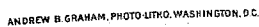


E. HUBBARD.  
PULP PAIL MAKING MACHINE.

Patented June 9, 1896.



# UNITED STATES PATENT OFFICE.

EBER HUBBARD, OF BERWYN, ILLINOIS.

## PULP-PAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 561,788, dated June 9, 1896.

Application filed August 10, 1895. Serial No. 558,841. (No model.)

*To all whom it may concern:*

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

The purpose of this invention is to provide improved means for molding a pail from wood or other fiber in pulp form and compressing it to hardness in or on the form in which it is so molded and leaving it with a finished surface.

It consists of features of construction which are specified in the claims.

In the drawings, Figure 1 is a vertical section of my entire improved machine for molding and pressing pails, certain hoods which cover the ports through which the pulp is injected being omitted in order to show other parts more clearly. Fig. 2 is a horizontal section at the line 2 2 on Fig. 1, the head of the mold being swung out of the way and not shown. Fig. 3 is a detail sectional plan at the line 3 3 on Fig. 1, only the head and its supporting and locking arms being shown in addition to the base of the machine and the corner-posts, which are cut by the section. Fig. 4 is a detail inverted plan of a portion of the table, designed to show hoods over the ports through which the pulp is introduced. Fig. 5 is a detail section at the same plane as Fig. 1, showing the hoods covering the ports in the table through which the pulp is injected.

In a former patent, No. 495,039, granted to me April 11, 1893, I have shown a press for compressing to suitable hardness a pulp pail which has been previously molded and placed on the form ready for such press, and in this patent I have shown a reducible tablet forming the bottom of the mold and a similar reducible head forming the top; and in Patent No. 515,958, granted to me March 16, 1894, I have shown a spring-metal jacket which constitutes a lining for a rigid tapering frame in which the pail is compressed by being longitudinally advanced thereinto, such lining being adapted to spring off from the molded pail when the latter is withdrawn out of the

tapering frame, thus avoiding the difficulty which had before been experienced in compressing the tapering bodies, such as pails, merely by longitudinally advancing them into tapering forms, that difficulty being that the pressure caused the fibrous material to adhere to the surface of the form, so that the pail was ruined or injured in withdrawing it after it had been forced thereinto for the purpose of compressing it. In my present machine I employ both the features above specified and will not enter into a minute description of them or their action, only referring to them in such general terms as will be necessary to identify them.

My improved machine comprises a rigid frame having a base A and a top plate A', connected by corner posts or rods A<sup>2</sup> A<sup>2</sup> A<sup>2</sup> A<sup>2</sup>. Since in this machine the strain experienced by the frame is such as will tend to strain the corner-rods A<sup>2</sup>, they should have great tensile strength. At the center of the base A is a long hub or cylinder a, in which is guided the stem a', which may be the ram of a hydraulic press, although the press may be operated by other means than hydraulic pressure. The ram a' carries at its upper end a reducible tablet constructed according to my Patent No. 495,039, above mentioned, and comprising the lower disk C and upper disk C', radial sliding sections C' C', &c., which the springs C<sup>2</sup> C<sup>2</sup>, &c., act upon, tending to hold them extended to expand the tablet. In addition to this tablet, which constitutes the bottom of the mold form, I provide an annular table, which is supported and guided on the rigid frame, having the hub B, which is adapted to be seated fast by means of the screw b on the upper end of the ram a', but is adapted also to be loose on said ram, and in that case to be supported by the bearing a at the upper end thereof. The arms B' B', &c., springing from this hub support the annular table proper, B<sup>2</sup>, in whose central aperture the tablet above described is designed to fit, closing the same, and with the annular table constituting a complete table for the mold.

