

(No Model.)

2 Sheets—Sheet 1.

M. L. DEERING.  
PULP MOLDING MACHINE.

No. 432,379.

Patented July 15, 1890.

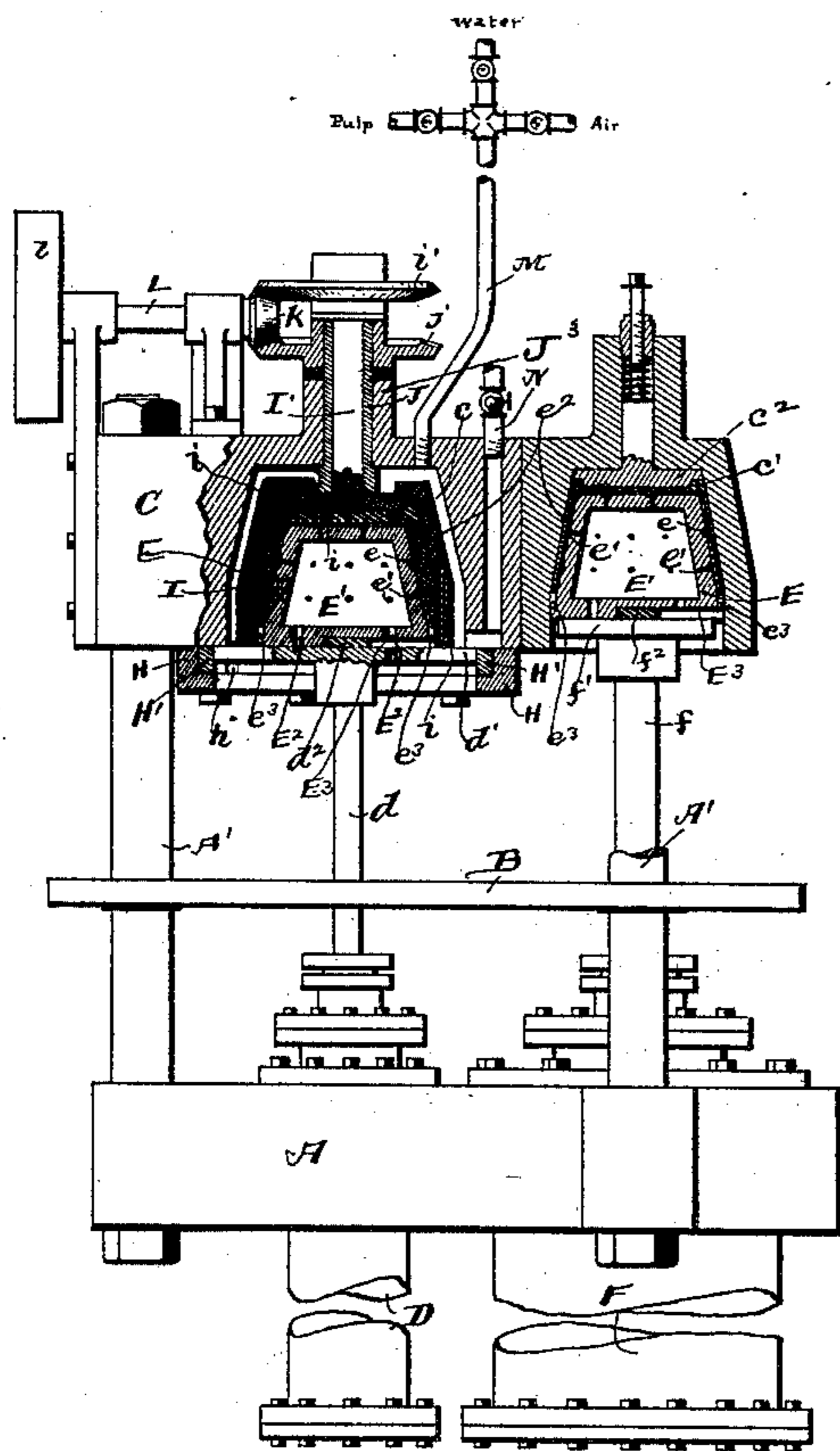


