

**No. 691,770.**

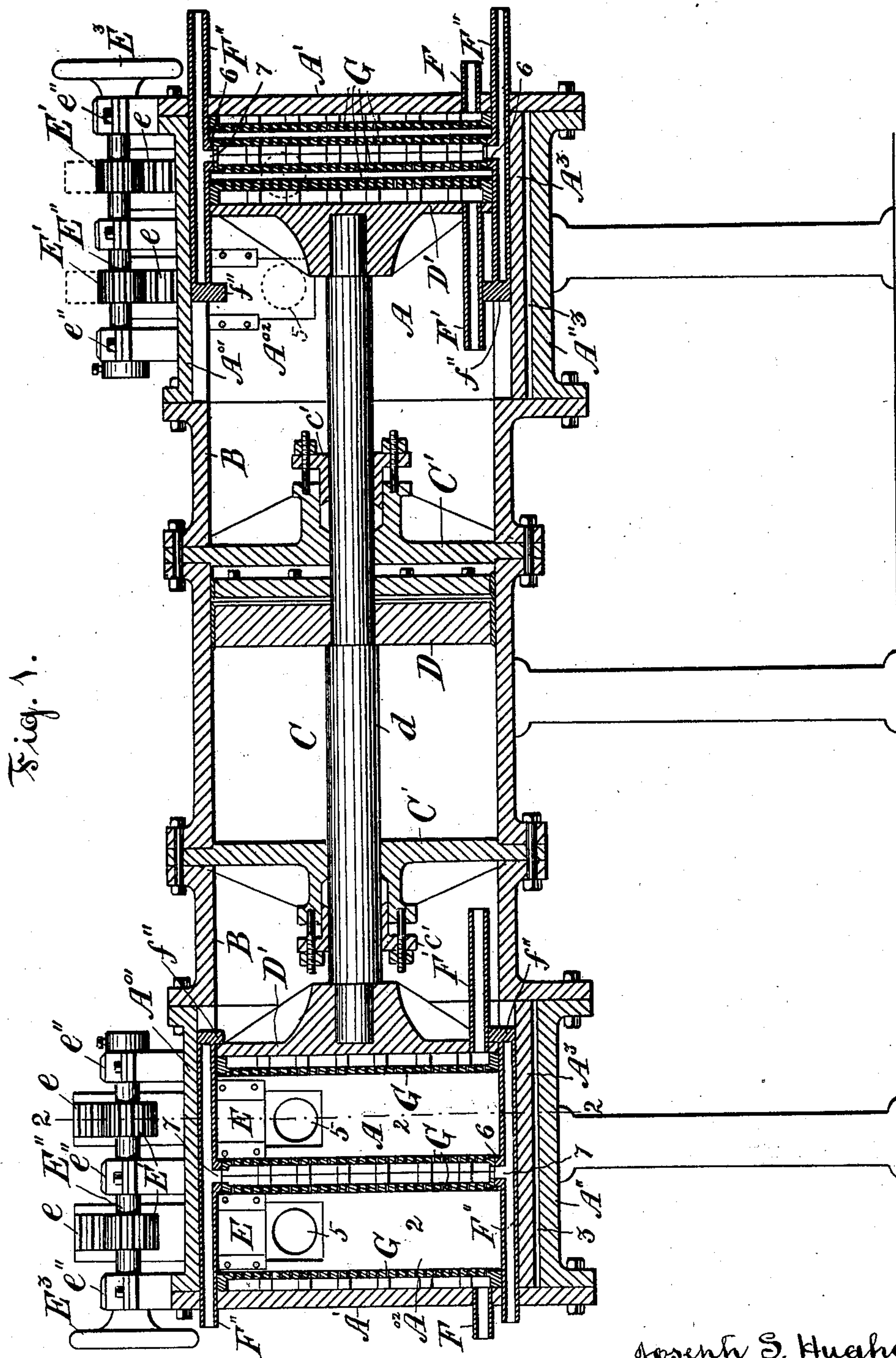
**Patented Jan. 28, 1902.**

**J. S. HUGHES.**  
**WOOD PULP PRESS.**

(Application filed July 3, 1901.)

(No Model.)

**3 Sheets—Sheet 1.**



Witnesses:

Sha. Riley.