D is the inner form, made in the customary manner, perforated to permit drainage and conformed to the cavity of the inverted pail. The exterior form of the mold is made up of

a series of staves E E E, &c., each provided with a thin metal lip *e* and lapping each other in circumferential series, the lap being sufficient to permit such expansion and reduction of the entire conical form thus made up to such extent as necessary in the operation of the machine, as will hereinafter appear. The expansion and reduction of this outer form is effected by the radial movement of the staves, respectively, and for their guidance in this movement, as well as for the purpose of communicating it to them, the staves have each an outwardly-projecting radial rib E', the outer edge of which is formed to operate as a cam, as hereinafter more particularly explained. These ribs are retained and guided by two rings F and F', which are secured rigidly to the frame by means of the steps or brackets *f f*, &c., fastened to the corner-posts A<sup>2</sup> A<sup>2</sup>, the rings being bolted to these steps or brackets. The rings have the radial slots *f' f'*, &c., to receive the ribs E' E', &c., of the staves E. A ring G, outside of the corner-posts A<sup>2</sup> and supported by the bracket-arms G' G', &c., extending conveniently to the same bolts which fasten the arms B', &c., to the annular table-top B<sup>2</sup>, is thus carried with said table. On this ring G are mounted springs F<sup>3</sup> F<sup>3</sup>, &c., one for each of these staves E, the said springs being extended up from the ring and engaging the eyes of the rigid arms F<sup>2</sup>, respectively, which project from the ribs E' of the staves E. These springs tend to hold the staves E out to the limit permitted by the slots in the rings F and F'.

Near the inner margin of the annular table-top B<sup>2</sup> there are formed through the same at opposite sides of the central opening two segmental apertures *b<sup>2</sup> b<sup>2</sup>* for the admission of pulp. For convenience of supplying pulp through these apertures they are covered on the lower side of the table by the hoods B<sup>20</sup> B<sup>20</sup>, which are provided with nipples *b<sup>20</sup> b<sup>20</sup>*, at which connection may be made with suitable pipes through which the pulp may be injected. B<sup>3</sup> B<sup>3</sup> are sliding valves let into suitable radial grooves in the upper surface of the table-top B<sup>2</sup>, and adapted to close the aperture *b<sup>2</sup>* when the valves are moved inward and adapted to be withdrawn to permit said apertures to stand open. These valves may be operated by hand. To close the mold at the upper end, I employ a reducible and extensible head constructed upon the same principle as the reducible and expansible tablet which forms the bottom, such head comprising the two disks H and H', bound together upon the stem *h* and affording guidance and support for the radially-movable and overlapping slides H<sup>2</sup> H<sup>2</sup>, &c., which are controlled by the springs H<sup>3</sup> tending to extend them. This expansible and reducible head is carried on an arm J, which is pivoted in one of the corner-posts A<sup>2</sup>, whereby it is adapted to be swung out from the frame or to be swung into the frame to occupy the position shown in Fig. 1,

closing the mold-cavity. When it is in this latter position, it is held rigidly by the engagement of the end of the swinging arm J with the latch J', which is secured to the opposite corner-post diagonally opposite the one to which the arm J is pivoted. I do not limit myself to any particular mode of latching this arm; but the construction shown in Fig. 3, wherein the arm J terminates in a tooth J<sup>2</sup> and is adapted to swing under the end of the latch J' and be stopped by a pin *j'*, answers the purpose well.

The construction of the fixed jacket K at the upper part of the frame and all that pertains to it and the reducible and expansible head therein and the spring-metal jacket K' is the same as shown in my Patent No. 515,958, above mentioned. Briefly described, K is a rigid jacket, which may be of cast-iron, bolted to the top plate A' of the press-frame, being interiorly conical—that is, circular—and tapering, the expansible and reducible head therein comprising the disks L and L' and the radial slides L<sup>2</sup>, retained between them and operated upon by the springs L<sup>3</sup>, tending to protrude the slides radially. It is carried by the stem L', which extends through the top plate A' of the frame in which it is guided, further guidance being afforded by the cross-head N, which is held by the bolt *n* at a distance above the top plate A', said cross-head N serving also as a stop for the upper ends of the springs M and M', which, at their lower ends, are stopped on the flange-collar L', which is pinned to the stem L' above the top plate A'.

O is a forked lever fulcrumed on the top plate A', having its fork-arms *o* spreading to embrace the springs M M', one arm extending each side thereof and being connected by a link O<sup>2</sup> to the jacket K' at the upper end of the latter. A weight O' on the outer end of the lever O overbalances the weight of the jacket K' and pulls it yieldingly up in the rigid jacket K.

