

(No Model.)

3 Sheets—Sheet 1.

H. FAIRBANKS.

MACHINE FOR THE MANUFACTURE OF PULP WARE.

No. 364,096.

Patented May 31, 1887.

Fig. 1

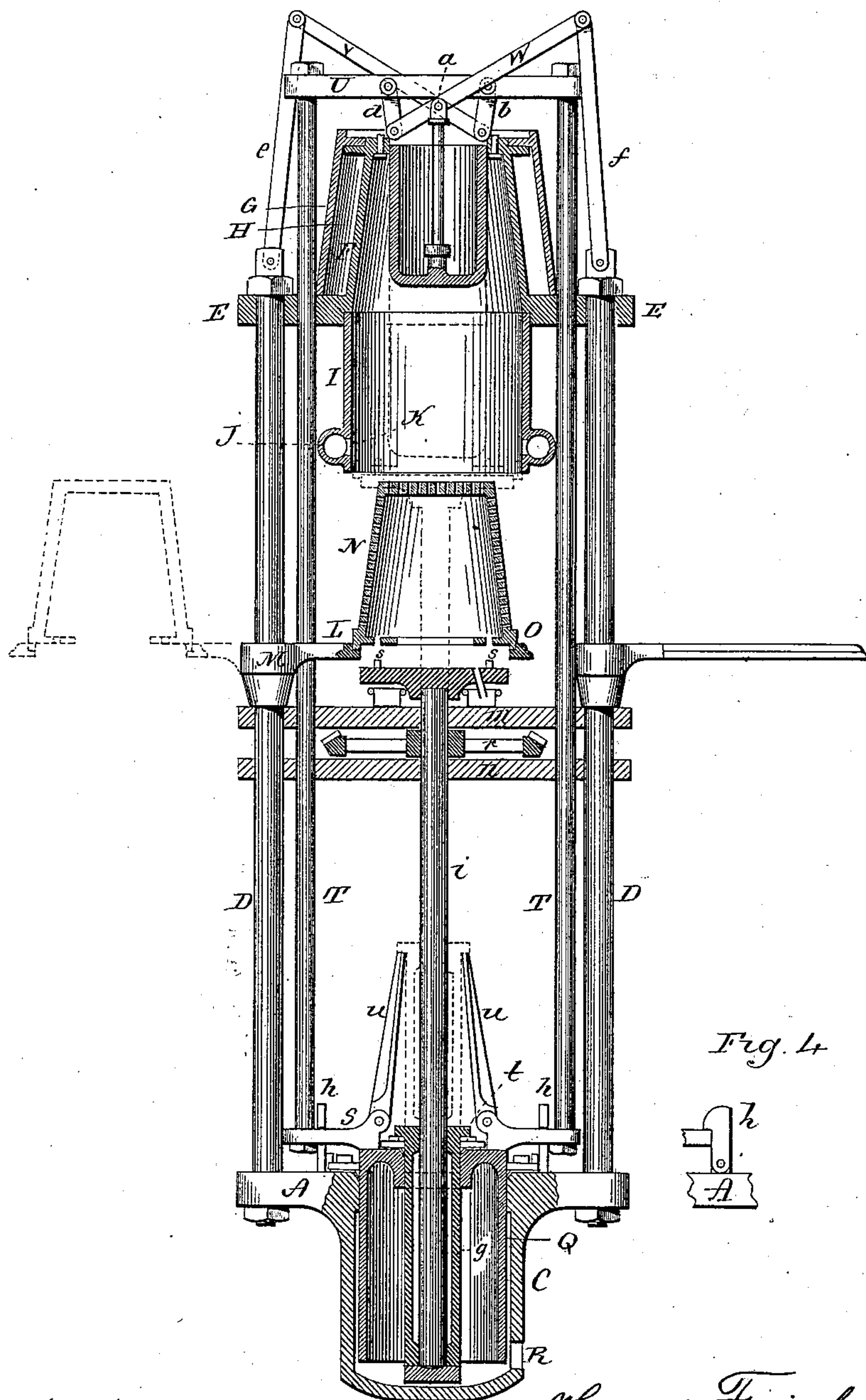
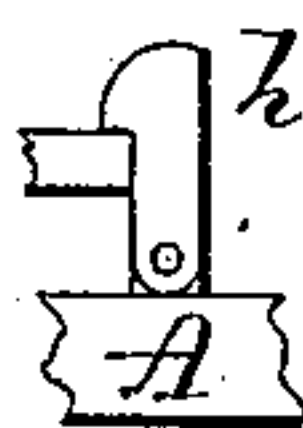


Fig. 4



Witnesses,
J. H. Shumway
Fred C. Earle

Henry Fairbanks
By atty. Inventor

Frederick C. Earle

(No Model.)

