

(No Model.)

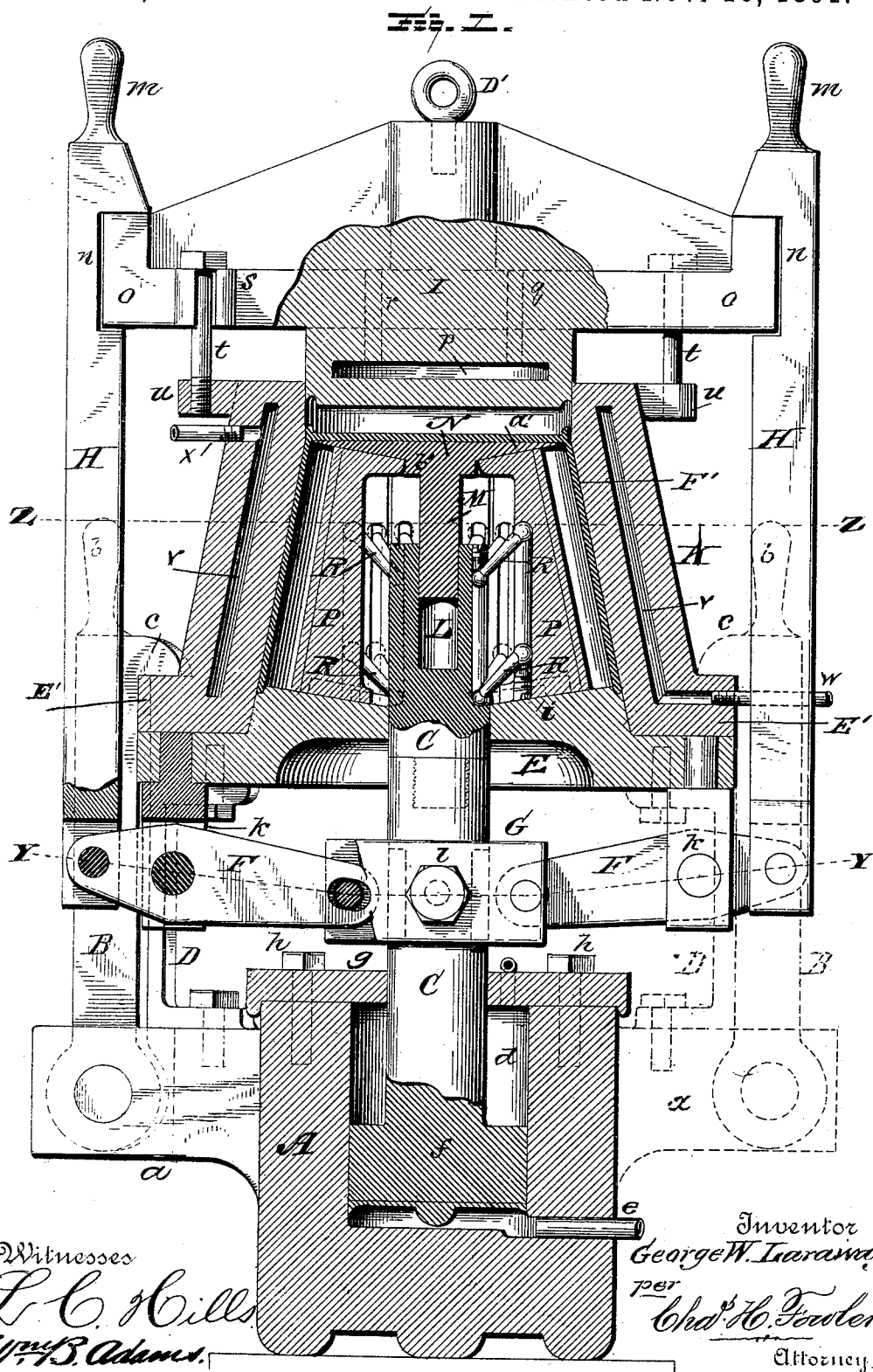
3 Sheets—Sheet 1.

G. W. LARAWAY.

MACHINE FOR FORMING HOLLOW WARE FROM PULP.

No. 462,802.

Patented Nov. 10, 1891.