The operation of the entire machine is as follows: By setting the bolt *b* the annular table is made fast to the ram *a'* with its upper surface flush with the upper surface of the slides C' of the tablet, which occupies the center of the annular table. The position of the ram being a little lower than that shown in Fig. 1, the outer jacket, made up of the staves E, is expanded a little more than shown in said figure. In this position the upper ends of the staves E are below the level of the extensible and reducible head which is suspended from the arm J, and which may therefore be swung into position ready to enter the upper open end of the form. The first slight upward movement of the ram causes the upper head to enter the form, and the slightest further advance causes the staves at their ends to press closely upon the sides of the extensible head, and at that stage there is formed a completely-closed mold, bounded by the inner form D and the outer form made up of staves E, the table at the

bottom and the head at the top. At this stage the pulp is injected through the ports  $b^2$ , and the valves  $B^3$  are then closed. The ram being now advanced upward, the edges  $e'$  of the cam-ribs  $E'$  on the staves  $E$  engage the outer end of the radial slots in the rings  $F$  and  $F'$ , respectively, at a portion of said edges  $e'$  where the slope is about forty-five degrees, and said upward movement of the ram and the entire form carried thereby causes a radially-inward movement of the staves equal in amount to the upward movement of the taper, whereby the pulp which fills the form is compressed substantially as much at the portion which forms the sides of the pail as at the portion which forms the bottom. The upward movement is continued until the staves at their lower ends coincide with the inner margin of the annular table, thus leaving the molded body standing entirely on the tablet and independent of any support which the annular table might afford. The bolt  $b$  being now loosened, the annular table and the outer form comprising the staves standing thereon is free to descend to the position from which it started, with the hub  $B$  resting on the upper end of the sleeve-bearing  $a$  of the ram. The staves being withdrawn radially by the operation of the springs  $A^3$  as they are descending away from the rings  $F$  and  $F'$ , respectively, permits them to withdraw. The staves being thus withdrawn below the extent of the reducible head on the arm  $J$ , said head is swung aside and the molded body is now left standing on the tablet exteriorly uncovered, the exterior jacket-walls, made up of the staves  $E$  and the head, having been withdrawn. The jacket is now spread so that its upper opening is as large as the tablet on which the molded pail stands—that is to say, as large as the greatest diameter of the pail. The ram being now advanced upwardly, the pail is carried up entirely through the jacket, passing out through the open end thereof and into the upper rigid jacket  $K$  and within the spring-metal lining  $K'$  thereof, the bottom of the pail eventually coming into contact with the extensible head in said jacket at the same time that the outer surface of the pail comes into contact with the lining  $K'$ . The slide-plates  $C'$  of the tablet having entered the lower end of the jacket  $K'$  and closing at the bottom forms a complete mold, which contains the molded and partially-pressed pail. The ram being now further advanced upward, the molded pail is further compressed by such longitudinal advance into the tapering and unyielding jacket, the lining  $K'$  having a tendency, however, when the pressure becomes considerable, to adhere to the pail and to be carried up with it, being itself reduced in diameter as it is thus carried up longitudinally, the springs  $M$  and  $M'$  being of such tension as to cause the head to yield only so much as to permit the bottom of the pail to be compressed equally with the sides. This portion of the operation is precisely

identical with the operation described in my said Patent No. 515,958. The pail having been compressed to the desired density, the ram is withdrawn, the jacket  $K'$  adhering to the compressed pail long enough to be pulled free from the fixed jacket  $K$ , and thereupon, the elasticity of the lining asserting itself, causes it to spring off from the compressed pail, whereupon the weight  $O'$ , operating through the lever  $O$  and links  $O^2$ , pulls the lining back again into the fixed jacket, leaving the pail fully compressed standing on a tablet, which now descends until the pail can be removed with the inner form  $D$ , on which it may be subsequently dried and indurated or otherwise treated, as desired, another inner form  $D$  being placed upon the tablet for the purpose of repeating the process in the manufacture of another pail.

