No. 891,489. PATENTED JUNE 23, 1908.

W. LEWIS.

MOLDING MACHINE.

APPLICATION FILED DEC. 1, 1906.

4 SHEETS—SHEET 1.

Fig. 1.

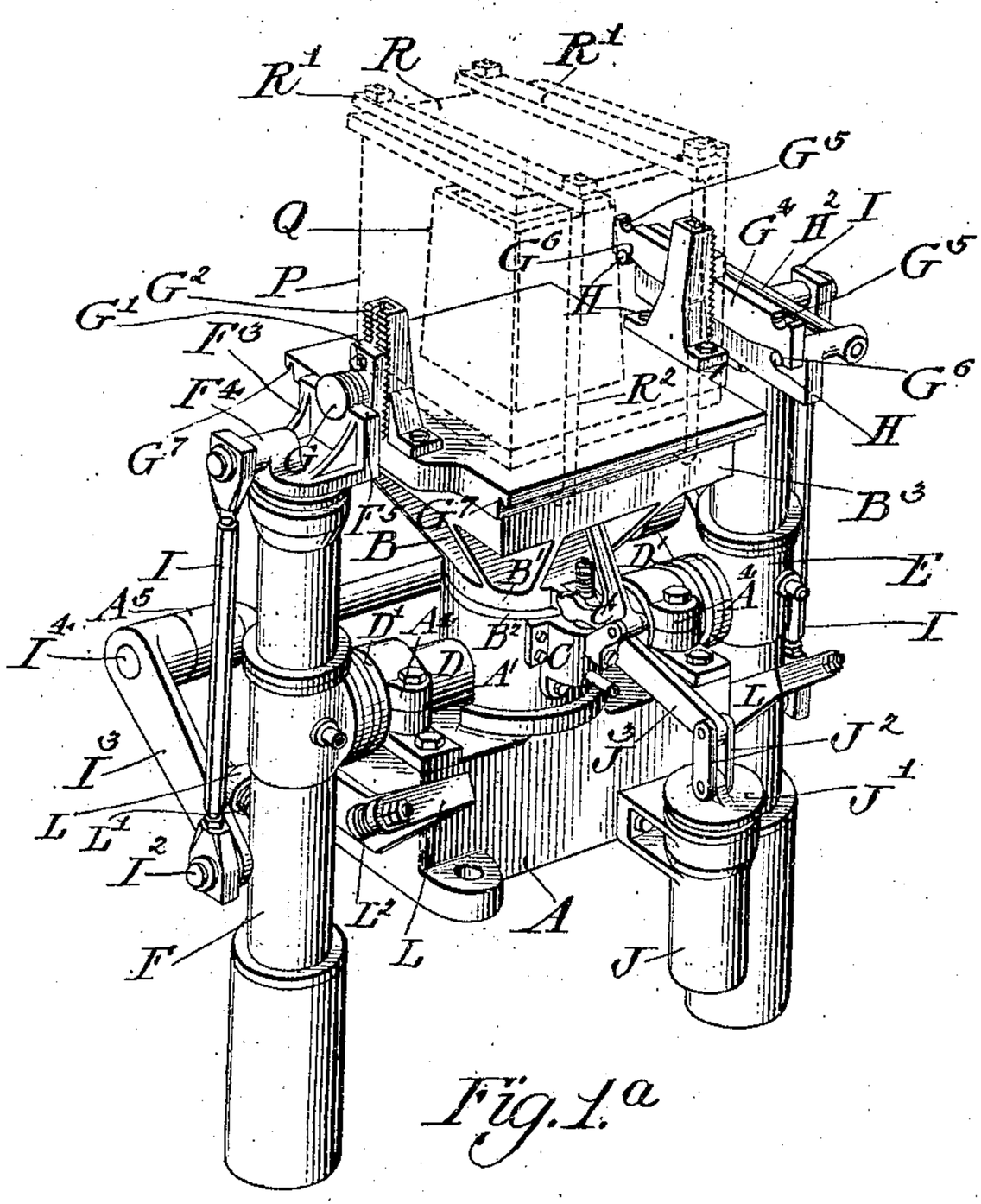
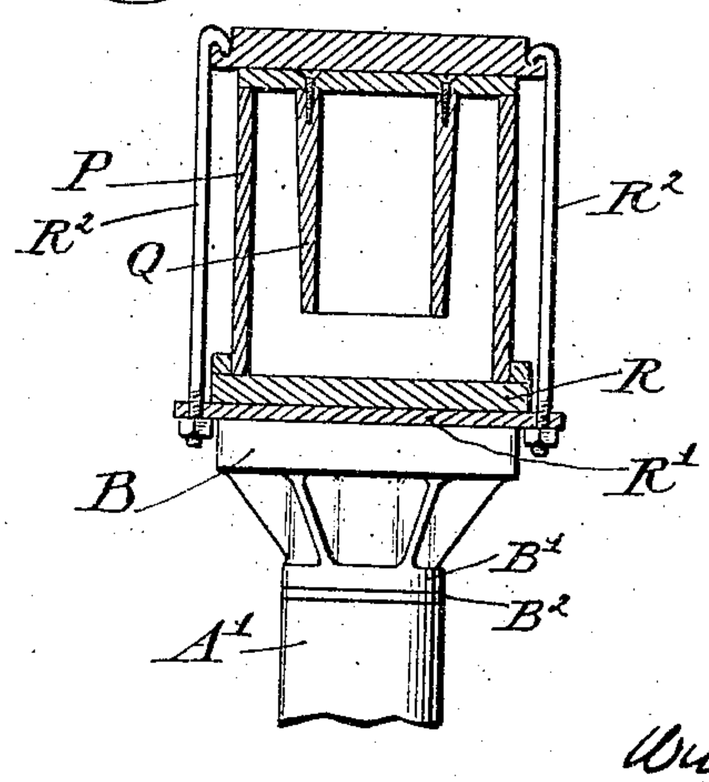