(No Model.)

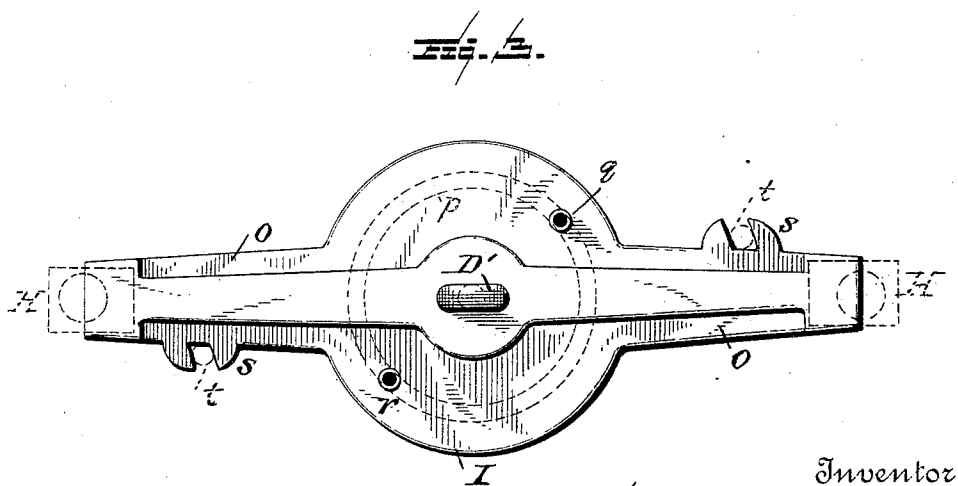
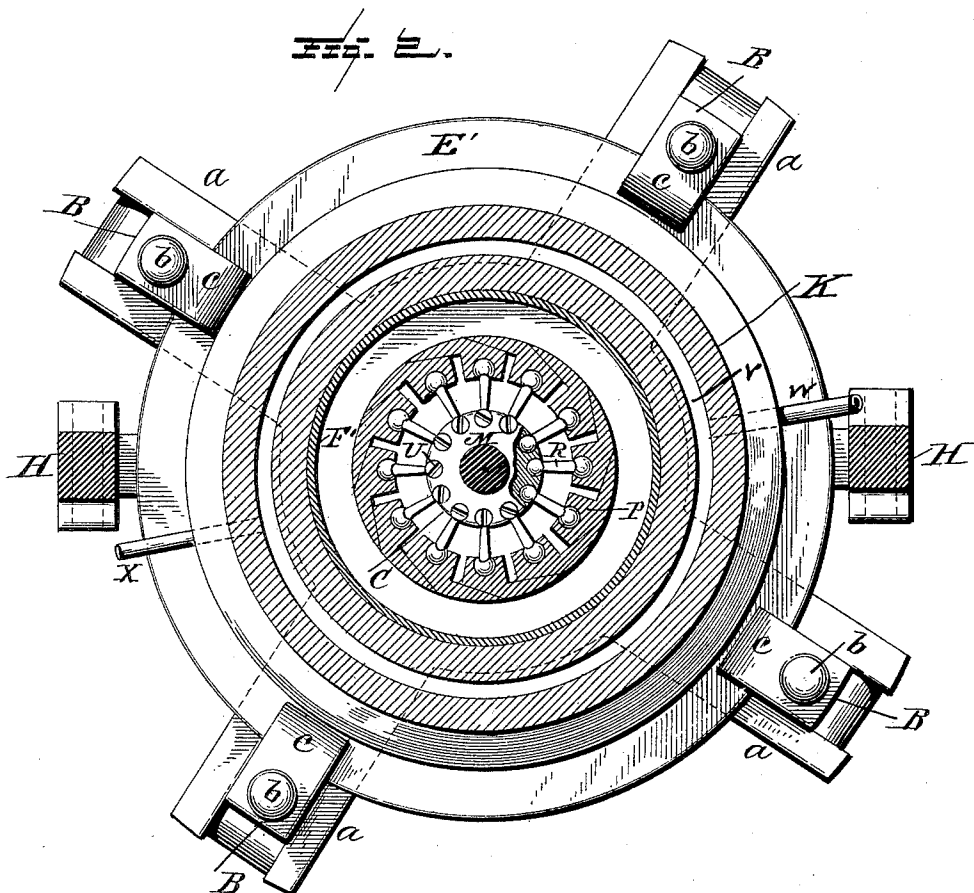
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Witnesses
L. C. Hills.
Wm B. Adams.