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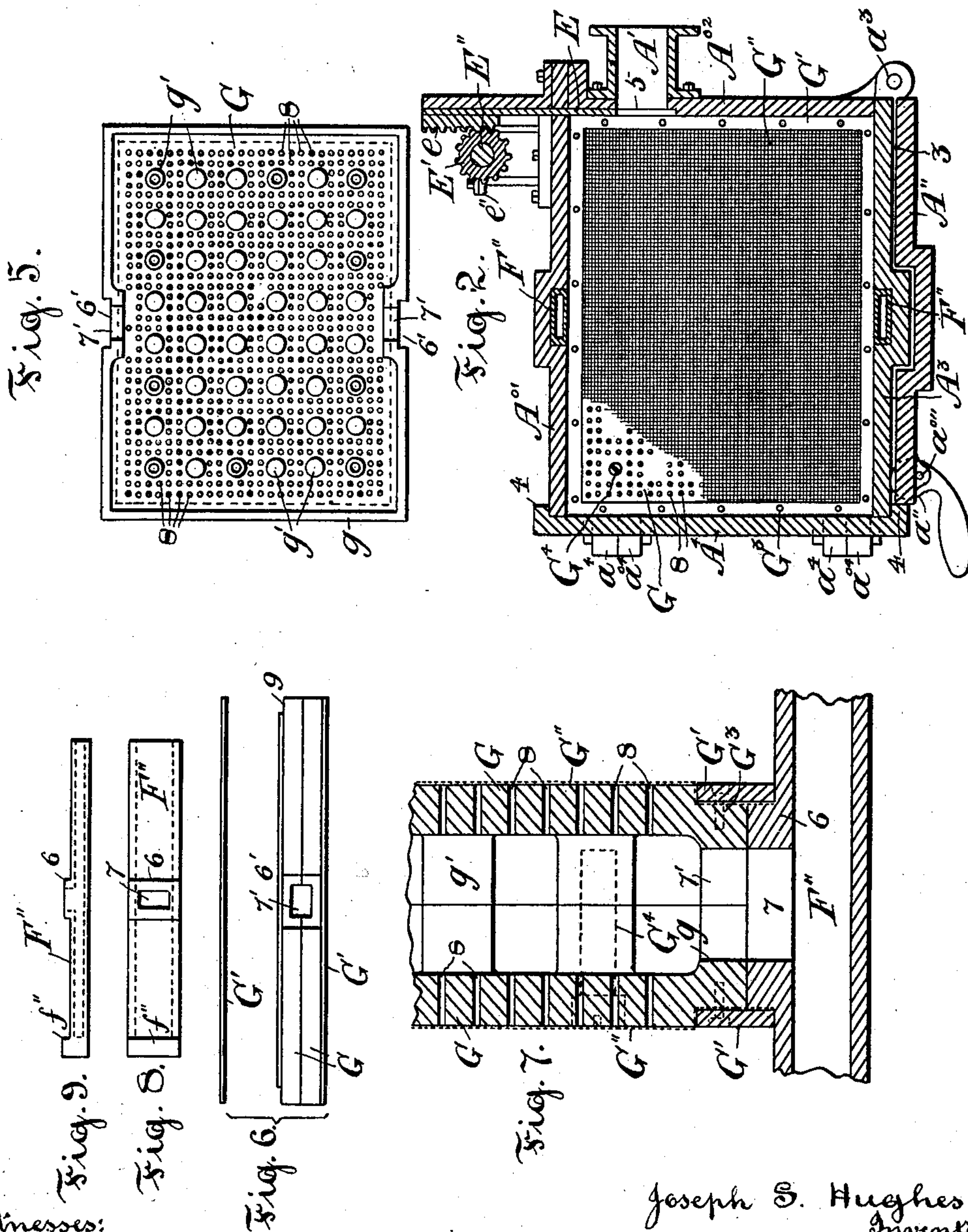
**Patented Jan. 28, 1902.**

**J. S. HUGHES.**  
**WOOD PULP PRESS.**

(Application filed July 3, 1901.)

(No Model.)

**3 Sheets—Sheet 2.**



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No. 691,770.

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(No Model.)

3 Sheets—Sheet 3.

Fig. 3.