3 Sheets—Sheet 2.

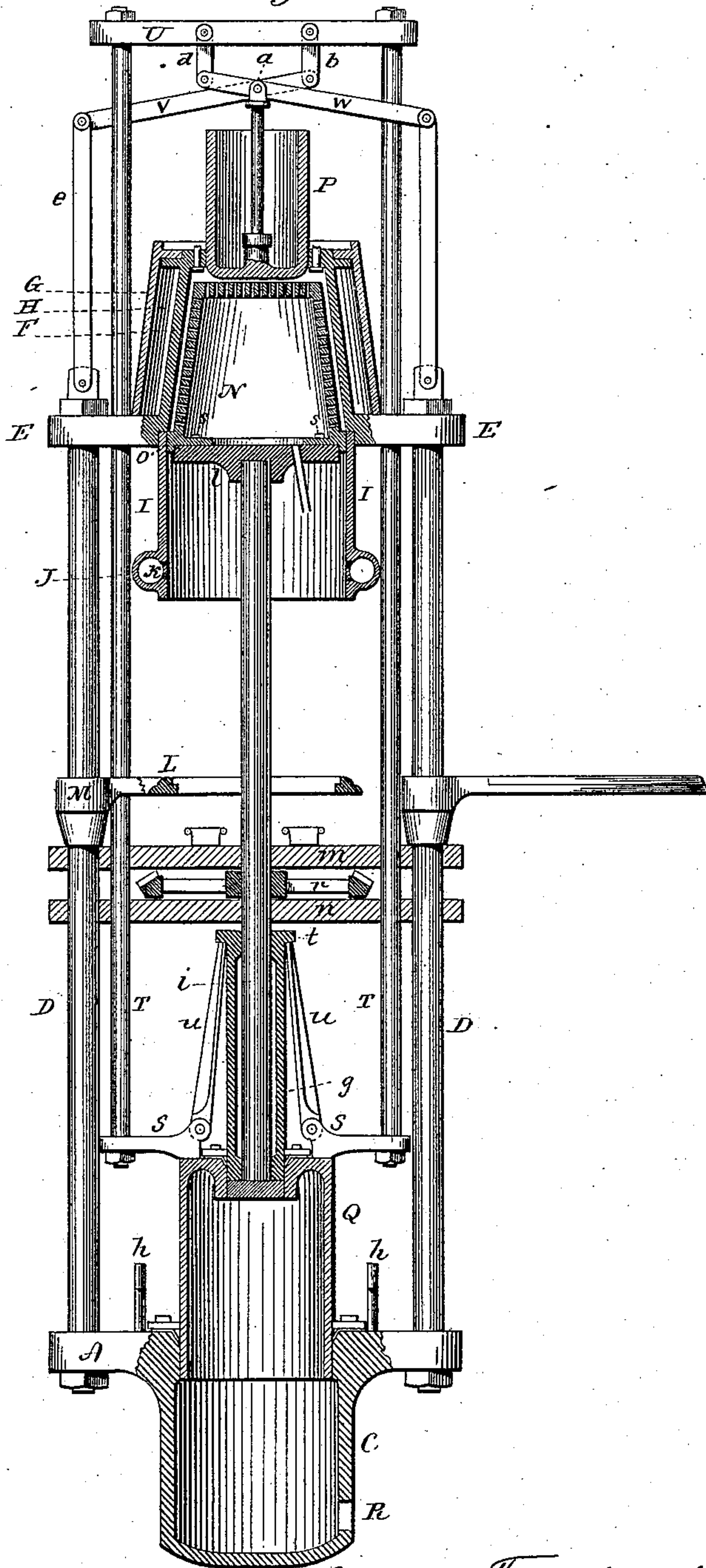
H. FAIRBANKS.