In some cases it may be found that by reason of the fact that the pulp injected into the mold solidifies in the first stages by drainage the pulp at the upper part of the mold, which forms the bottom of the pail, may be more watery or less thoroughly drained than the pulp which forms the side at the lower portion of the mold, and that, therefore, if the bottom is to be equally dense with the sides it will require more compression—that is, more reduction in thickness—than the sides. In such cases proper allowance may be made in the first adjustment of the parts of the mold, a greater distance being left between the top of the inner form and the under surface of the disk  $H'$  of the reducible head than is left between the inner and outer forms at the sides, and the edge of the cam-ribs  $E'$ , being shaped substantially as shown in the drawings, will cause the first portion of the upward movement of the table carrying the entire mold to reduce the bottom and sides equally, such equal reduction occurring when the hardness of the edges of the cams which have the forty-five-degrees' slope are passing the edges of the plates  $F$  and  $F'$ , respectively. The subsequent further upward movement of the form will compress the bottom as much more than the sides as the edge of the cam-rib  $E'$  diverges more from horizontal than from vertical direction. By sloping the cams at this portion more or less, according to experience with different qualities of pulp, they may be adapted to effect substantially uniform density in the bottom and sides of the pail.

I claim—

1. In a pulp-pail-making machine, in combination with the fixed frame, the ram at the bottom thereof; a table comprising a central portion fixed to the ram and an annular portion adapted to be fixed to the ram or detached therefrom at will; the inner form supported on the fixed portion and a reducible and expansible jacket supported on the annular portion, the rings fixed to the frame adapted to reduce the jacket as the latter is advanced through them, and the reducible

head removably supported by the frame in the upper end of the jacket: substantially as set forth.

2. In a pulp-pail-making machine, in combination with a fixed frame, the inner form and a reducible tablet which supports it and a ram which supports the tablet and by which it is adapted to be advanced upwardly in the fixed frame; a reducible and expansible jacket supported on the frame and a removable reducible and expansible head for the same, in combination with a fixed tapering jacket located above the reducible jacket and having a reducible and expansible head, longitudinally movable therein whereby the pail may be molded and compressed to integrality both as to sides and bottoms in the reducible and expansible jacket and then advanced through the same into the fixed jacket for a final hardening-pressure: substantially as set forth.

3. In a pulp-pail-making machine, in combination with a fixed frame; a fixed tapering jacket at the upper end and a ram at the lower end; an expansible and reducible tablet supported by the ram and an inner form supported on the tablet; an annular table adapted to receive the reducible tablet in its inner opening, such annular table being provided with support on the frame and adapted also to be secured at will to the ram; an expansible and reducible jacket and an expansible and reducible head for the same removably supported on the frame; and a ring or rings fixed with respect to the frame and adapted to reduce the jacket as the latter advances through such ring or rings substantially as set forth.

4. In a pulp-pail-making machine, in combination with the fixed frame and the ram adapted to be advanced therein; a table carried by the ram; an inner form and an outer reducible jacket, such jacket comprising overlapping staves having ribs or outer surfaces provided with tapering shoulders to

adapt them to act as cams; the rings F and F' fixed with respect to the ram and slotted radially from their inner circumference to receive said ribs, in combination with the reducible head secured to the frame and adapted to be embraced by staves at their upper ends, and adapted to be reduced by the pressure of the staves: substantially as set forth.

5. In a pulp-pail-making machine, in combination with the frame, the ram and the table carried by it; the reducible jacket carried by the table comprising overlapping staves having exterior radially-projecting ribs whose shoulders at the upper end are inclined about forty-five degrees to the axis of the ram, and at the lower part have reduced inclination to said axis; and the rings F and F', secured to the frame and radially slotted to receive the ribs, in combination with the reducible head adapted to be embraced by the upper end of the staves and reduced by their pressure; whereby longitudinal advancement of the ram in the frame compresses the sides and bottom of the pail equally at first, and afterward additionally compresses the bottom in excess of the sides: substantially as set forth.

6. In a pulp-pail-making machine, in combination with the frame, the annular table having ports  $b^2$  for the pulp; the tablet filling the central opening of such table, and the reducible jacket supported on the annular table and adapted to be reduced to the inner margin thereof; whereby the pail molded in such jacket and compressed to integrality by the reduction of the jacket is supported wholly on the tablet and free of the annular table: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 1st day of August, 1895.

EBER HUBBARD.

Witnesses:

CHAS. S. BURTON,  
JEAN ELLIOTT.