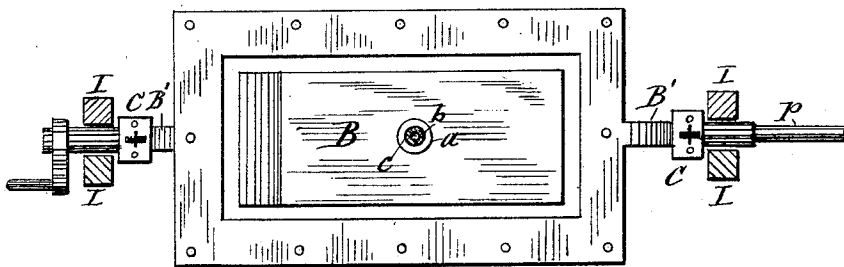
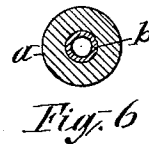
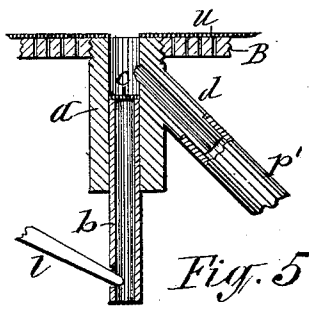
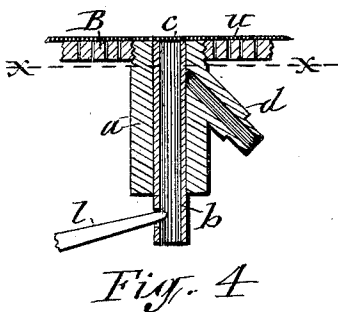
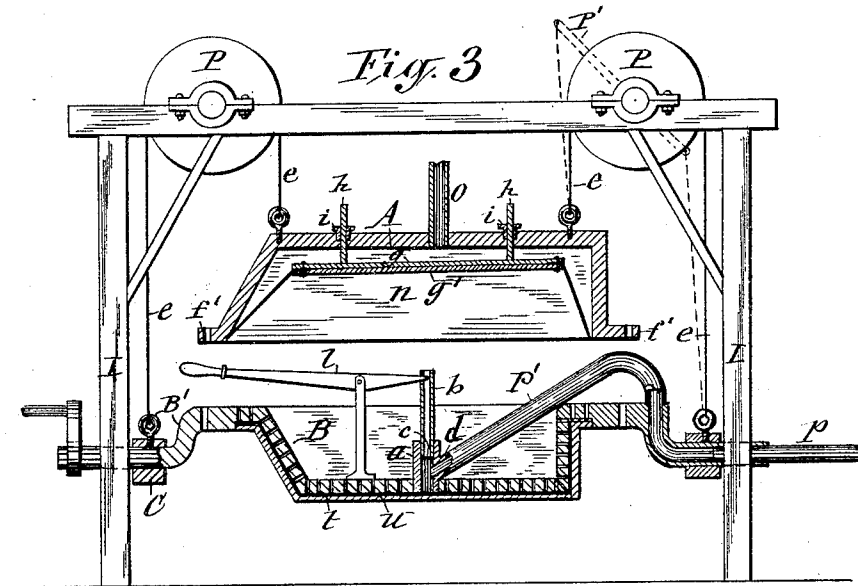


G. D. KING.

MACHINE FOR FORMING HOLLOW WARE FROM PULP.

No. 459,164.

Patented Sept. 8, 1891.



WITNESSES:

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J. J. Grass

Fig. 7

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UNITED STATES PATENT OFFICE.

GEORGE D. KING, OF OSWEGO, NEW YORK.

MACHINE FOR FORMING HOLLOW WARE FROM PULP.

SPECIFICATION forming part of Letters Patent No. 459,164, dated September 8, 1891.

Application filed April 22, 1889. Serial No. 308,168. (No model.)

To all whom it may concern:

Be it known that I, GEORGE D. KING, of Oswego, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Machines for Forming Hollow Ware from Pulp, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention consists in an improved construction of a machine by means of which hollow ware of large sizes, such as bath-tubs, &c., can be manufactured in a perfect, expeditious, and convenient manner from pulp, as herein after fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a vertical longitudinal section of a machine for forming bath-tubs and showing the same with the formed article between the dies or molds. Fig. 2 shows the same with the dies or molds separated from each other. Fig. 3 shows the same with the male die inverted preparatory to removing the molded article from the die. Figs. 4 and 5 are detached enlarged longitudinal sectional views of the pulp-induction pipe and conduit connected therewith and the piston by which the induction-pipe is closed. Fig. 6 is a detached enlarged transverse section on line *x x*, Fig. 4; and Fig. 7 is a horizontal transverse section on line *y y*, Fig. 2.

Similar letters of reference indicate corresponding parts.

