

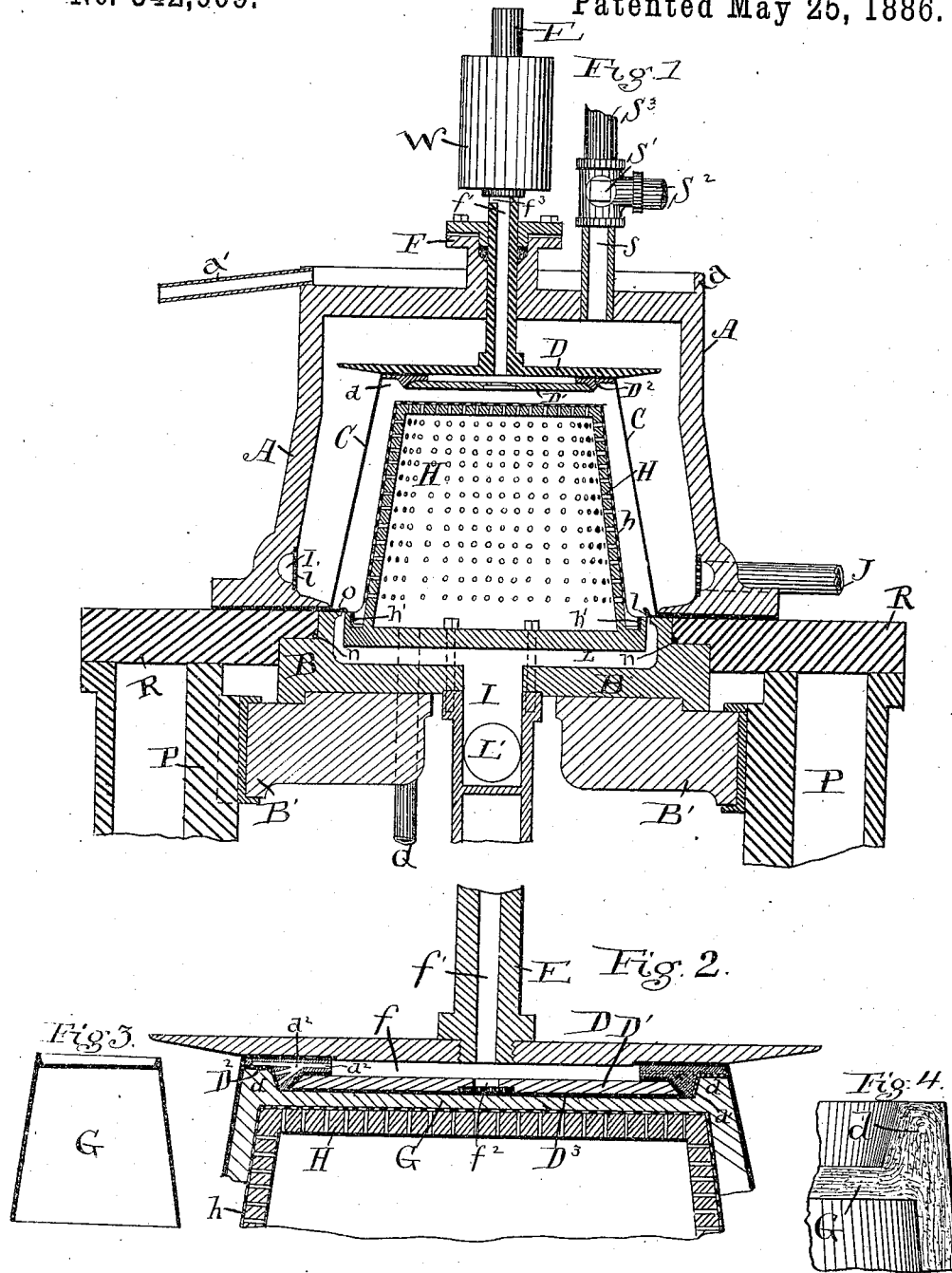
(Specimens.)

M. L. KEYES.

MACHINE FOR FORMING HOLLOW ARTICLES FROM PULP.