Inventor
George W. Laraway.
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Attorney

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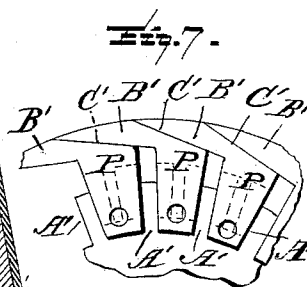
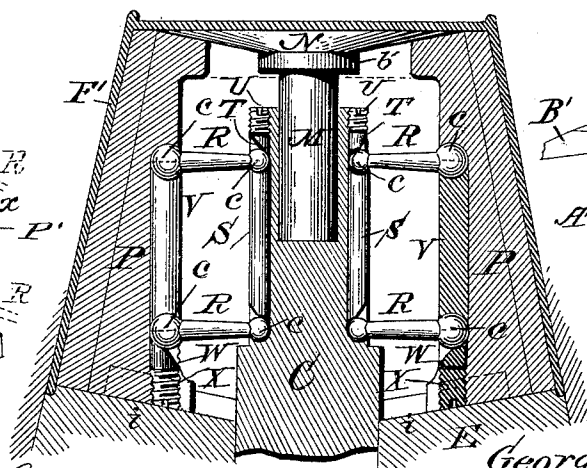
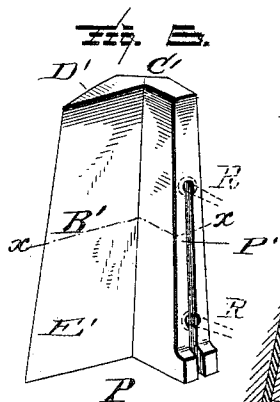
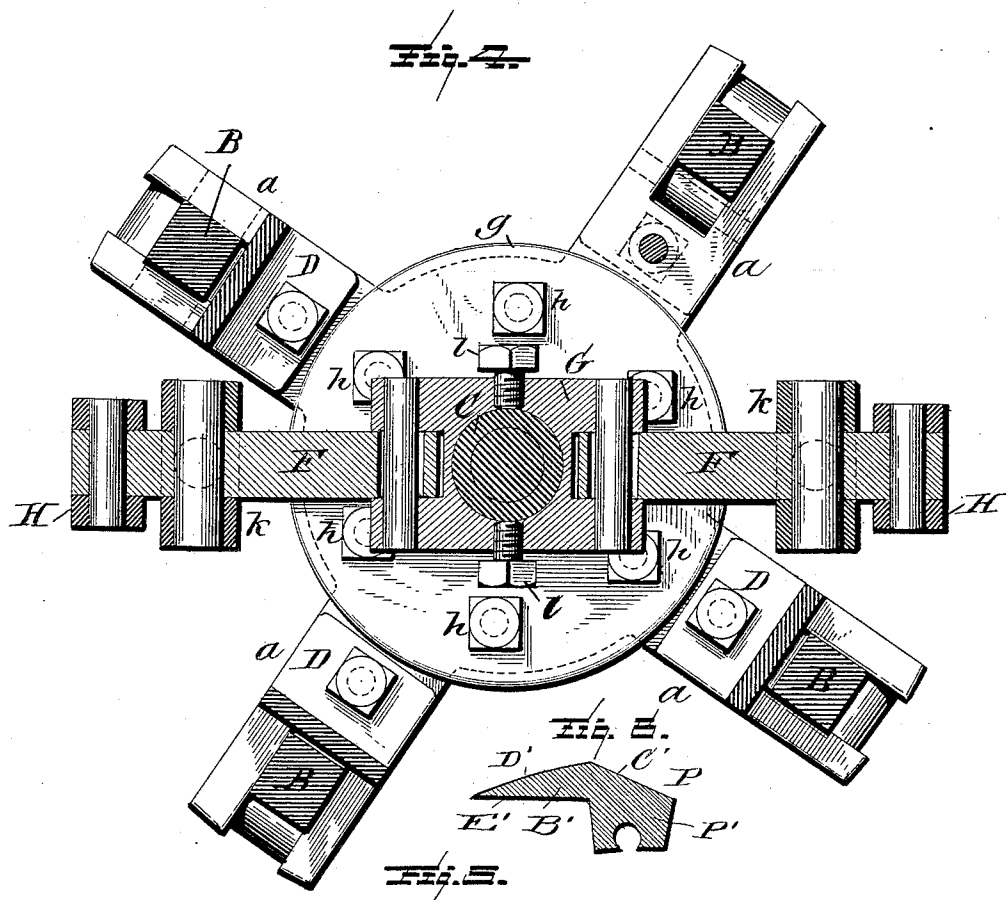
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UNITED STATES PATENT OFFICE.