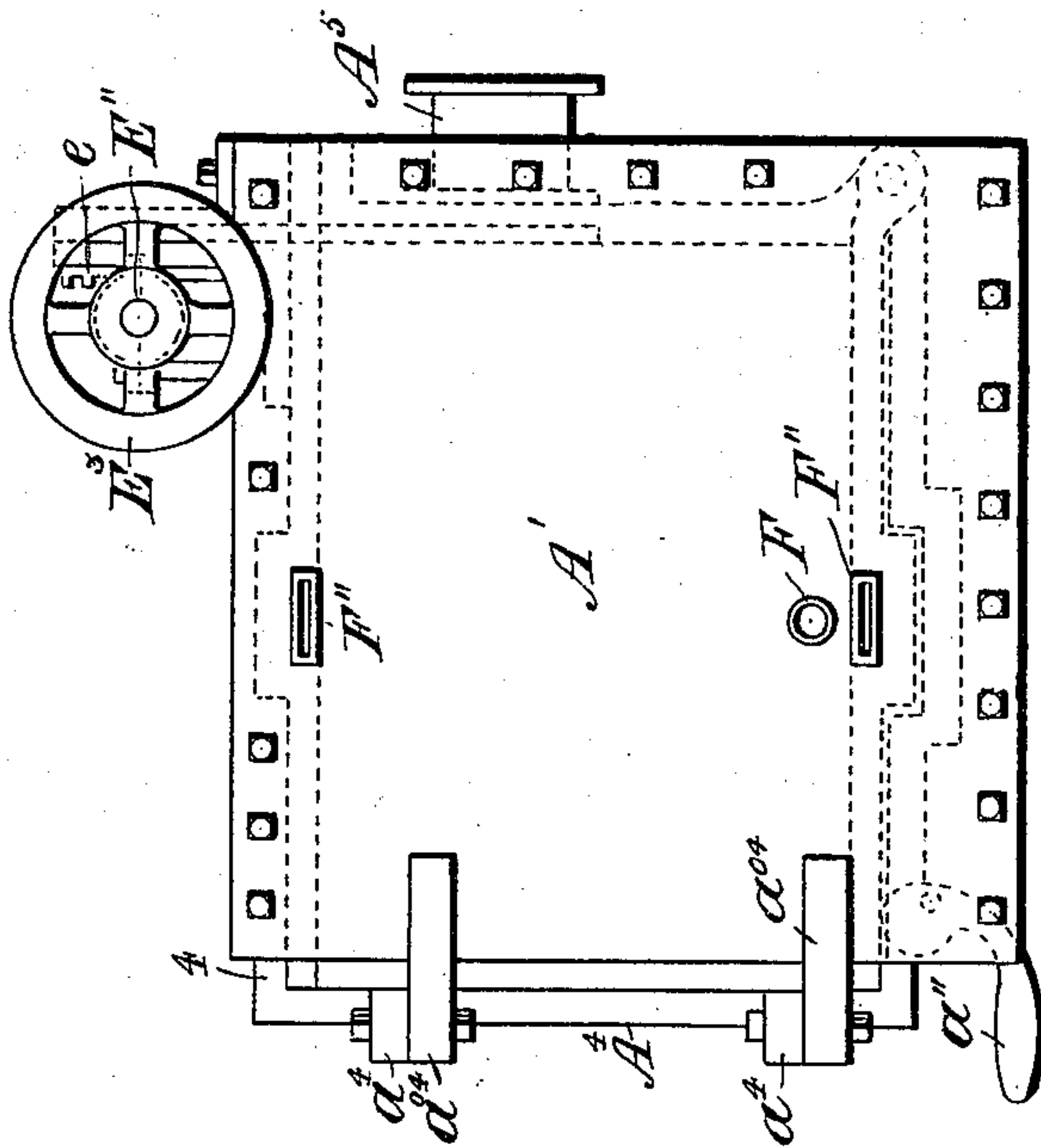
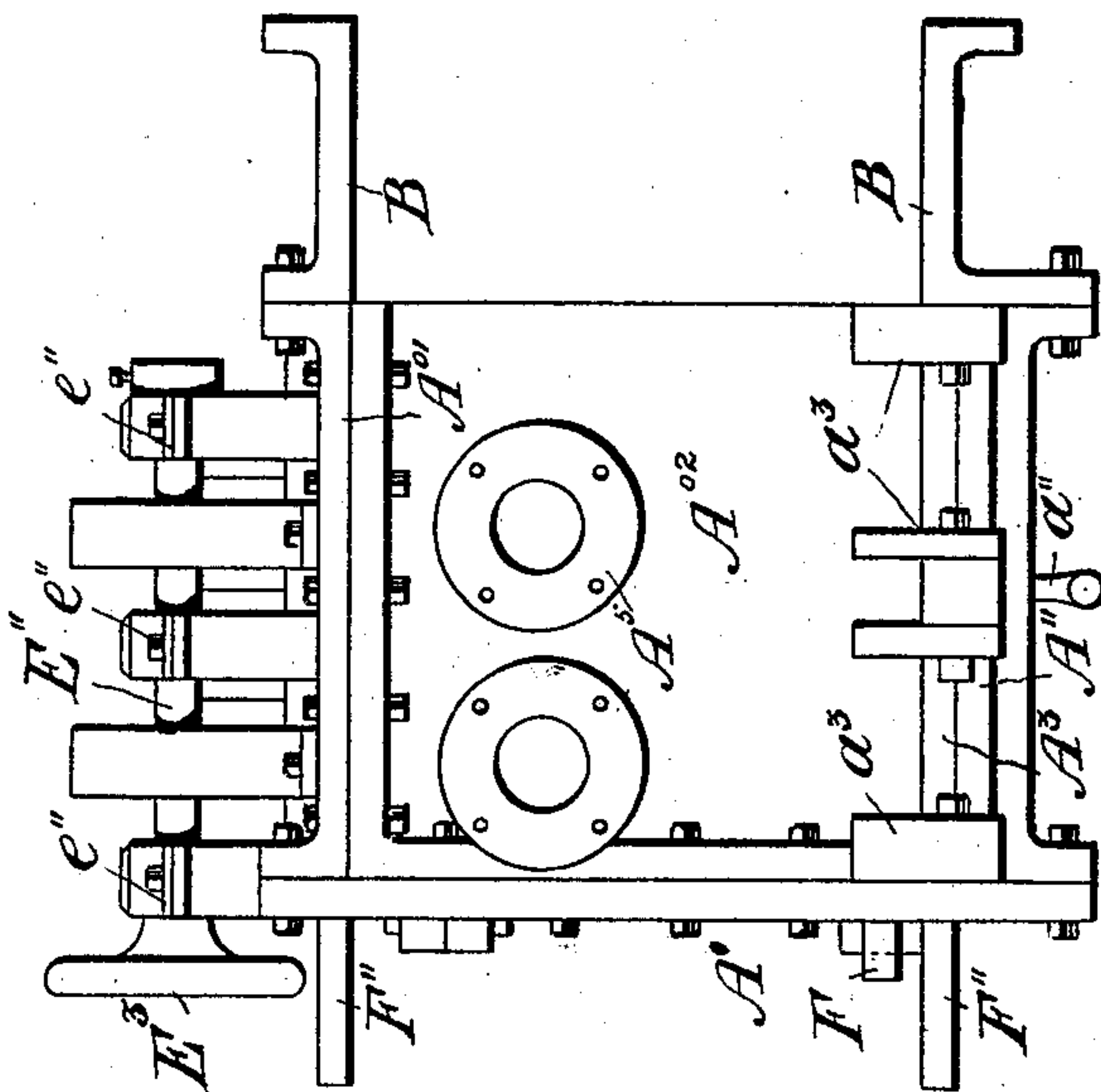