No. 342,609.

Patented May 25, 1886.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## MACHINE FOR FORMING HOLLOW ARTICLES FROM PULP.

SPECIFICATION forming part of Letters Patent No. 342,609, dated May 25, 1886.

Application filed January 28, 1886. Serial No. 150,058. (No model.)

*To all whom it may concern:*

Be it known that I, MARTIN L. KEYES, a citizen of the United States, residing at Gorham, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Machines for Forming Hollow Articles from Pulp; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to machines for making hollow articles—such as pails, tubs, &c.—from wood or paper pulp, and it is particularly designed as an improvement on Patent No. 287,416, dated October 17, 1883, granted to J. G. Bodge.

The object of my invention as applied to pail-machines is to form on the bottom of the pail a chine or annular projection around the lower edge of the pail in the place of the rounded corner previously made by these machines.

The invention consists in the insertion in the top of the rubber bag or diaphragm used in the machines of a rigid head or disk containing a groove around the outer edge of the under side of said disk, within which groove the pulp is deposited and compressed to form the chine of the pail, the disk being connected with a centering-rod, which extends upward through the top of the outer dome. The rigid head referred to is constructed in such a manner as to prevent its clinging to the bottom of the pail after the same has been formed and is being removed.

In the Bodge machine, on which my present invention is designed as an improvement, a rubber bag or diaphragm enveloping the outside of a perforated former is used, and between the bag and the former the pulp is introduced, which pulp, after being deposited on the outside surface of the former is compressed against it by a hydraulic pressure applied to the outside of the bag. In this operation the corners of the bottom of the pulp pail become more compressed than the other parts, and are consequently rounded, necessi-

tating the use of the chine-hoop to give the pail a proper form when finished. Attempts have been made to form a square corner on the bottom of the pail by molding the rubber bag with a square stiffened corner on its inner edge; but these attempts have failed because the head of the bag, having no means of centering itself, could not be relied upon to come down in the proper place.

My invention therefore consists in attaching to the top of the rubber bag a rigid head rabbeted or grooved around the under edge to form the chine of the pail, or otherwise formed to conform to the exterior surface of the article to be made, said head having a centering rod or spindle passing up through the top of the dome, and an arrangement of air-ducts, to prevent the pulp from clinging to the head when the pail is removed.

My invention is fully illustrated in the accompanying drawings, in which Figure 1 is a central vertical section through the Bodge machine embodying my improvements. Fig. 2 is an enlarged section through head D, as hereinafter shown. Fig. 3 is a sectional view of chine-pail produced by my improved machine; and Fig. 4 is an enlarged section through the chine of the same, showing the manner in which the fiber is laid.

A is the outer dome or cylinder of the Bodge machine.

H is the former, resting on its base B.

h is the wire-gauze used on the outside of former H, and L is a duct for the admission of stock through the base B. The duct L opens into the space between the rubber bag C, which surrounds the former H, and the exterior of the former by a narrow slit, l, which surrounds the base of the former, and which is closed by an inward-opening flap-valve, o. n is a rubber packing, which packs the base B with the bed-piece R on which the dome A rests. The base B is supported by the lugs B', which run up and down on the slides P.

S is a pipe entering the top of dome A, having a three-way cock, S'.

Q is a pipe leading from the interior of the former H downward through base B.

I shall now proceed to describe the parts of the machine on which I base my claims for

improvement, in order to distinguish them from what has been used previous to my invention.