GEORGE WASHINGTON LARAWAY, OF ST. CLOUD, MINNESOTA, ASSIGNOR
OF ONE-HALF TO JOSIAH E. WEST, OF SAME PLACE.

MACHINE FOR FORMING HOLLOW WARE FROM PULP.

SPECIFICATION forming part of Letters Patent No. 462,802, dated November 10, 1891.

Application filed November 25, 1890. Serial No. 372,623. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WASHINGTON LARAWAY, a citizen of the United States, residing at St. Cloud, in the county of Stearns and State of Minnesota, have invented certain new and useful Improvements in Machines for Forming Hollow Ware from Pulp; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon.

Figure 1 of the drawings represents a side elevation of my improved machine, partly in section; Fig. 2, a horizontal section of the machine, taken on line *z z* of Fig. 1; Fig. 3, a top plan view of the upper portion of the machine; Fig. 4, a horizontal section of the machine, taken on line *y y* of Fig. 1; Fig. 5, a detail sectional view, on an enlarged scale, of the expansible former or mold and its surrounding parts, showing the sections thereof in an extended position against the material which is to form the pail or other vessel; Fig. 6, a detail view in perspective of one of the sections which constitute the former or inner mold; Fig. 7, a detail plan view of several of said sections, showing their relative position to each other when extended and the guides between them. Fig. 8 represents a horizontal section through the mold-section, taken on line *x x* of Fig. 6.

The present invention has relation to that class of machines especially constructed to form hollow ware from a material consisting of a dry mixture of paper or other pulp and a gummy or resinous matter, which may be molded and vulcanized by the heat maintained in the molding-surfaces, although it is obvious, however, that the molding-surfaces may be provided with means for drainage, such as is commonly employed, when the machine will be adapted for operation upon the ordinary liquid pulp, in which case the means for heating the molding devices may of course be omitted, if desired.

The object of the invention is to improve such machines in the several details of construction, whereby the operation of forming the article is greatly facilitated, a more per-

fect and satisfactory compression of the pulp, fiber, or other material is obtained, and, if a vulcanizable composition is operated upon, a perfect vulcanized water-proof pail or other similar vessel is completed and finished in a comparatively short space of time.

The invention consists in the several details of construction whereby the above-named objects are attained, such construction being substantially shown in the drawings and hereinafter described and claimed.

In the accompanying drawings, A represents a hollow cylinder, which forms the base or support of the machine, the same being cast with radial open-slotted arms or other suitable extensions, as shown at *a*, and to which are suitably pivoted the lower ends of clamp-bars B, the upper extremities thereof terminating in handles *b* and laterally-extending jaws *c*, the purpose of which will be hereinafter described. The chamber *d* of the hollow cylinder A communicates with a suitable hydraulic apparatus through the pipe *e*, through which water is forced into the chamber under the head *f* of a ram or plunger C. This plunger, if preferred, may be constructed of two sections, the lower section, with the head above described, being of cast-iron and the upper section of steel, connected together by a screw-coupling, as shown in dotted lines, Fig. 1, of the drawings. A cap-plate *g* is secured by bolts *h* or other suitable means over the upper end of the cylinder A to close the upper section of the chamber therein.

