

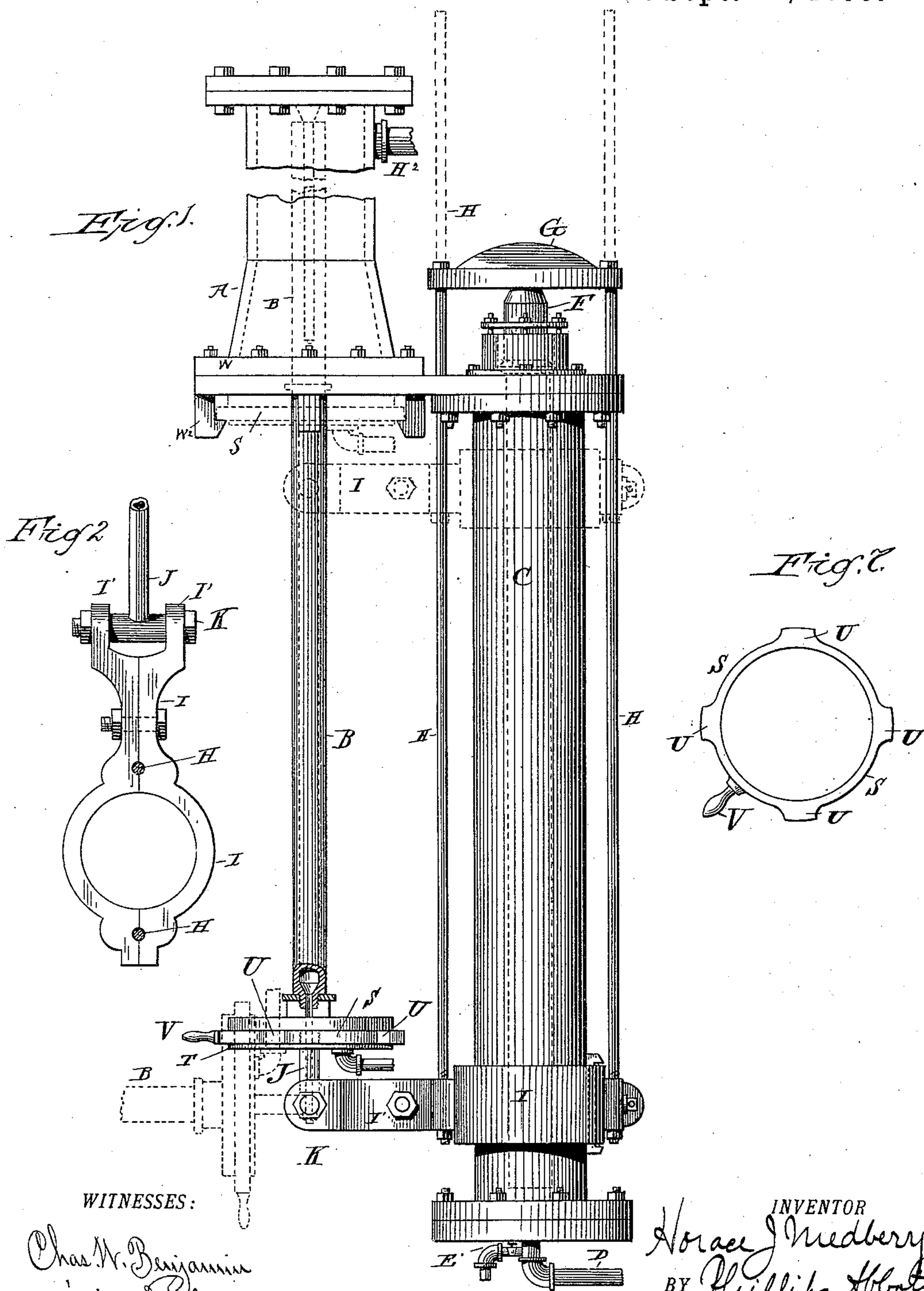
(No Model.)

3 Sheets—Sheet 1.

H. J. MEDBERY.
MACHINE FOR MOLDING TUBES FROM PULP.

No. 437,497.

Patented Sept. 30, 1890.