5 Secured to the upper portion of the rubber bag C is the hollow head D. This head consists of an upper plate, D, a lower plate, D', and a ring, D<sup>2</sup>. This ring D<sup>2</sup> has around its periphery a rabbet or groove, *d*, having the form desired for the chine of the pail. The upper edge of the rubber bag C is clamped between the upper plate and the ring D<sup>2</sup>. An 10 expansible rubber disk, D<sup>3</sup>, extends over the lower face of plate D', its edges being clamped between the ring D<sup>2</sup> and the lower plate, D'. The top and the interior walls of the groove *d* are lined with wire-gauze, *d'*, and the ring D<sup>2</sup> is pierced by numerous small ducts *d''*, extending from the walls of the groove *d* to the hollow chamber *f* in the interior of the head D. 15 A hollow centering-rod, E, is screwed into the top plate, D, and extends upward through the stuffing-box F in the top of the dome A. The duct *f'* in the interior of the rod E connects at its lower end with the chamber *f*, and opens into the air by the offset *f''*. W is a weight, which is slipped on over the rod E. The duct *f'* opens from the chamber *f* downward through the lower plate, D'. The diameter of the upper plate, D, is made somewhat larger than the other parts of the head for the reason hereinafter specified.

20 *a* is a rim raised around the upper edge of the dome, and *a'* is a drainage-pipe leading from the space inclosed by said rim. The recess I surrounds the lower part of the dome A, and is separated from the interior of the dome by the perforated metal plate *i*. The pipe J leads from the recess I.

25 When a pail is to be formed, the pulp or stock is forced under pressure through the duct L and the narrow slit *l* into the space between the bag C and the former H. The bag C is thus expanded outward against the interior surface of the dome A, the head D being at the same time lifted upward against the top of the dome. The outer edge of the upper plate, D, projecting out beyond the bag C, prevents the bag from folding over the edge of the head D, and thus cutting the rubber. 30 The water from the paper stock passing through the walls of the former H deposits the fiber on its exterior surface. A deposit is also made within the groove *d*, the water from the stock passing through the gauze *d'* and the ducts *d''*, *f*, *f'*, and *f''* to the air, where it drops down on the top of the dome A, and runs off through the drainage-pipe *a'*. When the pulp has been deposited of sufficient thickness to form the pail, the supply is shut off, 35 and water or compressed air under a heavy pressure is let in through pipe S to the space outside the rubber bag, the pipe J being closed. Under this pressure and the pressure of the weight W the head D is forced downward, and the bag C at the same time pressed inward from all sides, contracting around the outer surface of the deposited pulp, the valve O closing

and preventing the backflow of pulp in duct L. The head D bearing within the groove *d* the deposit of fiber, descends on the top of the 70 formed pulp, the fiber in the groove *d* uniting and forming a homogeneous mass with that deposited about the edge of the former, and completing and perfecting the formation of the bottom of the pail, which takes the exact 75 shape of the interior surface of the head D. The heavy pressure thus exerted on the top of the head D and the sides of the rubber bag C squeezes the greatest part of the water from the pulp and consolidates it into a solid mass 80 without disturbing the structure of the fiber, which is laid with a laminated structure similar to the structure of ordinary paper as laid on a paper-machine. The pail having been thus formed, the former H, bearing on its outer 85 surface the formed pail, is lowered by suitable machinery, the bag C, cleaving gradually from the sides of the pail, and the head D following it down, a valve in the pipe J being meanwhile opened to allow the escape of the water 90 or air used for pressure. When the sides of bag C are entirely cleaved away from the surface of the pulp, the elastic disk D<sup>3</sup> will draw away from the surface of the head D, sucking in water behind it through the duct *f'*, and 95 will gradually cleave from the bottom of the pail. The ducts *d''*, by admitting water freely behind the chine *d*, facilitate its removal without disturbing the fiber. Being relieved from the pail the disk D<sup>3</sup> returns to its former position. 100 If the rubber disk D<sup>3</sup> or some similar venting device were not used the pulp would cling solidly to the head D and be removed with difficulty. The bottom of the pail as thus formed on my improved machine, beside 105 being molded to the exact shape desired, is furnished with a smooth and even surface, which requires little or no sand-papering or other finishing. This is not true of those parts of the pail formed in contact of the rubber bag, which bag, being very elastic, forms the pulp with a more or less uneven surface, requiring the outside of the pail when dry to be turned down and sand-papered at a considerable expense. Any desired form of chine 115 may be made by altering the shape of the groove *d*; or, if a square corner is desired, the head D can be made perfectly plain. Beside effecting the formation of the bottom of the pail, I effect a more even distribution of the 120 pulp around the sides by accurately centering the bag C.