Fig. 1

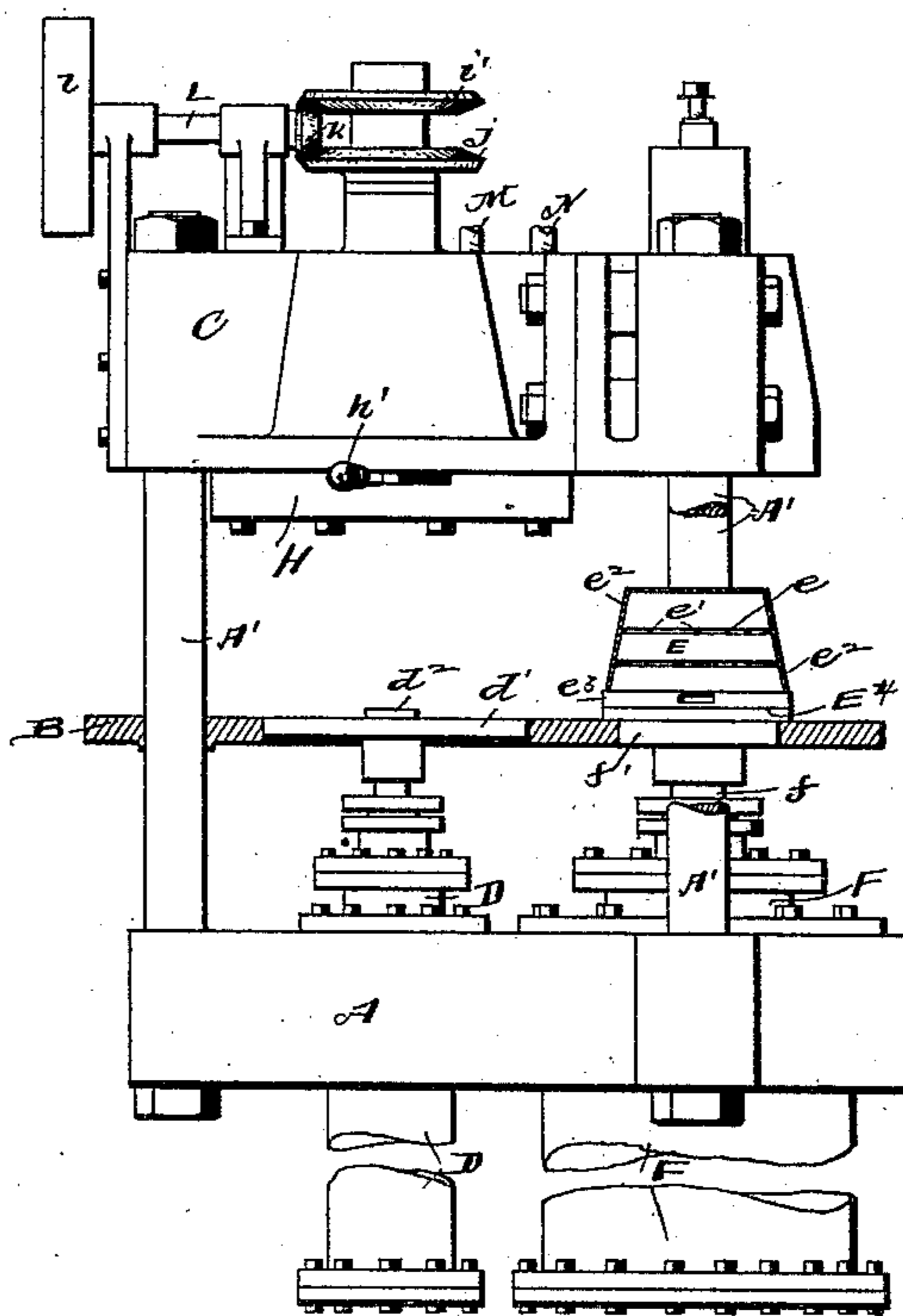


Fig. 2

WITNESSES,

M. S. Amstutz.  
Geo. W. King.

Mark L. Deering INVENTOR.