WITNESSES:

Chas. W. Benjamin
William E. K.

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his ATTORNEY

(No Model.)

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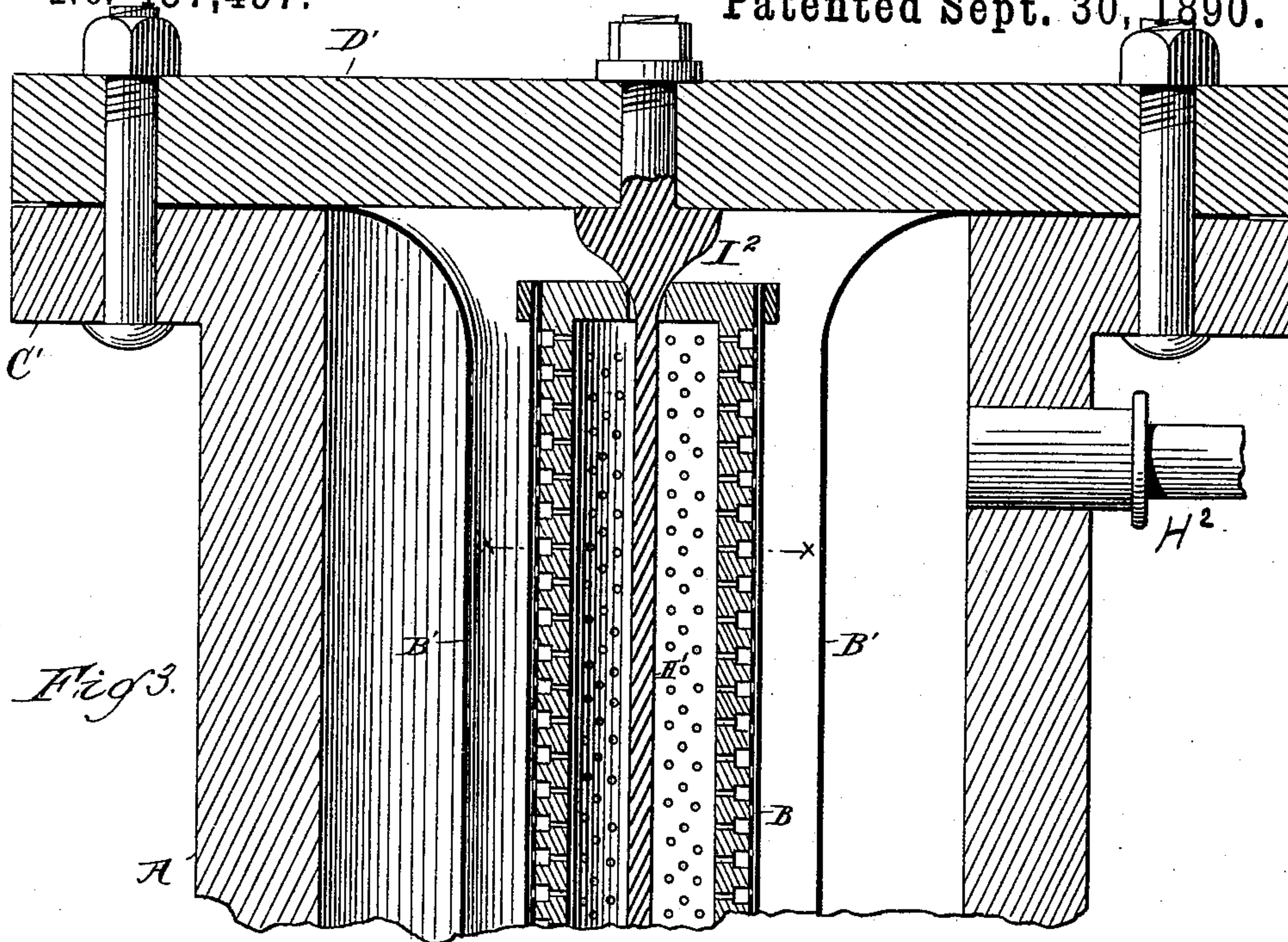


Fig. 5.