Fig. 1a



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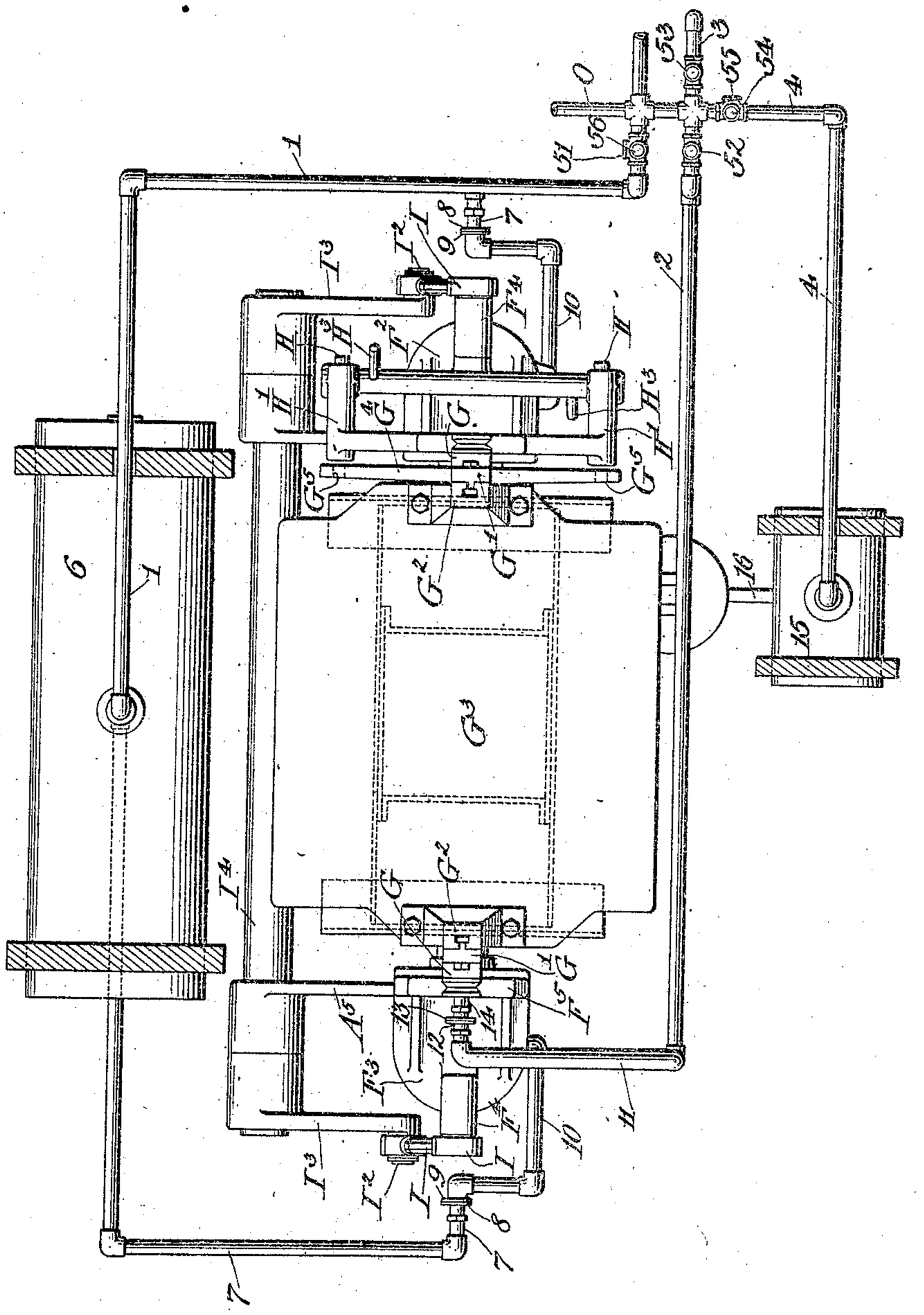
4 SHEETS—SHEET 2.

Fig. 2.