The ram or plunger C may be operated by hydraulic, steam, or other power, as I do not desire to limit myself to any special construction of the cylinder A or the lower portion of the plunger, as it is evident that any plunger, shaft, or other equivalent device may be used that is capable of having imparted to it a reciprocating motion to contract and expand the sections constituting the form or inner mold, which is connected thereto at its upper end, and which will be hereinafter described.

To the radial arms *a* are bolted or otherwise suitably connected brackets D, and to the upper ends of said brackets is connected the base-plate E, the brackets forming supports therefor, said plate having an inclined

upper surface inclining in a direction downward toward the center thereof, as shown at *i*. Connected to the base-plate E and depending therefrom are slotted hangers *k*, and to these hangers are pivoted links F, said links in turn being pivoted at their inner ends to a suitable bracket G, which is held to the plunger C by set-screws L. The outer ends of the links F have pivoted to them suitable clamping-levers H, terminating in handles *m* at their upper ends and recessed, as shown at *n*, to engage with the arms *o* of a chambered follower I. The chamber *p* is for steam or other heating agent, and has supply and exhaust ports, as shown at *q* *r*, respectively, in Fig. 3 of the drawings, the supply-port being connected by pipes or other suitable and well-known means to a steam or other heat-generating medium, where the chamber *p* obtains its supply, as is common in this class of machines. The arms *o* of the follower I have slotted ears *s*, extending horizontally upon opposite sides of said arms and with which engage headed bolts *t*, the lower ends thereof having screw-threads for connecting them to ears *u* upon the upper ends of the chambered outer mold K, which form the outer wall or sides of the pail or other vessel. The chamber *v* of the mold K extends entirely around the same and receives its supply of steam or other heating medium or agent through pipe *w*, and exhausts through pipe *x* in the usual manner, as practiced in machines of this class. The plunger C extends up centrally through the base-plate E, and has an axial opening L to receive the stem M of a forming-disk N, said disk having its under side inclined in a direction toward the center downwardly, and has annular shoulders *b'* to form a stop for the upper ends of a plurality of sections P, which constitute the inner mold or former.

The inclined surfaces of the base-plate E, as shown at *i*, and the inclined under side *a'* of the disk N, in connection with the corresponding inclines upon the lower and upper ends of the sections P of the inner mold or former, are considered of material importance, in that a much closer joint can be obtained and consequently greater security against the material working in between the mold-sections, and also enabling the toggles to more readily pull the sections back than were the surfaces perfectly flat or horizontal, thereby rendering the drawing back or moving outward of the mold-sections much easier and consequently more effective in their purpose. The stem M of the disk N also serves a twofold purpose in acting as a guide to retain the disk centrally, and also when the toggles R, which connect the sections P to the plunger C, are horizontal or straight across, as shown in Fig. 5, and doing their heavy work, the lower end of the opening L will come in contact with the lower end of the stem M, and thus counteract the pressure that is exerted on the follower through the

medium of pivoted links F and clamp-levers H.

The toggles R are connected to the mold-sections P and plunger C by a universal joint, thereby admitting or allowing of any slight movement of the sections in any direction without producing any strain on the toggles and securing a more perfect and easy movement of the section when being expanded and contracted, which universal joint is considered of great importance over the toggle connections heretofore employed, as it produces a more successful operation of the expandible mold or former and in proportion enhances the value of the machine. The toggles R have balls *c* at their extremities, which fit in sockets in the plunger C and section P, respectively; but any well-known universal joint connection between the toggles, plunger, and sections may be substituted for that shown.

In connecting the toggles to the plunger and sections of the mold or former I prefer to make longitudinal grooves in the periphery of the plunger extending from the top downward to a certain distance, and similar grooves are made in the sections, but from the bottom upward, both of which grooves are greater than a semicircle in cross-sections and of a size to receive the balls on the extremities of the toggles, which are inserted from the open ends of the grooves. The lower ones of the toggles are first inserted from the top of the grooves in the plunger and slid down, so that the balls on the ends thereof will rest at the lower end of the grooves, after which rods S the size of the grooves are inserted in like manner, and then the upper ones of the toggles are inserted so that the balls on the ends thereof will rest in the concavity on the upper ends of the rods to form a seat therefor. After the inner ends of the toggles are in engagement with the grooves in the plunger and the rods in place, as above described, and as shown more clearly in Fig. 5, suitable keys T are inserted over the balls on the ends of the toggles and then screw-plugs U to retain the keys in place. The outer ends of the toggles are engaged with the grooves in the sections P in like manner and held therein by rods V and keys W and screw-plugs X, the rods, keys, and screw-plugs securely holding the ball ends of the toggles in position in the grooves.