By  
Liggett & Liggett.

ATTORNEYS

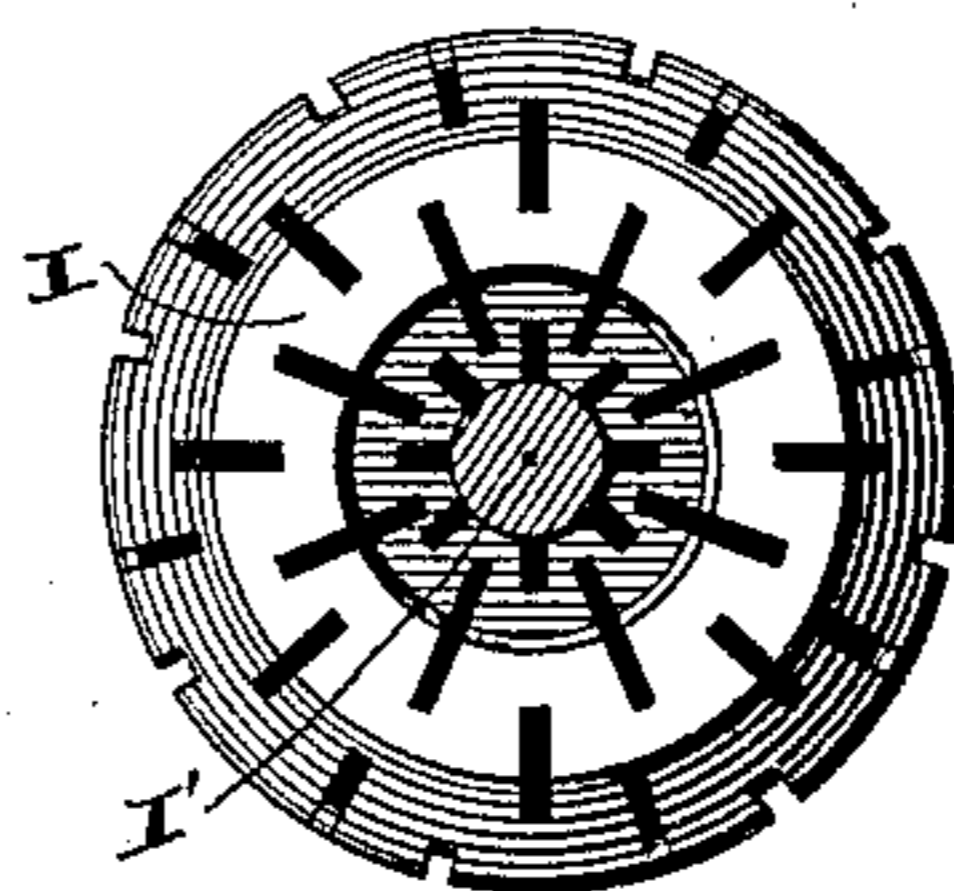