A denotes the hollow mold or female die, and B the male die, designed for forming bath-tubs. These dies I suspend from oscillatory supports and respectively at opposite sides of the fulcrums of said supports, so as to counterbalance or partly counterbalance said dies, and thus facilitate the manipulation of the same. The oscillatory supports may consist either of pulleys P P, as shown by full lines in the annexed drawings, or of levers P' P', as represented by dotted lines in Fig. 3 of the drawings, and when one die is heavier than the other the levers may have the fulcrums out of the center and the heavier die suspended from the short arms of the levers, as represented in said figure of the drawings.

e e e represent cables, chains, or straps by

which the dies are suspended, and when the oscillatory supports before mentioned consist of pulleys P P said cables or chains run upon the pulleys. The lower or male die is provided at opposite ends with arms B' B', by which it is hung on horizontal pivotal bearings or blocks C C, connected to the cables or chains *e e*, and thus said die is adapted to be inverted in its position, for the purpose herein after explained. The aforesaid arms extend through spaces between posts I, by which the said die is guided in its vertical movement. Said die is foraminous in the usual manner and covered with perforated sheet-brass or other suitable material, as shown at *u*, to allow free escape of the liquid from the pulp subjected to pressure between the two dies. By means of bolts *f f* passing through a flange *f'* on the base of the female die and through a horizontal projection or flange on the base of the male die said dies are fastened to each other during the process of compressing the pulp into form.

In the female die is arranged the piston *g*, consisting of a stout metallic plate of the shape of the bottom of the bath-tub or article to be formed. Said piston is guided by stems *h h*, projecting vertically from the top of the piston and through stuffing-boxes *i i* on the top portion of the female die.

n denotes the rubber bag, which is usually employed in connection with the piston and dies in this class of machines. Said rubber bag is attached to its upper edge between the marginal portions of the under side of the piston *g* and a plate *g'*, fastened to said side of the piston, and the lower edge of the rubber bag is clamped between the flanges of the two dies, as shown in Fig. 1 of the drawings.

o denotes a pipe through which to introduce water under pressure between the piston *g* and female die, said pipe tapping the die, preferably, near the center of its top, as shown.

a is the pulp-induction pipe, which is extended from the under side of the raised portion of the lower or male die at or near the center thereof for the purpose of distributing the pulp as uniformly and as quickly as possible, which is especially essential in the process of molding large articles. The delivery

of the pulp into the die is further facilitated and accelerated by the direction of the delivery direct from the end of the pipe and in line with the axis thereof. This induction-pipe is preferably but not arbitrarily at right angles to the part of the die to which it is attached; but in every case the discharge end is to be permanently flush with the inner side of the die. In said pipe is arranged a tubular plunger *b*, across the upper end of which is secured a perforated brass plate or other suitable strainer *c* to allow drainage through the plunger and prevent loss of pulp.

l is a lever by which to operate the plunger *b*. The pulp is introduced under pressure into the induction-pipe *a* by a branch pipe *d*, tapping the pipe *a* at its side and at a point to allow the plunger *b* to be moved outward past the intersection of the said two pipes, and thus allow the pulp to pass into the pipe *a* in advance of the piston. The plunger has a stroke to carry the head flush with the inner surface of the die.

For conveying the pulp to the pipe *d* I make the end portion of one of the arms *B'* hollow and connect thereto the pulp-conveying pipe *p*, and the inner end of the channel *s* in the said arm I extend through the bottom of the arm, as shown in Fig. 2 of the drawings, and to this end of the channel I connect a pipe or hose *p'*, the opposite end of which is connected to the branch pipe *d*.

The operation of the described machine is as follows: The two dies *A* and *B* being bolted or firmly secured to each other, as illustrated in Fig. 1 of the drawings, the pulp is admitted between the dies through the induction-pipe *a* by drawing the plunger *b* outward into the position shown in Fig. 5 of the drawings. The entrance of the pulp forces the piston *g* upward and the rubber bag *n* outward to the inner sides of the female die *A*, and when a sufficient amount of pulp has been admitted the plunger *b* is forced upward to bring the head thereof flush with the top of the male die, thereby shutting off the supply of pulp from the conduit *d*. Then water is admitted under pressure through the pipe *o*, and this presses the piston *g* and rubber bag *n* toward the male die and compresses the pulp into the requisite shape, as shown at *t* in Fig. 1 of the drawings. The water expressed from the pulp escapes through the perforations of the male die and through the

strainer *c* on the tubular plunger *b*. The end of the plunger, being flush with the inner surface of the male die, produces an even surface on the formed article. After the article has been subjected to the requisite pressure to expel sufficient liquid to render the article self-sustaining the two dies are disconnected from each other and the lower or male die lowered, and in doing so the female die is simultaneously raised by the cables or chains *e e* and oscillatory supports *P P*, as represented in Fig. 2 of the drawings. After the two dies have been separated a sufficient distance the lower or male die *B* is turned into an inverted position, as represented in Fig. 3 of the drawings, which may be effected by a crank *p''*, attached to one of the arms *B'* of the male die. This position of the male die allows the molded article to be readily and safely removed from the die.

I do not claim in this application the combination, with the pervious die or female die, of the pulp-induction pipe admitting pulp through said die and a valve connected to said pipe and having a strainer or pervious surface which, when said valve is closed, forms a portion of said die. Neither do I herein claim in combination with the aforesaid elements the lever for operating said valve, said features constituting the subject-matter of my application for patent, Serial No. 382,452, filed February 24, 1891, and which is a division of this present application.

What I claim as my invention is—

1. The combination of male and female dies, supports for said dies, and pivotal connections between the male die and its supports, whereby said male die is adapted to swing in a vertical plane, substantially as set forth.

2. The combination of the pulleys *P P*, cables or chains *e e*, running upon said pulleys, the female die *a*, suspended by one end of each of said cables or chains, the blocks *C C*, connected to the opposite end of the respective cables or chains, and the male die *B*, swiveled in said blocks, substantially as described.

In testimony whereof I have hereunto signed my name this 15th day of April, 1889.

GEORGE D. KING. [L. S.]

Witnesses:

C. H. DUELL,
MARK W. DEWEY.