Fig. 4.



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# UNITED STATES PATENT OFFICE.

JOSEPH STUART HUGHES, OF CHESLEY'S CORNERS, CANADA.

## WOOD-PULP PRESS.

SPECIFICATION forming part of Letters Patent No. 691,770, dated January 28, 1902.

Application filed July 3, 1901. Serial No. 67,059. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH STUART HUGHES, of Chesley's Corners, in the county of Lunenburg, in the Province of Nova Scotia and Dominion of Canada, have invented certain new and useful Improvements in Wood-Pulp Presses; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part hereof.

My invention, which will be hereinafter fully set forth and claimed, relates to apparatus for forming fluid wood-pulp into sheets.

The object of my invention is a machine having confined spaces into which the fluid pulp can be run intermittently and the water and air pressed out automatically, so as to leave a solid sheet of pulp in each space, a machine that can be handled with ease and facility and will do the work rapidly and with as little hand-labor as possible.

With this object in view my improved machine is made double-ended and double-acting, the pulp is forced in under pressure, special facilities are provided for the escape of water and air, and special facilities for loosening the pressed sheets in the press after pressing prior to their removal.

Referring to the drawings, Figure 1 is a vertical longitudinal section of my improved pulp-press with strainers in position, one end shown before and the other after the stroke. Fig. 2 is a transverse section of the same on line 2-2, Fig. 1, showing one of the strainers in elevation, one corner of the cloth or wire-mesh covering being broken out to expose the perforated surface of the plate. Fig. 3 is an end view of the same parallel to Fig. 2, but representing the other end, right hand of Fig. 1, both ends being alike. Fig. 4 is a rear elevation of one of the press-chambers, right hand of Fig. 1. Fig. 5 is an elevation of the cavity side of one of the strainer-plates. Fig. 6 is a top edge view of one of the double strainers complete, one of the cover-frames shown separated. Fig. 7 is a section, on a larger scale, of one of the joints of a double strainer, with the drain-pipe, being an enlargement of parts shown in Fig. 1, and showing also the construction of the strainer; and Figs. 8 and 9 are top and side views, respectively, of the sliding drain-pipes.