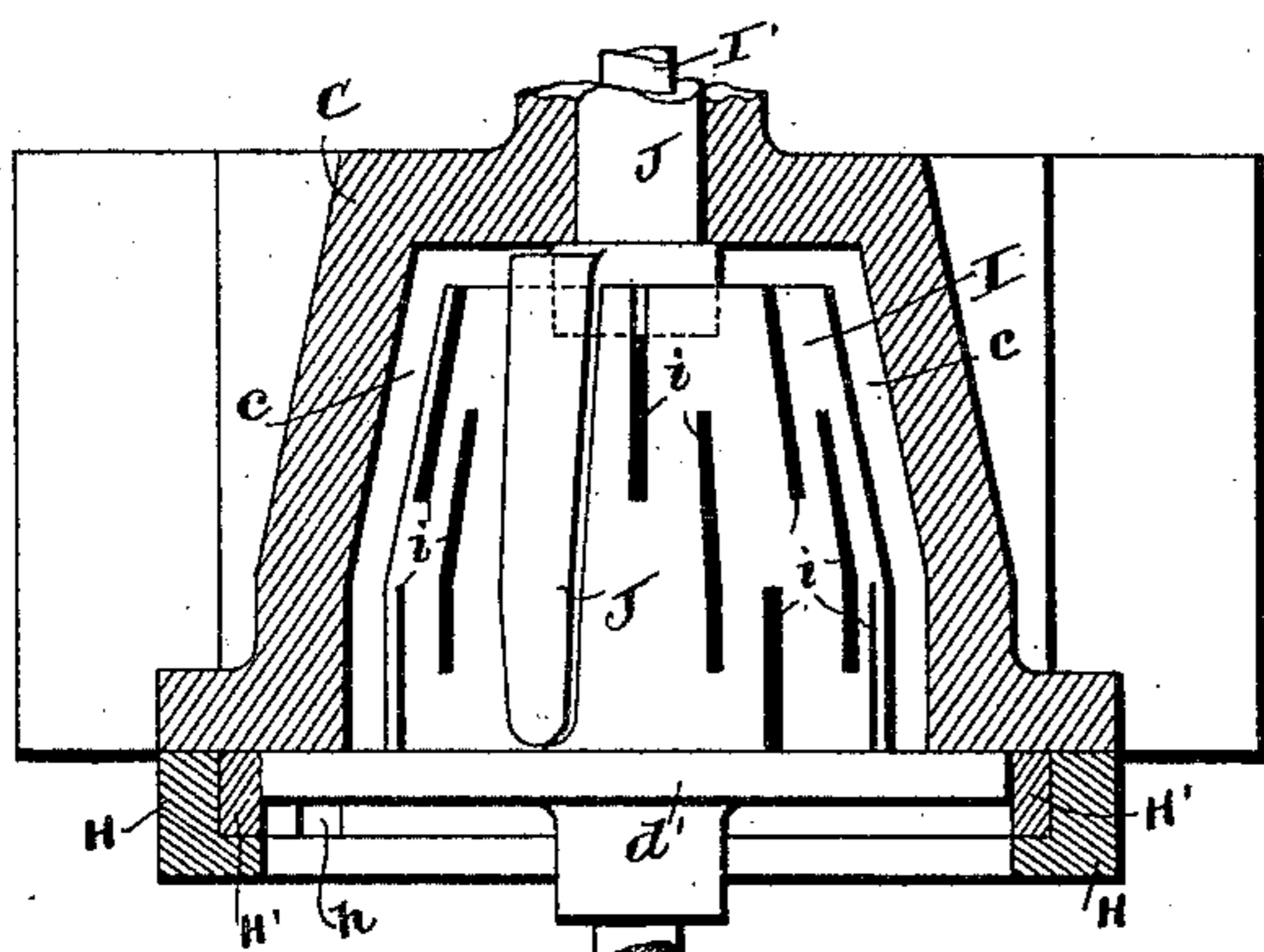