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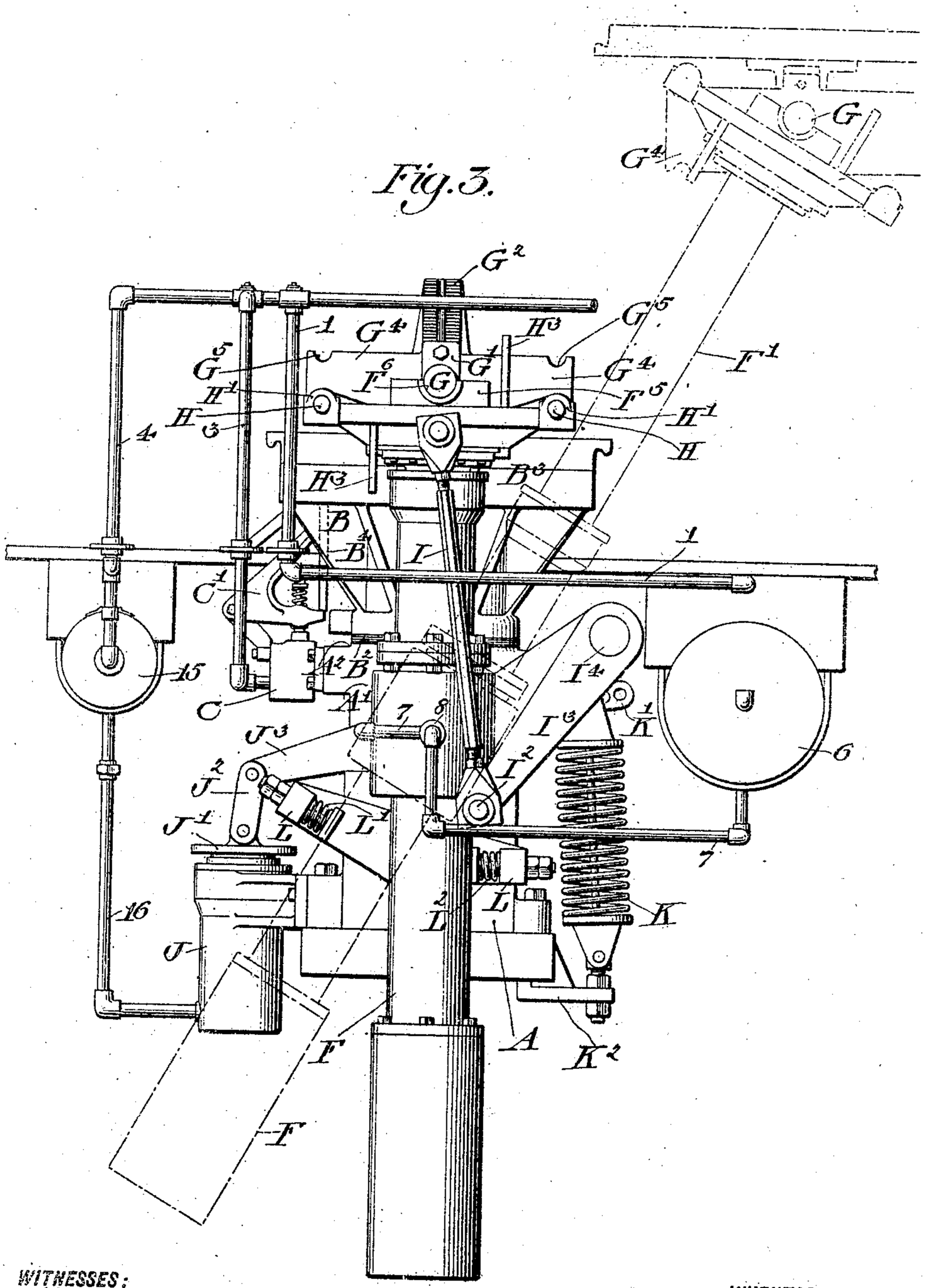
4 SHEETS—SHEET 3.

Fig. 3.



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APPLICATION FILED DEC. 1, 1906.

4 SHEETS—SHEET 4.

Fig. 4.