Two press-chambers A A, Fig. 1, rectangular in cross-section, said section the size of the sheet to be produced, are connected by skeleton extensions B B to a central cylinder C, all in a line. This cylinder is fitted with a piston D on a double-ended piston-rod *d*, which passes through stuffing-boxes *c'* on each cylinder-head C and extends into the press-chambers, each end carrying a piston or plunger D', closely fitting said press-chamber. The piston D may be operated by hydraulic, steam, or other pressure, and for this purpose suitable provision is made on the cylinder C for ingress and egress of the fluid used, which is not shown in the drawings, but which is well understood by those versed in the construction of machinery of such a nature.

The press-chambers A are open at the inner ends, facing each other, and are each of such a length as to afford room, besides the plunger and strainers, for two (or more) spaces 2, Fig. 1, each adapted for the formation of a sheet of pulp. Each chamber, Figs. 1, 2, 3, and 4, consists of a head A', top plate A<sup>0</sup>, back or side plate A<sup>02</sup>, fast bottom A'', hinged inner bottom A<sup>3</sup> above the former, and hinged front or door A<sup>4</sup>. The inner bottom A<sup>3</sup> is secured by hinges *a*<sup>3</sup> to the back plate A<sup>02</sup> between the bottom edge of the latter (with which it makes close joint) and the fast bottom A'', a small space 3 being provided between the hinged and fast bottom to afford a little play to the former. The front of the hinged bottom is raised through this small space by a hand-lever with eccentric *a''*, pivoted in lugs *a''* on the lower face of the fast bottom, the eccentric passing through a slot in the latter. The front or door A<sup>4</sup> of the chamber is provided at one end with lugs *a*<sup>4</sup>, pivoted to lugs *a*<sup>04</sup> on the head A', and the other end is provided with any suitable device for holding it securely closed. Its top and bottom edges are provided with flanges 4, overlapping and holding the edges of the top plate A<sup>0</sup> and hinged bottom A<sup>3</sup> when the door is closed, as shown in Fig. 2, thus forming a support to the edges of said plates and a fastening to the door itself by friction.

Each chamber A is provided with two valve-faced inlet-ports 5, Figs. 1 and 2, in the upper part of the side or back plate A<sup>02</sup> and in the center of the spaces 2 longitudinally for



the admission of fluid pulp. These ports are each provided with a nozzle  $A^5$ , Figs. 2, 3, and 4, at the exterior and with a valve-seat at the interior, which latter is covered with a slide-valve  $E$ , Figs. 1 and 2, flush with the inner surface of the plate and projecting through the top. Means of opening and closing the valves may consist, as shown in Figs. 1, 2, 3, and 4, of racks  $e$  on the slides gearing into pinions  $E'$ , secured on a shaft  $E''$ , suitably journaled to the top plate in bearings  $e''$ , and provided with a hand-wheel  $E^3$ .

Drainage-pipes, fixed and movable, are fitted in the press-chambers  $A$ , by which water and air may be quickly passed off. A fixed pipe  $F$ , Figs. 1, 3, and 4, is fitted in each chamber-head  $A'$ , near the bottom, and a fixed pipe  $F'$ , Fig. 1, is fitted in each plunger  $D'$ . A movable pipe  $F''$  of flat rectangular cross-section is fitted to slide in a corresponding groove in the top plate of the press-chamber and passing through the chamber-head  $A'$ , and another similar one in the hinged bottom  $A^3$ , as shown in Figs. 1, 2, 3, 4, 8, and 9. These sliding pipes are each closed at the inner ends by a lug  $f''$ , projecting above the flat side facing the interior of the chamber, which is engaged by the plunger  $D'$  when being retracted and drawn back from the position shown at the right hand of Fig. 1 to the position shown at the left hand, when the chamber is ready for filling. Each sliding pipe is also provided about midway with a raised shouldered part 6 on the flat side facing the chamber and projecting above the surface of the plate in which it is bedded, having a perforation 7 in it communicating with the interior. These sliding pipes have their surfaces facing the chamber flush with the inner faces of the top and bottom, respectively, except the raised portion 6 and lugs  $f''$ .