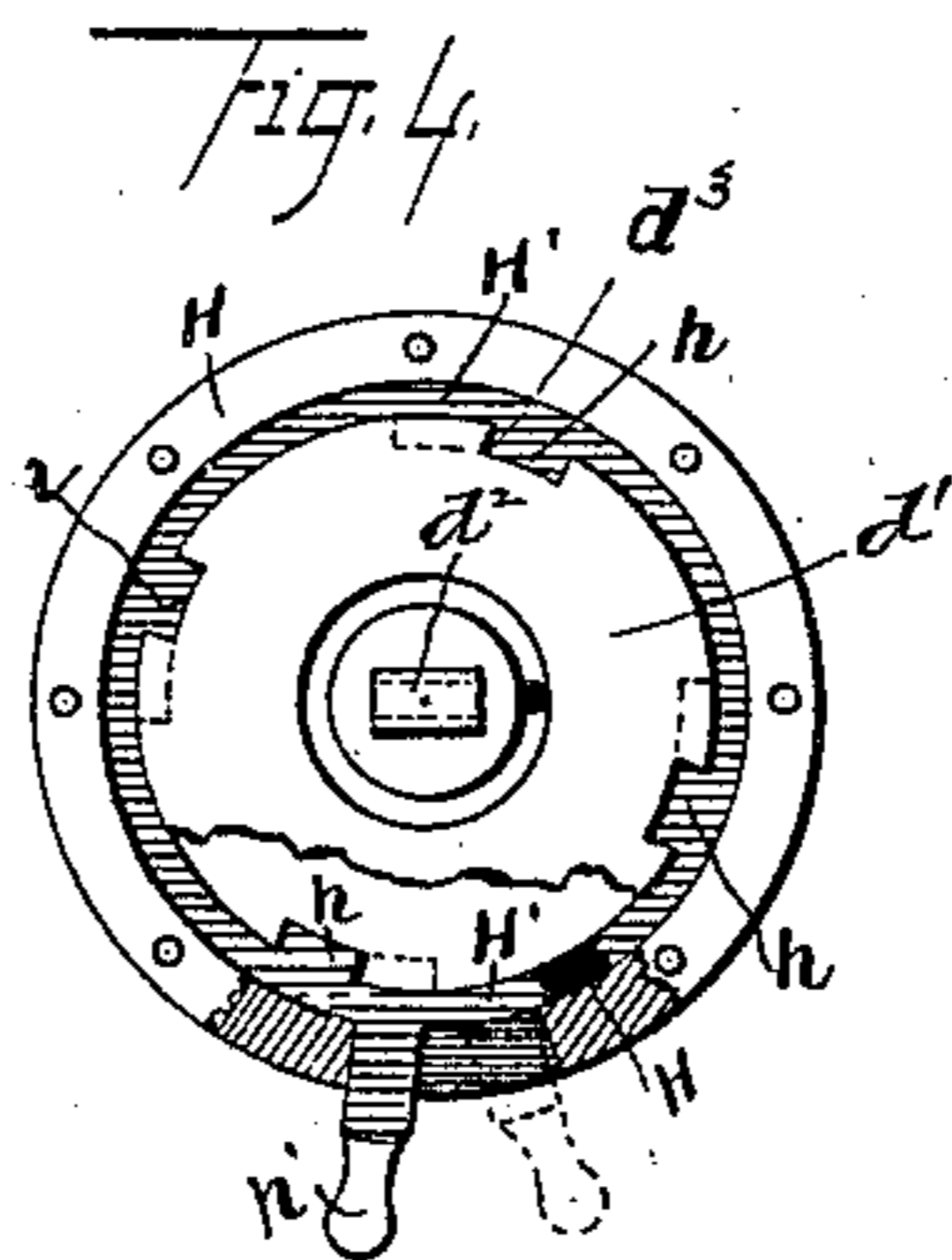
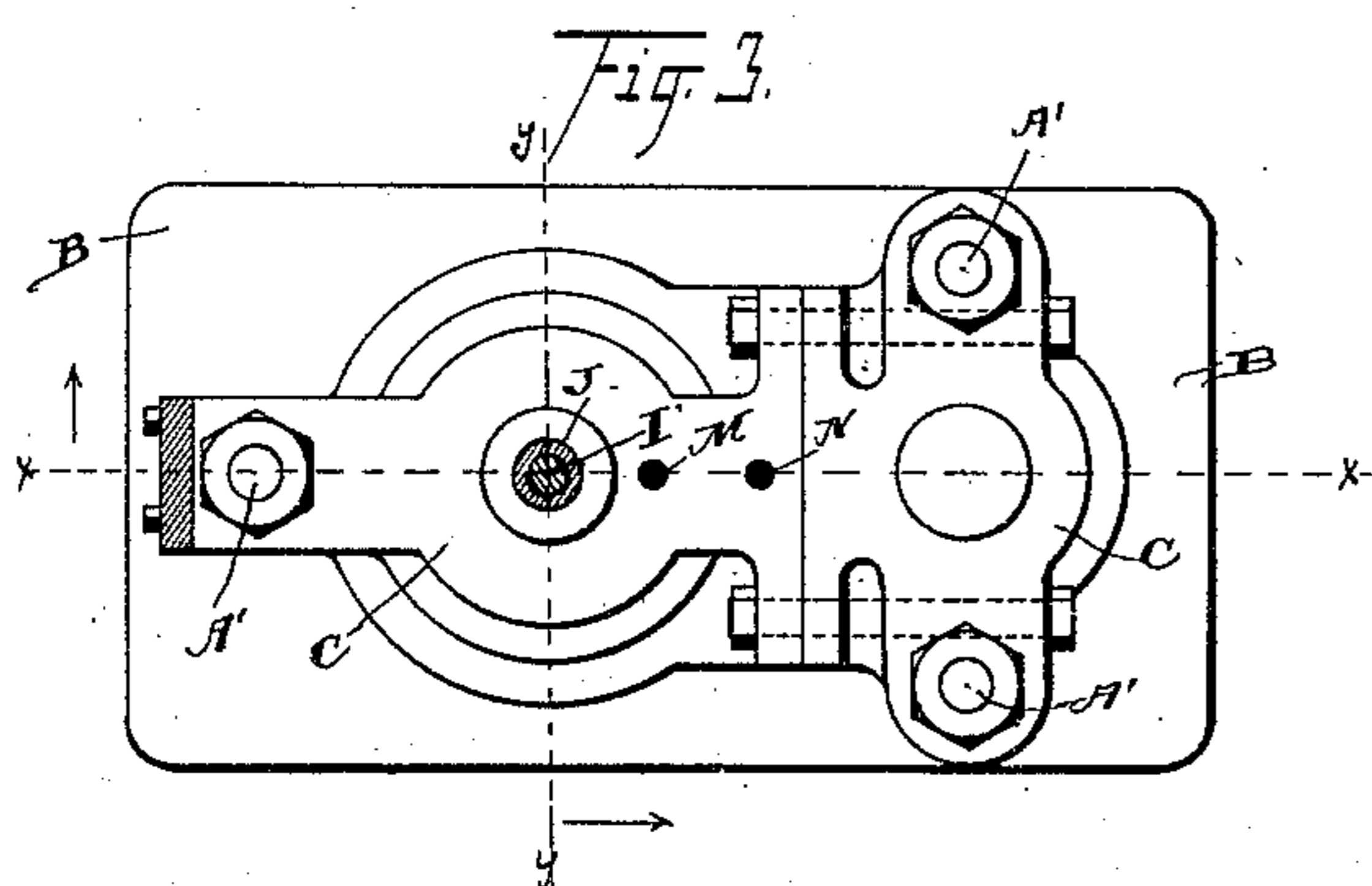
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WITNESSES,