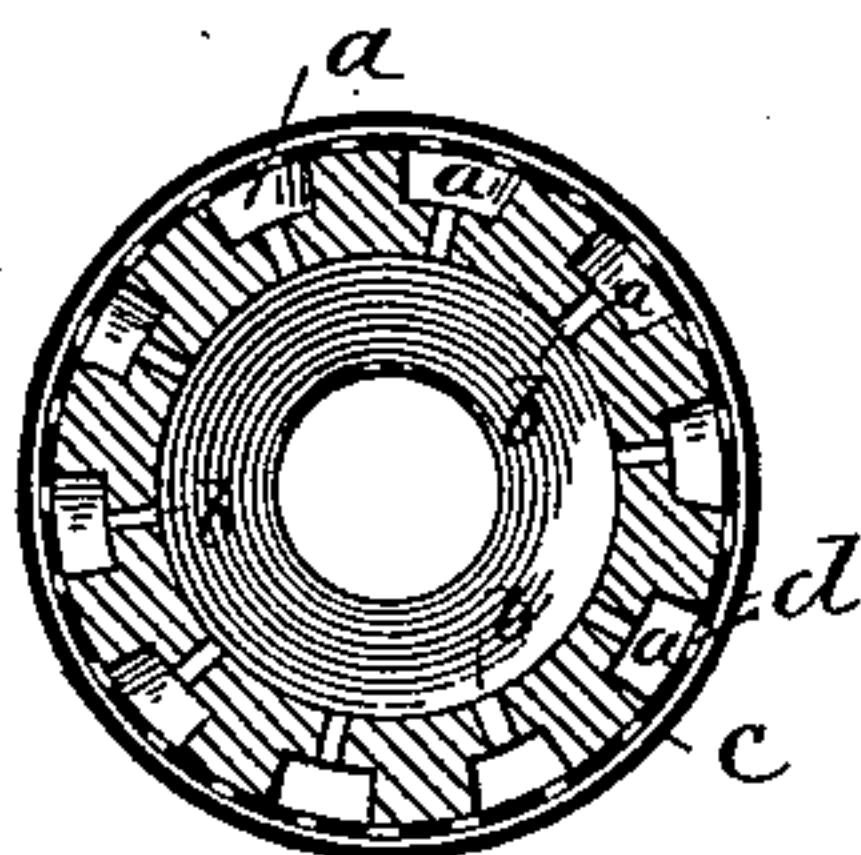
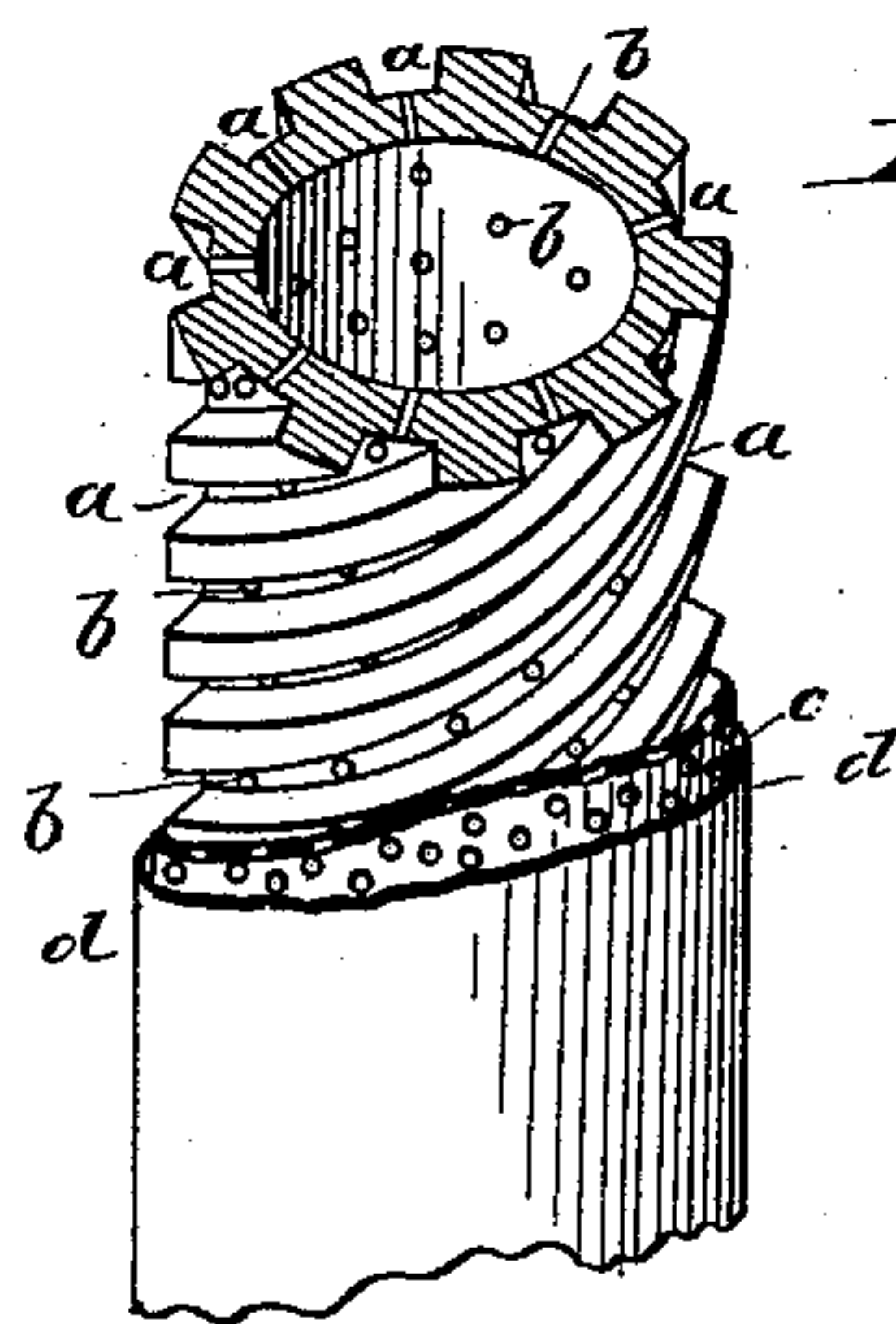