The sheets of pulp are formed between vertical transverse partitions made of strainers fitting and placed within the chambers transversely to the travel of the plungers and which divide the chambers longitudinally into the spaces 2, as shown in Figs. 1, 2, 5, 6, and 7. They consist of plates  $G$ , having perforations 8, rim-flanges  $g$  on one side, and supporting projections, as ribs or studs  $g'$ , on the same side, acting as supports to the plate. These projections  $g'$  are placed to register with those opposite when the plates are reversed, so that their cavity sides face each other. A frame  $G'$ , fitting flush in rabbets 9 at the edges of the plates  $G$ , Figs. 2, 6, and 7, holds a cover-sheet, of cloth, felt, or wire mesh  $G''$ , the frame being secured to the plates by countersunk screws  $G^3$ . Two such plates, each with sheet and frame, are joined together, cavities facing each other, as by screws  $G^4$  in the studs  $g'$ , Fig. 7, to form a central partition and double strainer, one in each press-chamber, as shown in Fig. 1. These have a portion of the center of their top and bottom rims set back and a notch 6' formed in it, which is adapted to receive the raised part 6 of the pipe  $F''$ ,

and within this notch there is a perforation 7', corresponding to the perforation 7 in said pipe and forming an outlet from the cavity of the strainer into the pipe, as shown in Figs. 5, 6, 7, and 8. The portions of the frames  $G'$  adjacent to the notches 6' set against the shoulders of the raised part 6 of the pipe  $F''$ , as shown in Fig. 7, and thus pipe and strainer are connected when both are in their position within the chamber and must partake of each other's sliding movements. A single plate  $G$ , complete with frame  $G'$  and cover  $G''$ , is placed against the chamber-head  $A'$ , cavity side facing it, and another is secured to the plunger  $D'$  of the single plates, being thus placed into communication with the fixed drain-pipes  $F$  and  $F'$  near the bottom of the chamber, while the double or central strainer has its outlets through the sliding pipes  $F''$  at top and bottom.

It is obvious that each chamber may contain more than two spaces 2 by increasing its length and the number of central partitions or strainers. In such a case the sliding drainage-pipes and their bed-grooves would necessarily have to be distributed over the surface of the top and bottom plates, and not all or none of the latter would therefore be centrally located in the chamber.

The machine operates as follows: Assuming the chamber at the left hand of Fig. 1 to be empty, the inner bottom  $A^3$  lifted up tight, the door  $A^4$  closed, the nozzles  $A^5$  connected to the delivery-pipes of a force-pump supplying the fluid pulp, the drain-pipes  $F$ ,  $F'$ ,  $F''$  connected with a suction-pump, and the valves  $E$  open, as shown, the spaces 2 are being filled with the fluid pulp under pressure. Immediately upon the entrance of the latter and owing to the pressure on one side and the suction within the strainers on the other water and air commence to be abstracted from it at once. When the spaces 2 are full of pulp, the valves  $E$  are closed by turning the wheel  $E^3$ . Pressure is allowed to act on the averted face of the piston  $D$ , and it moves, pushing the plunger  $D'$  in the chamber now under consideration toward the head. The pressure thus exerted upon the pulp within the spaces 2 causes the water and air therein to pass through the strainer-sheets  $G''$  and perforated plates  $G$  into the cavities of the strainer, thence through the drain-pipes  $F$ ,  $F'$ , and  $F''$  until the piston  $D$  and plunger  $D'$  have gone as far as the solid pulp remaining between the strainers will allow, and thus have arrived at the end of their stroke, and all water has been abstracted from the pulp that is capable of being expelled by pressure. During the movement of the plunger, with its strainer, the central strainer, with its drainage-pipes  $F''$ , have slid along the chamber until the strainers, with the sheets of pulp between them, have been pushed against the head  $A'$  and have finally arrived in the position shown on the right hand of Fig. 1. While this was taking place the chamber on the



right hand gradually assumed the condition shown in the other chamber, the plunger D' making part of its return stroke and then engaging the lugs  $f''$  of the drain-pipes F'' and drawing them along, together with the central strainer. The door of this chamber having been closed, the valves E opened, and the spaces filled with pulp, the piston D and plunger D' are caused to commence the stroke toward the right, restoring the left-hand chamber again to the condition shown in Fig. 1. In the meantime the door A<sup>4</sup> on the left was opened, the hinged bottom dropped, the strainers and sheets eased, and the pressed sheets removed. The same operation is then repeated. While pressing is going on in one chamber the other is opened, the hinged bottom dropped, the pressed sheets removed, closed again, the valves opened, and the chamber refilled.

I claim as my invention—

1. In a machine for forming pulp into sheets, the combination of a double-headed cylinder with double-ended piston-rod having piston within said cylinder, a skeleton extension of said cylinder beyond each head, a press-chamber secured to each of said extensions, said chambers rectangular in cross-section and open at the inner ends facing the cylinder-head, a plunger secured to each end of the piston-rod within said chambers, strainers within each chamber dividing it longitudinally into transverse spaces and an inlet-port to each space in the side of the chamber provided with connecting-nozzle at the outside, substantially as set forth.