The upper ends of the rods S V have concavities at their ends to form seats for the ball ends of the toggles, and the lower ends of the rods S and the several keys are beveled or cut away to allow the toggles to assume the angle necessary when the sections P are contracted, as shown in Fig. 1.

Although I have in detail described the manner of connecting the toggles to the plunger and to the mold-sections, it is not at all necessary that they should be connected in the manner shown for the successful operation of the invention, as many forms of uni-

versal joints may be substituted that are well known and that would perhaps be equally as effective in securing an easy and perfect motion of the sections in extending and contracting them. The mold-sections P are held in their relative position and down on the base-plate E by radial guides A', connected to the base-plate and extending between the sections, as shown in Fig. 7 of the drawings.

10 The mold-sections P consist of a body portion P' and a laterally-extending wing B', the face of the body portion of the mold-section having a bevel substantially the extent of its width, as shown at C', and the laterally-extending wing having a curved face D' and a beveled back E'. These beveled and curved faces of the mold-section, as above described, may vary in extent so long as such modification does not affect the principle of the invention, the overlapping of the mold-sections forming perfect joints and keeping in close contact with each other while contracting and expanding, and thereby preventing the dust or fiber or pulp from finding its way between the sections while working.

Although any number of sections P may be used, I have shown in the present instance twelve of these sections, and of course a corresponding number of toggles at both top and bottom, and as the material used from which to produce the pail or other vessel does not enter into the invention I reserve the right to employ any kind of fiber, either animal, vegetable, or mineral, as may be preferred.

35 In operating the machine the parts are in position as shown in Fig. 1, the head f of plunger C being down to the bottom of chamber d and the mold-sections P contracted, as shown, which leaves a space between them and the interior of the outer mold K for the reception of the material from which the pail or other vessel is to be formed. The clamp-levers H are now thrown out to disengage the upper ends with the arms o of the chambered follower I and said arms swung around to disengage the slotted ears s with the headed bolts t. Now by a hydraulic crane or other suitable hoisting apparatus connecting with the eye D' the follower I is lifted out of position in order to place the material in the space between the sections P and the inner side of the outer mold K, after which said follower is placed back in position and the headed bolts t engaged with the slotted ears s and the clamp-lever H engaged with the arms o, as shown in Fig. 1. The plunger C is now forced up by hydraulic pressure or otherwise, which will force the sections P outward against the material and compress it, and at the same time, through the medium of the links F and the clamp-levers H, will pull down the follower I to form the bottom of the pail or other vessel simultaneously with the sides or walls thereof. Now steam or other heating medium or agent is introduced into the chambers p v to heat the follower I and mold K, respectively, so that when the ma-

chine is used on the mixture of pulp and a binding substance, hereinbefore referred to, the binding material will be softened by the heat and the article so formed and compacted by the pressure under heat may be removed, and an article will be quickly completed in the condition of the ordinary indurated or vulcanized ware without any further treatment. After this is accomplished the machine is reversed, the plunger C descending, and through the medium of its toggle connections with the sections P the latter are contracted, as shown in Fig. 1. The clamp-bars B, which securely hold the mold or former K down on the base-plate E, are now released, and the clamp-levers H in like manner are released from engagement with the arms o, after which the hydraulic crane or other hoisting-machine is again brought into operation and follower I and mold K, which remains connected to said follower, are lifted off the machine. The follower I and the mold K being now out of the way, the pail or other vessel is left supported on the base-plate E and is removed therefrom by a suitable tool and placed over a cold form for a short period, when it is ready for painting or graining and bailing. The outer mold K is now replaced in position on the base-plate E and the clamps B brought back to position, so that the jaws c will engage with the circumferential flange E' of the mold to hold it firmly down on the base-plate, after which the follower I is disconnected from the mold and elevated out of the way for the purpose of again supplying the machine with the material necessary to form the pail or other vessel, when the operation is again repeated until another pail or vessel has been formed and removed from the machine, the pail or vessel being shown at F'.