Fig. 6.



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(No Model.)

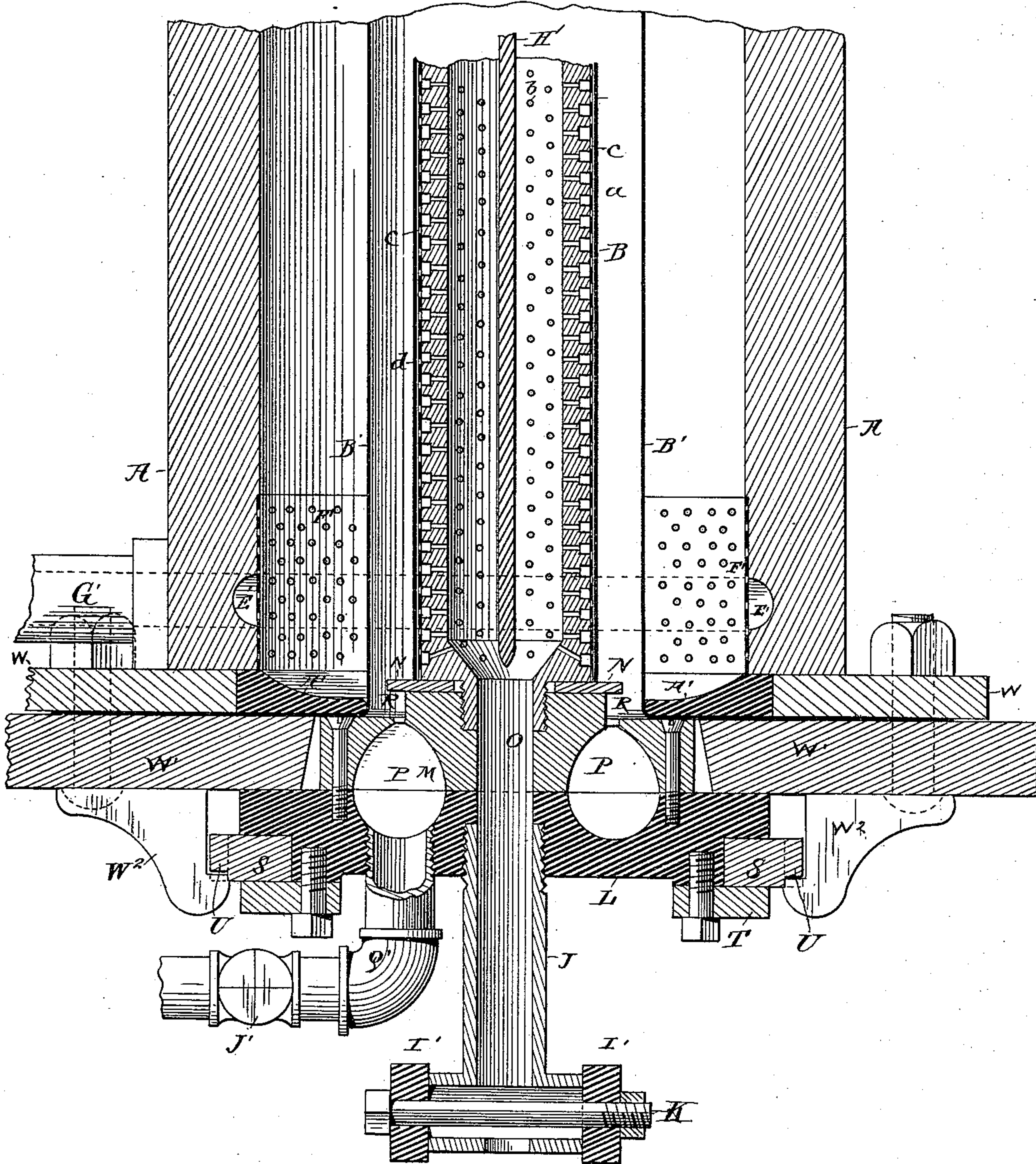
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Fig 4



