and may be of absolutely uniform thickness throughout, because the walls of the chamber in which it is compressed have definite and fixed relation to each other, and vary only to the slight degree that may result from inaccuracy in the structure or unequal yielding of the metal which is practically unyielding.

In all other machines for molding and compressing such vessels, they are left in an unfinished condition as to the character of the surface, and require to be sawed or ground or sand-papered into accurate shape and finished character of surface, whereby, not only is the expense of production increased, but it is impossible to obtain such perfect finish as can be given by the perfectly smooth metal surface of the jacket and form, which determine the character and surface of the vessel molded therein, in my press. The nearest approach which I am aware of to the result which I obtain is that which is obtained by compressing the vessel in a jacket composed of staves which overlap and slide upon each other as the jacket is diminished in the compression of the vessel, but these staves necessarily leave upon the vessel the marks of their overlapping edges, which must be ground off before the vessel is satisfactorily prepared for market. The somewhat similar marks which will be left by the overlapping sectors of the followers in my press, existing only upon the edges of the vessel, are unobjectionable, but even if objectionable, can be removed by a single touch of the vessel to a sand-papered disk, whereas, similar ridges left upon the sides can only be dressed off with very much greater labor.

I claim—

1. A press for compressing vessels of fibrous pulp, comprising a rigid tapering jacket; a follower in said jacket and a follower adapted to be advanced thereinto from the larger end of the jacket; each of said followers having overlapping sectoral marginal portions adapted to be diminished and expanded by radial movement: substantially as set forth.

2. In a press for compressing vessels of fibrous pulp, in combination with the rigid jacket G, the lower follower adapted to be advanced thereinto and provided with the expansible marginal portion substantially as described, and the follower in said jacket provided with a similar expansible marginal portion, the lower follower being provided with a stem by which it may be longitudinally actuated into the jacket; a cylinder rigid with the jacket; the upper follower being provided with a stem which protrudes from the smaller end of the jacket into said cylinder, and having a piston-head therein; said cylinder communicating with a source of fluid pressure operating above the piston therein to resist the upward movement of said piston and the upper follower: substantially as set forth.

3. In combination with the tapering jacket, the follower adapted to travel therein comprising a fixed central portion and sectoral portions radially guided in said fixed portion and provided with overlapping flanges at their proximate edges; a collar on the stem of the follower, and links connecting the said sectoral portions to such collar, whereby they are advanced and retracted early and simultaneously in their radial movement: substantially as set forth.

4. In combination with the downwardly open jacket G, the upper follower adapted to travel therein, comprising a fixed central portion and the sectors radially guided in said fixed portion; a heavy collar $K^2$ on the stem of the follower above, and a link extended from the sectors to said collar, whereby the weight of the collar tends to hold the sectors produced radially: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 10th day of May, 1892.

EBER HUBBARD.

Witnesses:

CHAS. S. BURTON,

JEAN ELLIOTT.