MACHINE FOR THE MANUFACTURE OF PULP WARE.

No. 364,096.

Patented May 31, 1887.

Fig. 2.



Witnesses.

J. H. Shumway
Fred C. Earle

Henry Fairbanks,
Inventor

By Atty.

Chas. Engle.

(No Model.)

3 Sheets—Sheet 3.

H. FAIRBANKS.

MACHINE FOR THE MANUFACTURE OF PULP WARE.

No. 364,096.

Patented May 31, 1887.

Fig. 3

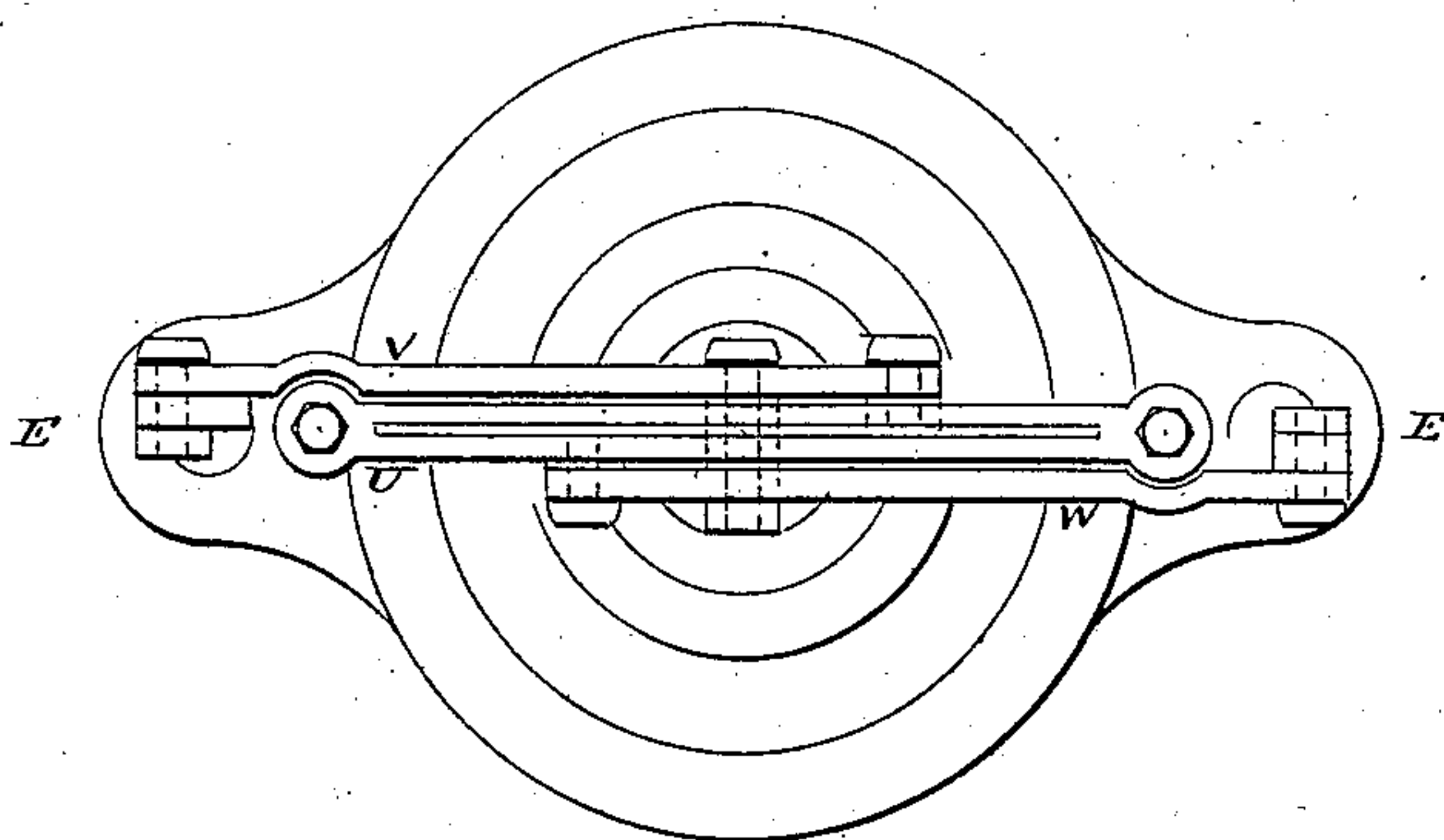


Fig. 6

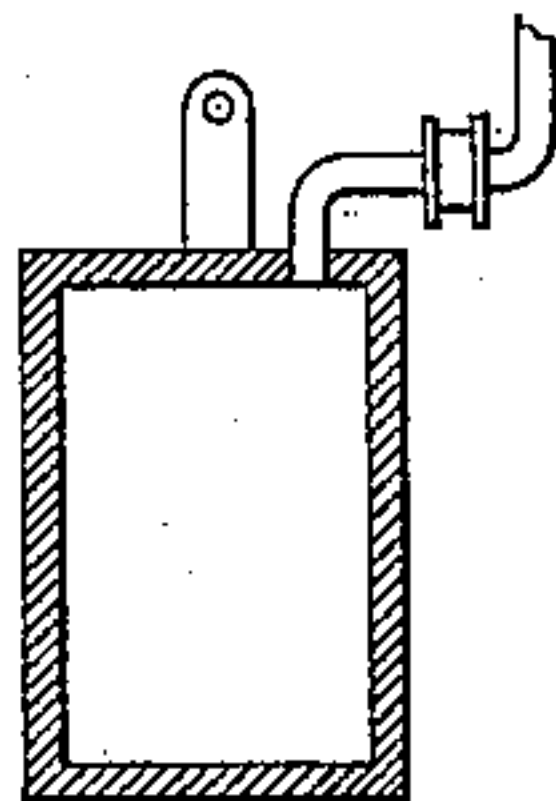
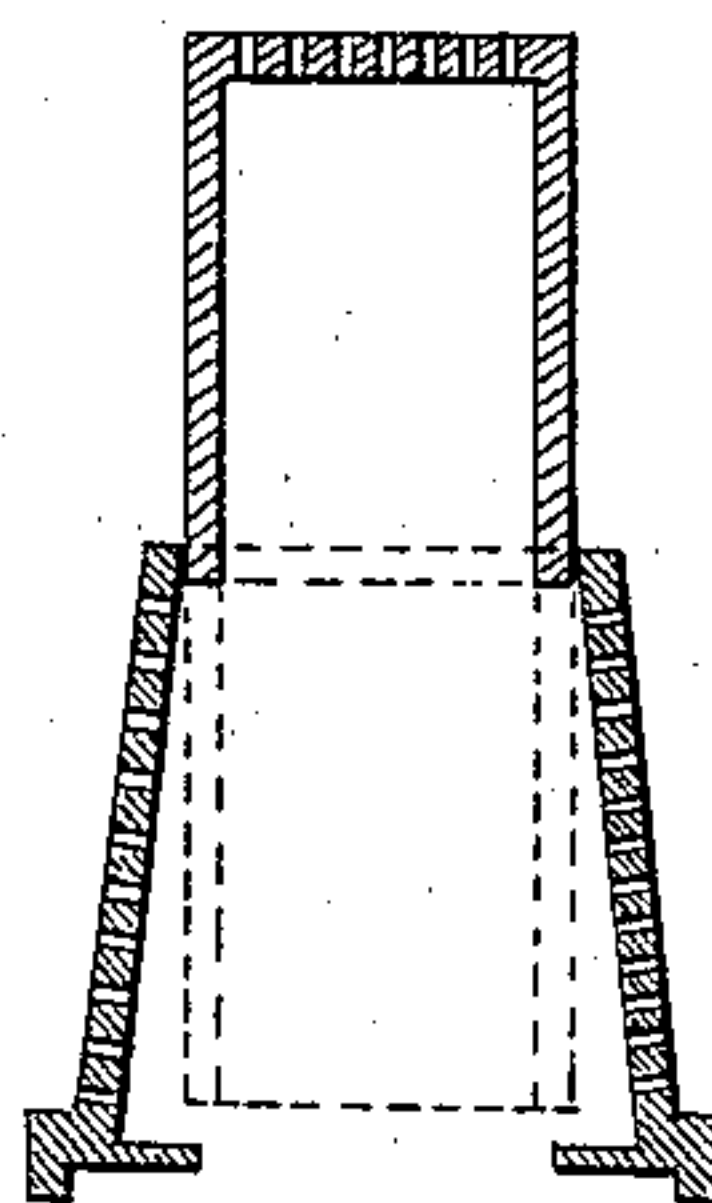


Fig. 5



Witnesses:
J. H. Shumway
Fred C. Earle

Henry Fairbanks,
Inventor,
By atty.
J. H. Earle

UNITED STATES PATENT OFFICE.