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UNITED STATES PATENT OFFICE.

HORACE J. MEDBERY, OF MECHANICSVILLE, ASSIGNOR TO STEPHEN C. MEDBERY, OF BALLSTON SPA, NEW YORK.

MACHINE FOR MOLDING TUBES FROM PULP.

SPECIFICATION forming part of Letters Patent No. 437,497, dated September 30, 1890.

Application filed January 15, 1889. Serial No. 296,416. (No model.)

To all whom it may concern:

Be it known that I, HORACE J. MEDBERY, a citizen of the United States, and a resident of Mechanicsville, in the county of Saratoga and State of New York, have invented a certain new and useful Improvement in Machines for Molding Tubes from Pulp, of which the following is a specification.

My invention relates to machines for making seamless tubes, pipes, or other analogous articles from paper, wood, or other equivalent pulp, which may be of a uniform diameter throughout or tapering, as desired; and it consists in the peculiar construction and combination of parts adapted to form such tubes or pipes, as hereinafter described and claimed, said invention embodying improvements on the invention set forth in my United States Letters Patent, dated January 15, 1889, numbered 396,103.

In the drawings, Figure 1 is a side elevation of the machine embodying my improvements, the former upon which the pipe is made and the lifting devices whereby it is lifted into the molding-cylinder being shown nearly at their lowest position, which position permits the former to be turned down horizontally, as shown in dotted lines, when freed from the molding-cylinder, the said figure showing also in dotted lines the elevated position of the lifter and its attached parts, as when the former is fully telescoped into the molding-cylinder. Fig. 2 is a plan view of the lifter or elevator and the rod hinged thereto which engages with the lower end of the former. Fig. 3 is a sectional view of the upper part of the molding-cylinder and coacting parts with the former in position therein, some of the details being omitted. Fig. 4 is a sectional view of the lower part of the molding-cylinder with the former inserted and locked to the bottom of the molding-cylinder. Fig. 5 is a cross-section looking toward the upper end of the former. Fig. 6 is a perspective view of a part of the former with its different coverings partly removed, showing the construction of the same. Fig. 7 is a view of the locking device or ring which is located at the lower end of the former.