*W. S. Amstutz*  
*Geo. W. King*

*M. L. Deering*

INVENTOR.

*Leggett Leggett*

ATTORNEY

# UNITED STATES PATENT OFFICE.

MARK L. DEERING, OF CLEVELAND, OHIO, ASSIGNOR TO THE UNITED  
INDURATED FIBRE COMPANY, OF PORTLAND, MAINE.

## PULP-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 432,379, dated July 15, 1890.

Application filed September 27, 1888. Serial No. 286,480. (No model.)

*To all whom it may concern:*

Be it known that I, MARK L. DEERING, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Pulp-Molding Machines; and I do hereby 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 pertains to make and use the same.

My invention relates to pulp-molding machines designed more especially for hollow ware; and it consists in certain features of construction and in combination of parts, hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figures 1 and 2 are side elevations, the former showing the molds in section and the latter showing the table in section. Fig. 3 is a plan with the top gearing removed. Fig. 4 is a plan of the locking-rings and head. Fig. 5 is a view in section of the molding-chamber, showing the mold in side elevation; and Fig. 6 is a plan view of the mold.

In carrying out my invention any suitable frame-work will answer the purpose, the construction shown being well adapted to the work, and is therefore recommended, and is as follows:

A represents the bed, to which are attached columns A', for supporting the table B and casing C, the latter containing the molding and compression chambers, respectively, *c* and *c'*. The casing (shown for convenience) was made in two sections bolted together; but this is not material.

D and F are hydraulic cylinders rigidly connected with the bed and provided with plungers, respectively, *d* and *f*, extending up through suitable openings in table B.

E are formers that are alike and are interchangeable on the ends of plungers *d* and *f*. Each former is hollow, having a central cavity E', of considerable size, with one or more drain-holes E<sup>2</sup>, leading downward from such cavity. The top and side walls of the former are provided with a series of deep narrow grooves *e*, with drain-holes *e'*, leading from the bottom of each groove into cavity E'. The face of the former is covered with finely-per-

forated plate *e*<sup>2</sup>. A removable band *e*<sup>3</sup> fits easily outside the former, the band resting on shoulder E<sup>4</sup> of the former. The plungers have flanges or heads *d'* and *f'*, permanently secured thereto, head *d'* being of suitable size to close the mouth or bottom of the molding-chambers, while flange *f'* is usually somewhat smaller in diameter than the base of the former. Each flange or head has an upwardly-projecting lug, respectively, *d*<sup>2</sup> and *f*<sup>2</sup>, these lugs being rectangular in plan and having undercut side walls and being fac-similes of each other. These lugs fit in grooves E<sup>3</sup> of the former, the engaging walls of the former and lugs forming a dovetail, by which arrangement the former is held securely on the flange or head and is held from turning thereon. In the depressed position of the plungers head *d'* and flange *f'* are flush with table B, so that a former is conveniently slid off of the lug *d*<sup>2</sup> and slid onto the lug *f*<sup>2</sup>, or vice versa, the table supporting the former during such changes.

H is a ring located concentric with the molding-chamber, this ring being bolted to the under side of casing C and having a rabbeted inner edge for engaging ring H' and forming a seat therefor. The latter has inwardly-projecting wings *h*, that correspond with notches *d*<sup>3</sup> of head *d'*. Ring H' has a handle *h'*, for turning the latter on its seat, and when wings *h* register with notches *d*<sup>3</sup> head *d'* may, by the action of ram D, be passed up through ring H' and made to abut against the under side of the casing, thus closing the molding-chamber, after which, by turning ring H' a short distance, head *d'* is locked in its elevated position.

I is the mold, the same being mounted on trunnion I'. The mold is provided with a series of openings—for instance, slits *i*—for the passage of the liquid pulp. Trunnion I' is journaled in sleeve J, the latter being journaled in box J<sup>3</sup> of the casing. To the lower end of the sleeve is attached one or more stirrers or arms J', the latter operating in chamber *c* outside of the mold to prevent the pulp from settling outside of the mold. Trunnion I' is provided with beveled gear *i'*, and sleeve J is provided with beveled gear *j*, both these bevel-gears engaging in common a bevel-pin-

ion K. This pinion is mounted on shaft L, the same having a suitable driving-pulley *l*, for operating the device. With such arrangement it is evident that arm *J'* and mold *I* will rotate in opposite directions. Induction-pipe *M* and one or more eduction-pipes *N* are provided, the former connecting, preferably, with the upper portion of chamber *c* and the latter connecting, preferably, with the lower portion of this chamber. Pipe *M* is provided with branches and suitable valves for admitting, respectively, pulp, air, and water. Pipe *N* discharges, preferably, into the pulp-tank. (Not shown.) The pulp used is of the liquid variety—that is to say, the pulp is mixed with so much water that the mass when thoroughly stirred is in the liquid state.