HENRY FAIRBANKS, OF ST. JOHNSBURY, VERMONT.

MACHINE FOR THE MANUFACTURE OF PULPWARE.

SPECIFICATION forming part of Letters Patent No. 364,096, dated May 31, 1887.

Application filed August 16, 1886. Serial No. 210,978. (No model.)

To all whom it may concern:

Be it known that I, HENRY FAIRBANKS, of St. Johnsbury, in the county of Caledonia and State of Vermont, have invented a new Improvement in Machinery for Manufacturing Pulpware; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a sectional side view of the apparatus, all the parts in their normal condition or position of rest; Fig. 2, the same view as Fig. 1 with the parts in the position of the former raised to its full height; Fig. 3, a top view; Fig. 4, a side view of the latches *h*, showing the manner of engaging the cross-head; Fig. 5, a modification in the arrangement of the follower; Fig. 6, a modification.

This invention relates to an improvement in machinery for manufacturing hollow ware from pulp, and is an improvement upon the machine shown and described in application for patent of Howard Parker, Serial No. 195,688, the invention being designed with special reference to the manufacture of pails or articles of like shape, but applicable to manufacturing articles from pulp in which, the pulp being placed in a receiver of a given shape, a former of the the required or corresponding shape forced into the said receiver will drive the water from the pulp and press the pulp between the exterior of the former and the interior of the receiver.

In the Parker machine the principal object was to provide for a rotative movement of the receiver or dome around the former, so as to lay the fiber, the dome being heated to facilitate this ironing-like operation.

In the Parker machine the dome is provided with a cylindrical extension corresponding to its larger diameter, and the former is provided with a flange around its larger end to fit the said cylindrical extension, and so that as the former passes into the said extension and the flange follows as a piston the dome and extension are closed to receive the fluid pulp, the upper or smaller diameter of the former at such time standing in the mouth or larger diameter of the dome, so that the whole space

around the former is filled with fluid pulp. This brings a large mass of the pulp above the top of the former—very much greater than that which surrounds the sides. The result of this is that as the former rises a much greater thickness of pulp will be deposited upon the top of the former than around its sides, and because of such greater amount the sides of the pail or article will be of less density than the bottom.

The principal object of my invention is to avoid this irregular character in the thickness or density of the pulp; and it consists in combining with the former and dome a follower which will enter the dome in advance of the former and recede therefrom as the former advances, the follower displacing so much of the pulp above the former that there will be substantially an equal amount on the top of the former as upon its sides.

A represents the base of the machine, to which a hydraulic cylinder, C, is fixed. From the base parallel rods D D extend upward and carry at their upper end a platform, E, parallel with the base. On the platform E the dome is fixed, and consists of an inner wall, F, and an outer wall, G, having a space or chamber, H, between them. The interior of the dome formed by the wall F corresponds in shape to the exterior of the article to be produced, and stands concentrically over the hydraulic cylinder C below. The chamber H is provided with suitable tubes, (not shown,) by which steam or other heating medium may be introduced to heat the dome.

The apparatus which I illustrate is designed for making pails, and the shape of the interior of the dome corresponds to the exterior of the pail, but in an inverted position, so that the larger diameter of the dome is downward.