The object of my invention is to construct an apparatus whereby tubes or pipes, irrespective of their diameter or length, may be made from paper-pulp, wood pulp, or other suitable pulp by the aid of hydraulic pressure, the fibers of the pulp being pressed into tubular or pipe form by pressure applied substantially at right angles to the resistance, whereby the strength of the resulting product is greatly increased.

In the drawings, A is a molding-cylinder within which the pipe is formed.

B is a former upon which the pipe is formed. The former B is removable from the cylinder A for the purpose of removing the pipe when made from it.

C is a hydraulic cylinder. The water is forced into it through the pipe D and drawn off through the pipe E.

F is a plunger which is caused to rise through the packed end of the cylinder C upon the inflow of water through pipe D, as now well understood.

G is a cross-head attached to the upper end of the plunger F, to which are attached lifting-rods H H, which at their lower ends are attached to a sliding lifter I. This lifter encircles the cylinder C, and is bifurcated at its end, as seen at I' I', Fig. 2. In the bifurcated end rests a hollow connecting-link J, which rocks on the cross-bolt K.

Referring now to Fig. 4, the link J is threaded at its lower end into a block L, which has bolted or screwed to its upper face another block M, and into the upper surface of the block M the former B is threaded, as shown, there being, preferably, a packing-ring N, of rubber or other suitable material, between their meeting surfaces. There is an aperture O extending through the bottom of the former B through the block M and block L, connecting with the hollow link J, whereby the water expressed from the pulp, as hereinafter explained, may escape.

P is an annular cavity made in the blocks M and L, which connects with the pulp-inlet pipe Q. This pulp-inlet pipe has a swivel in it or an elastic section, as preferred, whereby the swinging of the former B from a vertical

to a horizontal position may be effected without difficulty and without fracture of the said parts. At the upper end of this cavity P there is a series of openings R, which open
5 into the space between the water-tight bag, hereinafter to be described, and the exterior of the former B.

S is a locking-ring. (Shown in plan in Fig. 7.) It is held in a recess in the periphery of
10 the plate L by a holding-ring T screwed or bolted thereto. This locking-ring is provided with four (more or less) cam-surfaces U U U U, (see Figs. 4 and 7,) and it also has a handle or lever V, whereby it may be turned, rotating in the recess before described.

W is the base of the molding-cylinder, which is bolted to another plate W', which supports also the upper end of the hydraulic cylinder C. (See Fig. 1.) To the under side of this
20 plate W' are attached by bolts or by being cast therewith, as preferred, four downwardly-projecting hooks W², which engage with the locking-ring S when the parts are in coactive position. The engaging faces of the locking-
25 parts U of this ring S or of the hooks W², or both of them, if desired, are cut upon a bevel, so as to present cam-like surfaces, whereby the former and its coacting parts will be held firmly in place by the pressure against the
30 base-plate W' of the machine when in operation.

A' is an annular ring, which is supported by the lower end of the molding-cylinder.

B' is a water-tight expansible bag, which
35 extends from the bottom to the top of the molding-cylinder. Its lower part is flanged outwardly, passing over the inwardly-presented edge of the ring A', and is clamped between the plates W and W', being firmly held
40 thereby, and the upper end of this bag (see Fig. 3) is in like manner flanged outwardly, its edge being clamped firmly between a flange C' on the upper end of the molding-cylinder and a plate D', which closes the end of the
45 cylinder.

E' is an annular recess at the lower part of the molding-cylinder, which is covered by a strong perforated brass or other metal shield F'.

50 G' is the water-outlet from the molding-cylinder exteriorly of the bag B'. It connects with the annular recess E', and is provided with a cock (not shown) whereby it may be closed.

55 H' is a guide-rod fastened centrally to the plate D' and having at its upper end a downwardly-presented conical portion I', which in the operation of the apparatus partially enters a hole in the end of the former B, as
60 hereinafter explained. Its attachment to the plate D' may be made adjustable, if desired.

J' is a stop-cock placed in the pulp-inlet pipe Q, which may be turned shut to prevent the backward passage of the pulp when the
65 hydraulic pressure is applied, as hereinafter set forth.

H² is a pipe for the supply of water under

hydraulic pressure to the space between the exterior of the bag B' and the interior of the molding-cylinder A.