2. In a machine for forming pulp into sheets, the combination of a double-headed cylinder having a stuffing-box in each head, a piston-rod passing through both stuffing-boxes, a piston within said cylinder secured upon said piston-rod, a plunger or piston secured to each end of said piston-rod fitting a press-chamber, a press-chamber of rectangular cross-section opposite each end of said cylinder immovably secured relatively to the cylinder and in which said plungers have a sliding movement in unison with the actuating-piston in the cylinder, means of dividing said chambers into transverse spaces by sliding strainer-partitions and means of admitting fluid pulp into said spaces intermittently, substantially as set forth.

3. In a press-chamber of a machine for forming pulp into sheets, the combination of a head, side, top and bottom plates forming part of a chamber of rectangular cross-section a plate hinged between the bottom edge of the side plate and the bottom a little distance above the latter and forming the working bottom of the chamber, means for raising said plate at the front, a front plate hinged to the head of the chamber and provided with a fastening and having flanges overlapping the top plate and hinged bottom and a piston or plunger adapted to slide in said chamber, substantially as set forth.

4. In a press-chamber of a machine for forming pulp into sheets, the combination of a head, side, top and bottom plates forming part of a chamber of rectangular cross-section, a hinged bottom within said chamber a little above the fixed bottom plate, said hinged bottom and top plate having longitudinal grooves, means of raising said hinged bottom, a drain-pipe of rectangular cross-section sliding in each groove flush with the surface of the plate and passing through the head, a fixed drain-pipe secured in the fixed head near the bottom of the chamber, a plunger or piston adapted to slide in said chamber, a drain-pipe secured within said plunger near the bottom of the chamber, said drain-pipes communicating with the interior of the chamber, a hinged front plate or door having flanges overlapping the top plate and hinged bottom, and ports in the side plate of said chamber fitted with slide-valves flush with the surface of said plate, substantially as set forth.

5. In a press-chamber of a machine for forming pulp into sheets, the combination of a head, side, top and bottom plates forming part of a chamber of rectangular cross-section a hinged bottom within said chamber a little above the fixed bottom plate, means of raising said hinged bottom, a hinged front plate or door having flanges overlapping the top plate and hinged bottom, said side plate having inlet-ports with valve-faces, slide-valves covering said ports flush with the surface of the plate, means of raising and depressing said valves and a piston or plunger adapted to slide in said chamber, substantially as set forth.

6. In a press-chamber of a machine for forming pulp into sheets, the combination of a head, side, top and bottom plates forming part of a chamber of rectangular cross-section, a hinged front plate or door, means of securing said front or door, said side plate having inlet-ports with valve-faces, slide-valves covering said ports flush with the surface of the plate, racks on the parts of said valves projecting above the top plate, pinions gearing into said racks, a shaft carrying said pinions journaled into bearings secured to said chamber-casing and a hand-wheel secured upon said shaft, substantially as set forth.

7. In a press-chamber of a machine for forming pulp into sheets, the combination of a head, side, top and bottom plates forming part of a chamber of rectangular cross-section open at one end, a hinged bottom within said chamber a little above the fixed bottom having longitudinal groove, means of raising said hinged bottom, said top plate having a groove similar to the one on the hinged bottom, a front or door hinged to the head and provided with means of securing it and having flanges overlapping the edges of the top plate and hinged bottom, rectangular drainage-pipes sliding in the grooves of the top and bottom and passing through the head, a fixed drain-pipe in the head near the bottom of the chamber, a piston or plunger adapted to slide in said



chamber, a drain-pipe secured in said plunger near the bottom of the chamber, valve-faced ports in the side plate, a slide-valve covering each port flush with the inner surface of the plate and projecting through the top and means of raising and depressing said valve, substantially as set forth.

8. In a machine for forming pulp into sheets, the combination with a press-chamber of rectangular cross-section having longitudinal grooves in the top and bottom and provided with hinged front and with inlet-ports in the side plate covered with slide-valves flush with the inner surface of said plate, of a drain-pipe sliding in each of said grooves and passing through the head, a fixed drain-pipe in said head, a piston or plunger adapted to slide in said chamber, a drain-pipe secured in said plunger and strainers forming vertical partitions and linings within said chamber, substantially as set forth.