To the platform E a cylinder, I, is fixed, the internal diameter of which corresponds to the larger internal diameter of the dome, and extends downward therefrom and concentric therewith, as seen in Fig. 1. The cylinder I is open at its lower end. Around the outside of the cylinder; and near its lower end, is an annular channel, J, communicating by suitable openings, K, with the interior of the cylinder. This channel J is designed to receive the pulp in a fluid condition, introduced thereto through a suitable tube, (not shown,)

and so that at the proper time the fluid pulp may be permitted to enter the cylinder I and fill the space therein as well as the dome. Below the cylinder I, and distant somewhat greater than the height of the former to be employed, is a swinging platform, L. This platform, as here represented, extends from a hub, M, on one of the rods D, and so that it may be swung therefrom in a horizontal plane; and on the platform, in a position concentric with the cylinder when the platform is beneath the cylinder, the former N is placed, the platform and former being constructed so that the former may be properly located on the platform, as shown, and so that the platform being turned to one side, as indicated in broken lines, Fig. 1, the former may be set thereon and then swung around into a concentric position beneath the cylinder, as seen in Fig. 1.

The exterior shape of the former corresponds to the interior shape of the pail or article to be produced. Around its lower end is an annular flange, O, which corresponds in diameter to the internal diameter of the cylinder I, and so that as the former is raised into the cylinder, as indicated in broken lines, Fig. 1, the flange will enter and fill the mouth of the cylinder as a piston. In the Parker patent, before referred to, the cylinder is raised to this position by a piston in the hydraulic cylinder below, and when thus introduced into the cylinder I the fluid pulp is permitted to flow or is forced into the cylinder through the channel J until the cylinder and dome are filled. Thus far the construction of the two machines is substantially the same.

It will be observed that if there be nothing in the dome above the top of the former the space between the top of the former and the top of the dome will be very considerably greater than the space around the sides of the vessel; hence, if in this condition the former be raised it will work through the mass of pulp above, and will accumulate upon the top of the former a very much greater amount of pulp proportionately than around the sides; hence the density of the pulp is necessarily very much less around the sides than at the bottom. To overcome this difficulty, I arrange a follower, P, preferably through the top of the dome, and so as to work up and down therein, as from the position in Fig. 1 to that seen in Fig. 2.

When the former has entered the cylinder, as seen in Fig. 1, the position of this follower P is so that the bottom of the follower will stand at about the same distance from the top of the former as between the sides of the former and the side of the dome, so that the space will be substantially the same. Now the follower is forced upward, as in the Parker application; but at the same time the follower recedes or rises in advance of the former, but so as at all times to maintain substantially the same distance between its lower end and the top of the former as there is between the side of the former and the inside of the dome, so

that there will always be substantially the same amount of pulp at all points surrounding the former, unless it be desired that there shall be more or less density at the top of the former, when the position of the follower will be varied accordingly.

It will be evident to those skilled in the art that the follower may be moved and maintained in its proper relation to the former by various mechanical devices. I illustrate the devices best known to me.

In the hydraulic cylinder a piston, Q, is introduced, such as employed in hydraulic presses, and which is adapted to work up and down in the cylinder. At the bottom of the cylinder the medium for operating the piston is introduced through an opening, R, or otherwise, so that considerable pressure may be brought to bear upon the piston. This piston carries a cross-head, S, from which at each side a rod, T, extends upward through suitable guides and through the platform E above the dome, the two rods there connected by a cross-bar, U. The follower P works through an opening in the dome of corresponding diameter suitably packed. At the upper end of the follower a pair of levers, V W, are hung, as at *a*, the levers crossing each other at that point. One of the levers, V, at one side of the point *a* is hung by a link, *b*, to the cross-bar U, and upon the opposite side the end of the lever W is hung by a similar link, *d*, to the cross-bar U. The other end of the lever V is hung by a link, *e*, to the platform E, or, as here represented, to the upper end of one of the rods D, and upon the opposite side the outer end of the lever W is in like manner hung to the other rod D. The cross-head S rises with the piston, and with it, because of the connecting rods T, the cross-bar U must correspondingly move up or down, as the case may be, and because of the connection of the cross-bar U with the follower P through the links *b d* and the levers V W and their links *e f* the follower must move with the cross bar U, its movement in proportion to the movement of the cross-bar being according to the relative connections between the said levers V W and the cross-bar U.