Compression-chamber *c'* is provided with false head *c<sup>2</sup>*, the latter being backed by a strong spring *c<sup>3</sup>*.

In operating the device, first the former *E* is by means of hydraulic cylinder *D* elevated to the position shown at the left hand in Fig. 1, closing the molding-chamber, and in such position is locked, the former in such elevated or locked position being of course concentric with mold *I*. The mold *I* and stirrers *J* are set in motion, and the so-called "liquid pulp" is admitted under pressure through the induction-pipe *M*. The pulp passes in through slits *i* and fills the space between the mold and former. The water passes through the perforated plates of the former, these plates serving as filters or strainers, the perforations thereof being so small that the pulp is retained and accumulates in a layer over the face of the former, the movement of the mold tending to distribute the material evenly. A few moments' time is sufficient to pack the space between the mold and former with the pulp, the motion of the mold and the pressure under which the pulp is admitted tending to pack the material firmly onto the former. Next, the supply of pulp is shut off and the eduction-pipe is opened. Water under pressure is then admitted through pipe *N* to wash out the surplus material that may remain in chamber *c* outside the mold and in the slits *i*, such surplus material being forced back into the pulp-tank. Next, the water is shut off and air is admitted under pressure to force out the water. Next, lever *h'* is turned to unlock the device and the former bearing the pulp formation is lowered to the level of the table. The former is next transferred to plunger *f*, after which the plunger is elevated and the pulp formation is forced by the action of hydraulic cylinder *F* into compression-chamber *c'*, where the thickness of the pulp-walls of the vessel being made is reduced usually about one-half. The pressure applied is very great, and in consequence of which the product comes out firm and hard. The false head *c<sup>2</sup>* is of course backed up against the upper wall of the compression-chamber, and when the plunger is lowered the reaction of

spring *c<sup>3</sup>* presses head *c<sup>2</sup>* upon the work, causing the latter to cleave from the walls of the compression-chamber and to descend with the former, after which by lifting on the loose band *e<sup>3</sup>* the compressed work or vessel is removed from the former. While the one vessel is being compressed in chamber *c'* another vessel may be in course of formation in the mold, so that by the time a compressed vessel is removed from the one former, and such former is disengaged from plunger *f*, the other former is ready to take its place in the compression-chamber.

What I claim is—

1. The combination, with a casing having a molding-chamber, means for supplying pulp to said chamber, and a rotating mold having openings therein for admitting liquid pulp, of a former located and held stationary within such mold, said former having a perforated surface and suitable discharge for draining the water from the adjacent pulp, substantially as set forth.

2. The combination, with a casing having a molding-chamber, and a rotating mold operating in such chamber, of a former substantially as indicated, the said former being located and held stationary within the rotating mold, substantially as set forth.

3. The combination, with a casing having a molding-chamber, means for supplying pulp thereto, a rotating mold operating in such chamber and having openings through its walls, and a former located inside the mold, of one or more stirring-arms operating in the molding-chamber outside the revolving mold, substantially as set forth.

4. The combination, with a casing having a molding-chamber, means for supplying pulp thereto, and a rotating mold and stationary former, substantially as indicated, of rotating arms or stirrers operating in the molding-chamber outside the mold, the said arms and mold rotating in opposite directions, substantially as set forth.

5. The combination, with a casing having a molding-chamber having induction and eduction pipes, a rotating mold operating in such chamber, said mold having openings therein for receiving liquid pulp, of a perforated former located and held stationary in such mold, substantially as set forth.

6. The combination, with a casing having molding and compression chambers therein, of hydraulic cylinders, plungers therein, each plunger having a lug, and formers, each having a groove for the reception of the lug on either plunger, the said formers being interchangeable, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 14th day of July, 1888.

MARK L. DEERING.

Witnesses:

CHAS. H. DORER,  
ALBERT E. LYNCH.