9. In a machine for forming pulp into sheets, the combination with a press-chamber of rectangular cross-section having longitudinal grooves in the top and bottom and provided with hinged front and with inlet-ports in the side plate covered with slide-valves flush with the inner surface of said plate, of a drain-pipe sliding in each of said grooves and passing through the head, a fixed drain-pipe in said head, a piston or plunger adapted to slide in said chamber, a drain-pipe secured in said plunger, a series of perforated strainer-plates having on one side rim-flanges and supporting projections level therewith, setbacks in said rim-flanges at top and bottom, each having a shouldered notch and a perforation within said notch, a raised shouldered part on each of the sliding drain-pipes fitting into said notches and a perforation in said raised part corresponding to the perforation in the notched flange of the strainer-plate, a sheet of cloth, felt or wire covering the plain surface of each of said perforated plates, and a frame secured into rabbets of said strainer-plate and holding said sheet in position, substantially as set forth.

10. In a strainer of a machine for forming pulp into sheets, the combination of a perforated plate having a rabbet in its face around the edges, rim-flanges on one side of said plate, supporting projections on the cavity side of the plate level with said rim-flanges, a setback in the top and bottom rim-flange having a shouldered notch and perforation within said notch communicating with the cavity of the plate, a sheet of cloth, felt or wire covering the plain face of the plate and a frame fitting flush into the rabbeted face and secured therein and holding said covering, substantially as set forth.

11. The combination of a pair of perforated strainer-plates provided with rim-flanges and registering supporting projections level with said flanges and having setbacks in two opposite rim-flanges with shouldered notches and perforations within said notches, said plates

faced with their cavity sides inward and connected by screws, a covering-sheet of cloth, felt or wire on the outer face of each plate, a frame fitting flush into a rabbet near the edges of the plate and secured therein and holding said covering in position, substantially as set forth.

12. The combination of a pair of perforated strainer-plates provided with rim-flanges and registering supporting projections level with said flanges and having setbacks in two opposite rim edges and shouldered notches and perforations within said notches, said plates placed in contact and connected with their cavity sides inward and their rim-flanges supporting projections meeting, a covering-sheet of cloth, felt or wire on the outer face of each plate, a frame fitting flush into a rabbet near the edges of the plate and secured therein and holding said covering, a pipe of rectangular cross-section placed transversely on each notched edge of the connected plates, a raised shouldered and perforated portion on each pipe fitting into the notches of the connected plates between the projecting portions of the cover-frame, substantially as set forth.

13. The combination of a pair of perforated strainer-plates provided with rim-flanges and registering supporting projections level with said flanges and having setbacks in two opposite edges with shouldered notches and perforations within said notches, said plates placed in contact and connected with their cavity sides inward and their rim-flanges and supporting projections meeting, a covering-sheet of cloth, felt or wire on the outer face of each plate, a frame fitting flush into a rabbet near the edges of the plate and secured therein and holding said covering, a pipe of rectangular cross-section placed transversely on each notched edge of the connected plates, a raised shouldered and perforated portion on each pipe fitting into the notches of the connected plates between the portions of the cover-frames adjacent to the notches, a lug at the end of each pipe, a chamber having a cross-section corresponding to the edges of the connected plates and having a groove in the top and bottom in which said pipes fit and slide flush with the surface, said lugs on said pipes projecting above the surface, a plunger fitting and sliding in said chamber between the raised portions of the pipes and the lugs at the ends and engaging said lugs when moving in one direction, substantially as set forth.

14. In a pulp-press, a central strainer, combined with a drainage-pipe applied thereto, and the chamber-casing having a recess formed to receive the pipe, so that it will be flush with the side of the casing, substantially as set forth.

15. In a pulp-press, a chamber-casing, having a recess formed in it, combined with a drainage-pipe placed in the recess, a central strainer secured to the pipe which pipe has its outer end projecting beyond the end of the casing, and a lug formed upon its inner



end, and a plunger which strikes against the lug to return the strainer to position, substantially as set forth.

16. In a pulp-press, a casing provided with  
5 a strainer at its outer end, and a plunger provided with a drainage-plate, combined with a central strainer which is movable back and forth in the case, and which has secured to it a drain-pipe which is movable back and forth  
10 in the casing with the central strainer, the pipe being provided with means for returning the strainer to position, substantially as set forth.

17. In a pulp-press, the combination with

the casing of a false bottom hinged to the 15 lower edge of one of the sides of the press, of a cam pivoted to the stationary bottom the said cam being provided to hold the false bottom at its highest throw, and adapted to be slightly lowered to loosen the compressed 20 sheet of pulp, of the lateral swinging door having lips substantially as set forth.

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

JOSEPH STUART HUGHES.

Witnesses:

F. W. CLARK,  
A. L. WILL.