The position of the follower is down when the former stands in the position for filling the dome. If, now, the former be raised, it will advance toward the follower; but the follower under the action of the levers will rise from the former until the former has reached its extreme up position, as seen in Fig. 2; but during this movement of the follower and former, owing to the relative positions in which the levers are hung to the follower and cross-bar, the movement of the follower has been so much slower than that of the former that the former has gradually approached the follower, so as to reduce the space between the two, until at the extreme up position the space between the bottom of the follower and the top of the former will correspond substantially to the space between the outside of the

former and the inside of the dome, as seen in Fig. 2, and this relation of the follower to the former may be varied by changing the connection between the follower and the cross-bar 5 accordingly.

In operation the former should rise into the cylinder to the position seen in broken lines, Fig. 1, before the follower commences its movement. To give this movement to the 10 former, I arrange an auxiliary piston, *g*, in the hydraulic piston *Q* below and concentrically therewith, the piston *g* being of considerably smaller diameter than the piston *Q*, but open into the cylinder, so that the pressure within 15 the cylinder *C* may readily act upon the piston *g*. The piston *g* extends up through the upper end of the piston *Q*, and is packed in the usual manner to make a tight joint.

The cross-head *S* is locked in its down position by latches *h*, these latches being adapted 20 to engage the cross-head when in its down position or to release the cross-head when it is desirable, as seen in Fig. 4. Therefore, as the pressure in the cylinder cannot act upon the 25 principal piston *Q* when it is so locked down, the pressure will be brought directly upon the piston *g*. The piston *g* is tubular, and within it stands the vertical shaft *i*, the shaft stepped at the bottom in the piston, and so that it 30 may revolve freely. The shaft *i* extends upward and carries a head, *l*, adapted to work through an opening in the platform *L*, and so as to engage the former *N*, and so that when the rod *I* rises the former will rise with it.

When the piston *g* is in the down position, the head *l* stands below the platform *L*, as 35 seen in Fig. 1, and so that the platform with the former may be swung out or in, as the case may be, independent of the head; but when 40 the former is in place, so soon as pressure is applied to the cylinder *C*, the piston *g* rises and brings the head *l* upon the under side of the former, and so that it will engage the former and cause it to continue to rise with the 45 piston *g* until the flange *O* has entered the cylinder, as indicated in broken lines, Fig. 1.

The shaft *I* works up through cross-bars *m n*, and between these cross-bars is a gear-wheel, *r*, preferably a bevel-gear, through 50 which the shaft *i* works, the shaft and gear being splined in the usual manner, (the spline not shown,) so that as the wheel revolves it will impart corresponding revolution to the shaft, the wheel being supported between the cross- 55 bars *m n*, so as to prevent other than rotary movement of the wheel. The gearing by which revolution is imparted to the wheel *r* is not shown.

The revolution of the wheel *r* imparts, as 60 before stated, revolution to the shaft *i* and to the head *l*. That this revolution of the wheel may be communicated to the former I make engagement between the head *l* and the former, say, by studs *s s* on the head, which 65 extend up through corresponding openings in the internal flange on the former, and so as to

interlock therewith; hence as the shaft *i* revolves the former will revolve with it.

When the shaft *i* and the former have 70 raised, so that the former stands within the cylinder, and the lower end of the cylinder is closed by the flange *O* of the former, the work of the auxiliary piston *g* is completed, and at this time an annular flange or projection, *t*, 75 on the piston has arrived at an elevation where dogs *u* on the cross-head *S* may engage it, as seen in broken lines, Fig. 1, so that now the former, the shaft, and piston *g* are supported upon the cross-head. Having attained 80 this position, the cross-head *S* is disengaged from the latches *s*, to leave the principal piston *Q* free. Then the pressure within the cylinder is brought to bear upon the principal piston, and, it rising, causes the follower to rise accordingly. At the same time the con- 85 necting-rods *T* act, through the cross-bar *U* and the lever and link connections, upon the follower *P*, causing it to rise in advance of the rising former, as before described, until the former reaches its extreme up position, as seen 90 in Fig. 2.

The former *N* is perforated, as in the Parker machine, for the escape of water, and so as to leave the fiber upon the former.

I do not show the auxiliary appliances for 95 the former, which are shown in the Parker application, as they are immaterial to the present invention, nor have I particularly described some of the details shown in the illustration of this application, which are the same as in 100 the Parker application, for the reason that they are unnecessary to the full understanding of my invention.