The inclined surfaces of the base-plate and the disk with its stem, also the form and shape of the movable mold-sections, together with their toggle connections, constitute important features of the invention, which are essential in rendering the operation of producing the pail or other article successful in its results. The outer mold detachably held on the base-plate by the pivoted clamp-bars, the follower detachably connected to said mold, and the clamp-levers connected to the plunger by pivoted links by which the follower is brought down to form the bottom of the pail or vessel simultaneously with the sides or walls thereof as the plunger ascends are features of material importance and all go toward making a successfully-operating machine and are susceptible of many changes or modifications without affecting the principle of the invention, and therefore I reserve the right to make such changes in the details of construction as would come within ordinary mechanical skill.

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

1. A mold-section having a body portion

and a lateral wing, the face of said body portion being beveled through substantially its whole width and the wing having a curved face and a beveled back, substantially as and for the purpose set forth.

2. The combination, with a plunger and a plurality of expansible mold-sections and longitudinal grooves in said plunger and sections, of toggles and means for holding them in the grooves, substantially as shown and described.

3. The combination, with a plurality of expansible mold-sections having their lower ends inclined, of a base-plate having an inclined bearing-surface for the ends of said mold-sections and a plurality of guides therefor, substantially as and for the purpose specified.

4. The combination, with a plunger and a plurality of expansible mold-sections, both of which have longitudinal grooves, of toggles having ball ends seated in the grooves, and rods, keys, and plugs for retaining them therein, substantially as and for the purpose described.

5. The combination, with a plunger, a plurality of mold-sections, and toggles connected thereto, of a base-plate for supporting the sections, having an inclined upper surface, and a disk having a correspondingly-inclined under surface and supported upon the upper ends of the sections, substantially as and for the purpose specified.

6. A plunger having an opening in its upper end, a plurality of mold-sections, and toggles connected thereto, in combination with a disk having a central stem extending into the opening in the end of the plunger and supported by the upper ends of the sections, substantially as and for the purpose set forth.

7. The combination of a plunger having an opening in its upper end, a plurality of mold-sections, and suitable toggles, a base-plate having an inclined upper surface, and a disk having an inclined under surface and a central stem, substantially as and for the purpose described.

8. The combination of an outer chambered mold, an inner mold consisting of a plurality of expansible sections, a base-plate for supporting the same, and a chambered follower operating simultaneously with the expansion.

of the sections to form the bottom and sides or walls of the pail or vessel, substantially as and for the purpose specified.

9. The combination, with a base-plate and an outer mold and means for holding said mold on the plate, of a follower and suitable means for detachably connecting it to the mold, substantially as and for the purpose set forth.

10. The combination, with a plunger, suitable toggle connections, and a plurality of mold-sections having laterally-extending wings and angular heels and having their ends inclined, of a base-plate having an upper inclined surface, substantially as and for the purpose described.

11. In a machine for forming hollow ware from pulp, a base-plate, an outer mold, and a follower, in combination with pivoted clamp-bars for holding the mold on the base-plate and clamp-levers adapted to engage with the follower, substantially as and for the purpose set forth.

12. In a machine for forming hollow ware from pulp, the combination of a plunger, expansible mold-sections connected thereto, a follower, and means for operating it simultaneously with the expansion of the sections, consisting of pivoted clamp-levers adapted to engage with the follower and pivoted links for connecting said levers with the plunger, substantially as and for the purpose described.

13. In a machine for forming hollow ware from pulp, the combination of a suitable support or frame, a base-plate, an outer mold, and clamp-bars for holding it on the base-plate, a follower, and means for detachably connecting it to the mold, a plunger, expansible mold-sections connected thereto, pivoted clamp-levers adapted to engage with the follower, and links pivoted to the levers and to hangers depending from the under side of the base-plate and to a bracket upon the plunger, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

GEORGE WASHINGTON LARAWAY.

Witnesses:

JOHN A. ROESER,

FRANK E. SEARLE.