By cementing raised letters or figures on the surface of the disk D<sup>3</sup> I am able to imprint on the bottoms of the pails labels, &c. 125

The laminated structure of the fiber with which the chine *d* is made up (see Fig. 4) renders this chine as solid and substantial as any portion of the pail, a result which has not before been attained in paper pails, and I am 130 thus able to finish the pail without the use of any protecting-hoops around the bottom.

The weight W is necessary to make up for the loss of pressure resulting from the use of

the centering-rod E, and this weight may be indefinitely increased if more pressure is desired on the bottom than on the sides of the pail. The thickness of the bottom of the pail may be regulated by putting a stop on the centering-rod E.

It is evident that the means here shown for centering the head D may be replaced by other means equally effective. For instance, arms might be run out from the head D, resting against the inner surface of the dome, thus centering the head D and dispensing with the rod E; but I prefer to use the centering-rod E, because it forms a convenient means of discharging the water which comes through the ducts *d*.

The use of a rigid head or section attached to and forming part of the rubber bag in these machines is capable of being used in a great variety of ways, and I do not wish to limit myself to its use in making pails, nor, indeed, to articles having circular heads; but in forming any kind of hollow article by means of a rubber bag acting outside of a perforated former I design to attach to that bag a rigid section with a centering device, the inner surface of this section being of the form of the outside surface of the article to be formed. This rigid section may be flat, or to a certain extent convex or concave, according to the shape of the article to be formed; but it must be of such form that every portion of the rigid section will approach the corresponding portion of the perforated former in a direction substantially at right angles to both surfaces, otherwise the pulp will be rolled between the two approaching surfaces.

Experiment will determine how far the approaching surfaces may vary from a right angle to the line of motion of the head without rolling the pulp and destroying the structure.

It is desirable to make the rigid section in each case as large as possible, because of the perfect formation of both the inside and outside of the article, where such section is used, as compared with that produced by the pliable rubber bag.

I claim—

1. In a machine for forming hollow articles from wood or paper pulp, a rubber bag or diaphragm enveloping a perforated former, said bag having attached to it a rigid section or head, the inner surface of which is molded to fit the corresponding section of the article to be formed, and being provided with means for centering it, substantially as and for the purpose set forth.

2. In a machine for forming hollow ware from wood or paper pulp, a rubber bag or

diaphragm enveloping a perforated former, said bag having attached to it a rigid section or head, the inner surface of which is molded to fit the corresponding section of the article to be formed, said head being provided with a centering-rod passing upward through the outer dome, substantially as and for the purpose set forth.

3. In a machine for forming pails and similar articles from wood or paper pulp, in combination with a perforated former enveloped by an expansible rubber bag, a rigid head attached to said bag and having on its under surface a groove for forming the chine of said pail, and a centering-rod passing upward through the top of the outer dome, substantially as and for the purpose set forth.

4. In a machine for forming pails and similar articles from wood or paper pulp, in combination with a perforated former enveloped by an expansible rubber bag, a rigid head or disk attached to said bag and having on its under surface a groove for forming the chine for said pail, said groove being lined with some pervious material connecting with ducts leading to the hollow centering-rod passing upward through the outer dome, substantially as described.

5. In a machine for forming pails and similar articles from wood or paper pulp, in combination with an expansible rubber bag, a rigid head or disk attached to such bag and having on its under side a groove for forming the chine of said pails, said groove being lined with pervious material connected with ducts for conducting away water and venting said groove, substantially as described.

6. In a machine for forming pails or similar articles from wood or paper pulp, a rubber bag or diaphragm to which is attached a rigid head, the under surface of which is wholly or partially faced with a rubber disk, said disk being secured around its periphery and expansible at its center, combined with vent-holes for allowing the same to expand when said pail is removed, substantially as described.

7. As a new article of manufacture, a pail or other similar article formed from wood pulp or other similar fibrous material, having an annular projection or chine around its bottom, said chine being formed with a uniformly-laminated structure, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN L. KEYES.

Witnesses:

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JAMES WHITTLE.