After the complete pressure upon the fiber by the rise of the former, as before described, 105 (and may be during the rise of the former,) rotation is imparted to the former by means of the gear *r*, so as to produce between the former and dome the ironing-like operation upon the 110 fiber.

The advantage of rotating the former instead of the dome arises from the simplicity in construction which such arrangement permits.

From what I have said in regard to the ad- 115 vantages of the follower, it will be apparent to those skilled in the art that the follower may be arranged in various ways, so as to produce the same equalizing result—as, for illustration, the follower may be arranged to work 120 up and down through the former, as indicated in Fig. 5, the former standing in the up position, so as to make the required space between the under side of the top of the dome and the top of the follower, the follower gradually 125 rising as the former rises, until finally they arrive at the finishing position. This illustration will be sufficient to enable those skilled in the art to devise various means for operating the follower. 130

After the article has been properly shaped and placed in the dome, the forcing medium

in the hydraulic cylinder is permitted to escape and the piston to gradually descend, both pistons returning to their down position, and in so doing leave the former with the article thereon upon the platform L, from which it is removed as in the Parker machine.

It is understood that the shape of the former, as well as of the receiver, is to be changed according to the shape of the article to be produced, and the former and receivers may be duplicated to produce several articles at the same time, if desired.

Instead of first moving the former up to the follower, as I have described, and then gradually advancing the follower by a system of levers, the follower and former may be moved together, the follower being arranged to stand near the top of the former, according to the thickness of the bottom of the article to be produced, as indicated in broken lines, Fig. 1, and hung directly to the cross-bar U above, omitting the levers, and the single piston be of sufficient length to impart the full movement to the former, as in the Parker application, and so that the movement of the follower and the former will be equal and together throughout their movement. The links *b d* may represent the connection between the follower and the cross bar. This arrangement will to a considerable extent overcome the difficulties which I have mentioned in apparatus in which no follower is employed; but I prefer the partial independent movement of the follower and former.

From the foregoing it will be understood that I claim nothing shown or described in the application for Letters Patent hereinbefore referred to.

In some cases it may be desirable to apply heat to the follower. This may be done by the introduction of steam through a jointed pipe, as seen in Fig. 6, or by any of the known means for applying steam-heat to moving articles.

I claim—

1. In a machine for forming hollow articles from pulp, the combination of a receiver or dome, a former adapted to enter said receiver, the interior of the receiver corresponding to the exterior of the article to be formed, and the exterior of the former corresponding to the interior of the article to be formed, with means, substantially such as described, to force said former into said receiver, and a removable

follower arranged to occupy a portion of the space in the receiver in advance of the former, substantially as and for the purpose described.

2. In a machine for making pulpware, the combination of the receiver, its interior corresponding to the shape of the article to be produced, the said receiver supported in a fixed position, a former corresponding in shape to the interior of the article to be produced, and mechanism, substantially such as described, to force said former into said receiver, the said former supported upon a shaft adapted to be revolved, and whereby corresponding revolution will be imparted to said former, substantially as described.

3. In a machine for making pulpware, the combination of a receiver corresponding internally to the exterior of the article to be produced, a former corresponding to the interior of the article to be produced, a hydraulic cylinder fixed in substantially axial line with said former and receiver, a principal piston in said cylinder carrying a cross-head, a follower arranged to work through the back of the receiver, the cross-bar above said follower, with connections therefrom to the said cross-head of the piston below, the said follower hung to said cross-bar, and an auxiliary piston adapted to carry said former, the said auxiliary piston having a movement independent of the principal piston, with dogs arranged to engage said auxiliary piston when raised from the principal piston, substantially as described.

4. The combination of the receiver or dome F I, the former N, hydraulic cylinder C, principal piston Q, carrying the cross-head S, cross-bar U above the dome, connected to the cross-head below, the follower P, arranged in the top of the said dome, levers V W, pivoted together and at the pivot connected to said follower, one end of said levers hung to said cross-bar and the other end of the levers hung by links to the frame, and an auxiliary piston arranged in the principal piston, with a shaft extending therefrom upward and adapted to receive and support the said former, and movable independent of the principal piston, with dogs *u u* on the cross-head to support said auxiliary piston and former in the up position, substantially as described.

HENRY FAIRBANKS.

Witnesses:

DENNIS E. MAY,
O. A. WALKER.