Reference will now be made to the details
70 of the construction of the former B, having special reference to Figs. 4, 5, and 6. It is a hollow tube, preferably, although not necessarily, cylindrical in shape, and for the pur-
75 poses of more easily removing the pipe made upon it I sometimes prefer that it should be very slightly tapering from its base toward its upper end, so that when the pipe is once
80 started it may easily slip off. It may also be of other form than circular in cross-section. *a a a*, &c., are grooves, preferably spiral, cut in the exterior of the metallic former, as
85 shown. They are preferably separated by a "land" having about the same width as they themselves have, and through the bottom of these spiral grooves holes *b* are bored into the interior of the former at very frequent inter-
90 vals. *c* is a perforated metallic plate, the perforations in which are quite fine and close together. It is placed close to the surface of the former B, resting upon the lands be-
95 tween the grooves. *d* is an exterior covering of cloth, which should preferably be tough and strong in texture. The upper end of the
former B is closed by a head, as shown in Fig. 6, through the center of which there is a hole,
100 the sides of which preferably taper from the exterior of the head inwardly, the inner opening being such that the rod H' (see Fig. 3) will slide easily but not too loosely therein. As before stated, the former B is hollow and has an opening O at the bottom communicat-
105 ing through the blocks M and L and the link J with other openings or passages.

The operation of the apparatus is as follows: Assuming that the former is withdrawn from the molding-cylinder, as shown in Fig. 1, and is in its horizontal position, the operator lifts the former B into a vertical position, during which act it swings upon the
110 pivot K in the bifurcated end of the lifter I. (See Fig. 2.) The water is then let into the hydraulic cylinder C through the pipe D, moderately at first. As the cylinder is gradually filled the plunger F is displaced and rises, carrying, by means of the cross-head G, lifter-rods H, and lifter I, the former B with it. As the former B slowly rises the lower
115 end of the guide-rod H', (see Fig. 3,) which is preferably pointed for the purpose, is entered into the hole in the top of the former B. As soon as it has entered therein the water is turned on full force through the inlet-pipe D of the hydraulic cylinder, thereby rapidly lift-
120 ing the former into the molding-cylinder A, and when it reaches its uppermost position the cone-shaped enlargement I² on the guiding-rod H', entering the conical hole in the end of the former B, accurately centers it, and
125 also seals the said hole so that no pulp can enter it. Any suitable packing, preferably metallic, may be employed at this point, if desired. As soon as the former has reached
130

its uppermost position the locking-ring S is rotated by the lever V, thus engaging the cam-shaped locking-surfaces U of the ring with the hook W², thereby firmly holding the former B in position in the molding-cylinder against the hydraulic pressure about to be exerted. The stop-cock J' in the pulp-inlet pipe is then opened, and the pulp flows into the annular chamber P and through the openings R at its upper part into the space between the former and the water-tight bag B'. The orifices R are preferably made quite small, in order that any foreign matter—such as chips and the like—which may accidentally get into the pulp cannot enter the space between the former and the bag B', and also in order that the flow of the pulp may be smooth and uniform. The pressure of the inflowing pulp is sufficient to expand the bag B' so that it shall practically rest against the inner wall of the molding-cylinder A throughout, and on this account I prefer to make this bag of rubber, since it should have considerable elasticity. As soon as the space between the bag and the former has been completely filled with pulp, which is determined by the partial cessation of the flow of water through the link J, (thus indicating that the inflow of pulp surcharged with water had ceased,) the stop-cock J' is shut and the water in the pipe H², which is under hydraulic pressure, is allowed to enter through that pipe into the space between the water-tight bag B' and the inner walls of the molding-cylinder A. This of course generates hydraulic pressure upon the exterior of the bag and forces it inwardly toward the former B with substantially equal pressure and at substantially right angles to the resistance—in other words, the former B—at all points. During this operation the fibers of the pulp are compressed with great force into tubular form upon the exterior of the former B, the water contained in the pulp passing first through the strainer-cloth D, then through the perforations in the metallic plate c, thence into the spiral grooves a and through the holes b into the interior of the former, thence through the opening O at its lower end, and through the openings in the plates M and L, escaping finally through the hollow link J, flowing around the pivot on which it rocks. The pressure is continued as long as may be necessary, depending upon the character of the pulp employed and of the pipe desired. After the pressing operation has been completed the inflow of water through the pipe H² is cut off and a cock in the draw-off pipe G' is opened. The water then escapes from the space between the bag B' and the inner walls of the molding-cylinder A by passing through the perforated plate F' into the annular space E', and thence out through the draw-off pipe G'. Any suitable air-inlet between the bag and the cylinder may be employed to break the vacuum and allow the outflow of the water after G'. When all the water has thus run off, the lock-

ing-ring S is unlocked, the draw-off pipe E at the bottom of the hydraulic cylinder C is opened more or less, as will be determined by the rapidity with which it is desired to withdraw the former with the tube on it from the molding-cylinder, and as the water escapes from the hydraulic cylinder C the former B and all its coacting parts descend. When they have been entirely withdrawn from the molding-cylinder, the former, having the pipe upon it, is swung down into a horizontal position and the pipe is withdrawn from the former. It is then dried in any suitable or preferred manner, and when dry it becomes exceedingly hard and may have screw-threads cut in it. It may be turned down on its exterior or bored out internally or used rough, just as it comes from the machine, depending upon the degree of finish desired or the use to which it is to be put. It is preferably waterproofed or otherwise treated in any suitable manner before use.

If the pipe should stick to the cloth covering of the former, it may be loosened sufficiently to be withdrawn by tapping it with blocks of wood about the size of an ordinary brick on its several sides. There will not be much jar of this character necessary, however.

I do not limit myself to the details of construction shown, since it is obvious that many changes may be made therein without departing from the spirit of my invention—as, for instance, the molding-cylinder may be made to move downward over the former instead of the former moving upwardly into the molding-cylinder; also, other means of drawing off the water from the various spaces or parts may be employed, and other means of confining the water-tight bag may be employed; also, the construction of the former may be very greatly altered from that shown. Nor do I limit myself to a vertically-operating apparatus. It may be arranged horizontally. I prefer, however, that during the construction of the pipe the former should be vertical.

There are many other changes which may be made in the apparatus without departing from my invention.

I claim—

1. The combination of a molding-cylinder provided with water inlet and outlet pipes, a removable former provided with locking mechanism whereby it may be held in position in the molding-cylinder, a guide for the former located on the interior of the molding-cylinder, whereby the former is guided during its insertion and removal from the molding-cylinder, a water-tight bag between the former and the molding-cylinder, a pulp-inlet pipe opening into the space between the former and the water-tight bag, and outlets for the water expressed from the pulp, substantially as set forth.

2. The combination of a molding-cylinder provided with water inlet and outlet pipes, a removable former provided with locking

mechanism whereby it may be held in position in the molding-cylinder, a guide for the former located in the interior of the molding-cylinder and having a downwardly-extending rod-like part which enters the former and guides it, and also a tapering part near its upper end which centers the former when fully in place within the molding-cylinder, a water-tight bag between the former and the molding-cylinder, a pulp-inlet pipe opening into the space between the former and the water-tight bag, and outlets for the water expressed from the pulp, substantially as set forth.

3. The combination of a molding-cylinder, a water-tight bag, a perforated movable former, water inlet and outlet pipes for the molding-cylinder, an escape for the water expressed from the pulp through the bottom of the former, a conical centering device at the upper end of the molding-cylinder, and an opening in the upper end of the former for

the reception of the conical centering device, substantially as set forth.

4. The combination of a hydraulic lift, a molding-cylinder, a perforated former hinged to the hydraulic lift, substantially as described, and having an opening in the upper end thereof, water inlet and outlet pipes for the molding-cylinder, a water-tight bag, a guiding device for the former during its movement in and out of the molding-cylinder, water-escape passages from the interior of the former, and means to lock the former in place within the molding-cylinder, substantially as and for the purposes set forth.

Signed at Mechanicsville, in the county of Saratoga and State of New York, this 11th day of January, A. D. 1889.

HORACE J. MEDBERY.

Witnesses:

WM. W. SMITH,
A. J. HARVEY.