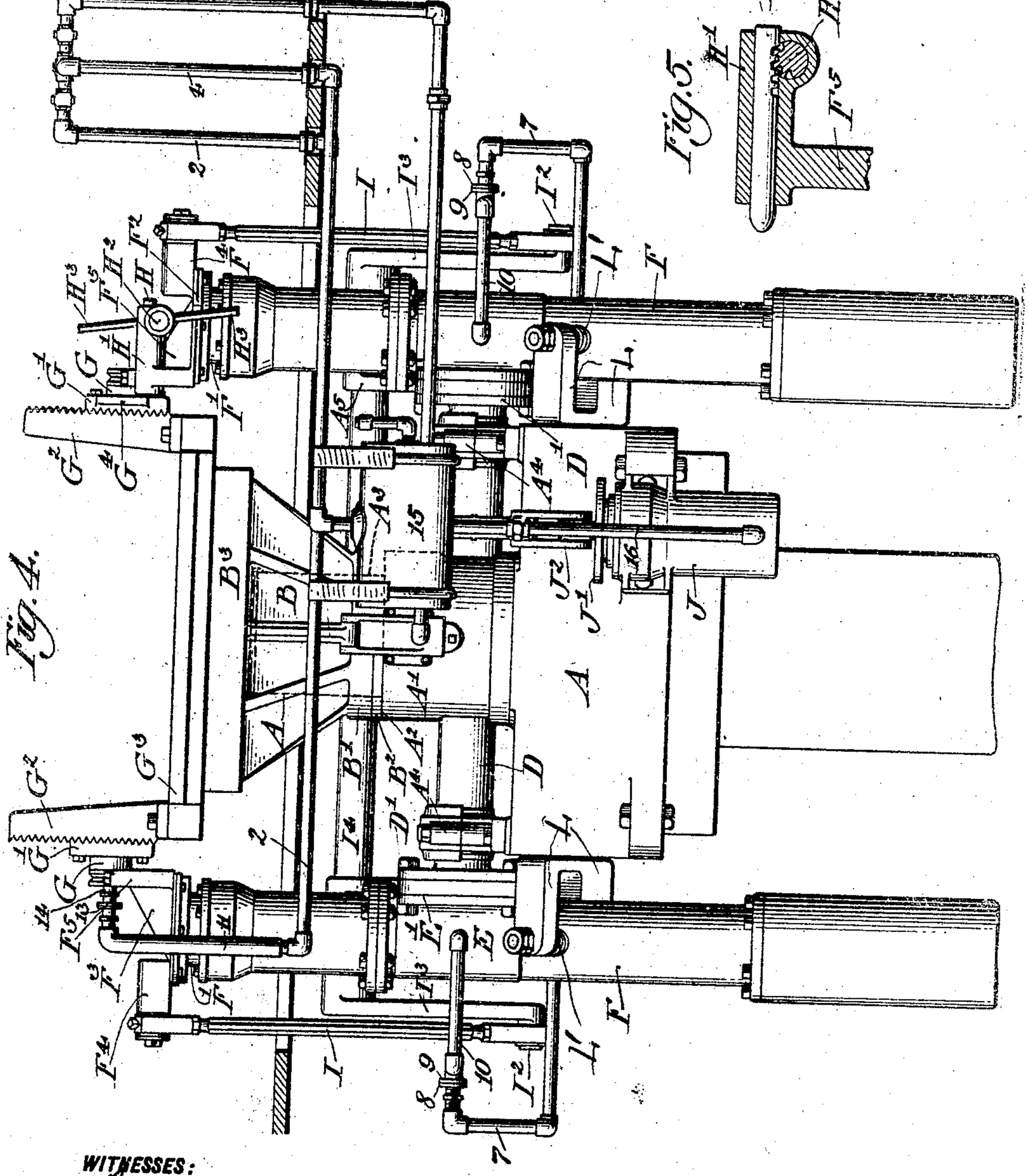

Fig. 5.

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UNITED STATES PATENT OFFICE.

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MOLDING-MACHINE.

No. 891,489. Specification of Letters Patent. Patented June 23, 1908.

Application filed December 1, 1906. Serial No. 345,947.

To all whom it may concern:

Be it known that I, WILFRED LEWIS, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Molding-Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to apparatus for forming molds in sand or the like, and has for its object the provision of effective means for manipulating the mold supporting flasks and for drawing the patterns from the molds after the latter are formed.

In the particular form of my invention disclosed, a molding machine is employed in which the sand is settled around the pattern to form the mold by jarring the table or support on which the pattern and surrounding flask are supported, and the mechanism for manipulating the flask and drawing the pattern are intimately connected with and form a part of the molding machine proper.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, and the advantages possessed by it, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described somewhat in detail one of the forms in which my invention may be embodied.

Of the drawings, Figure 1 is a perspective view of the molding machine with a pattern and inclosing flask in place. Fig. 1ª is a sectional elevation of a portion of the flask and pattern manipulating mechanism with the pattern and flask held in one of the positions assumed by them in operation. Fig. 2 is a plan view of the molding machine. Fig. 3 is an end elevation of the molding machine with parts shown in two different positions and Fig. 4 is a side elevation of the molding machine. Fig. 5 is an elevation partly in section illustrating the flask support locking pins.

The molding machine proper comprises a base or main frame member A provided with a cylindrical upward extension A^1 terminating above the shoulder A^2 in the piston A^3 shown in dotted lines in Fig. 4. A cylinder member B is slidingly mounted on the piston A^3, the downward movement of the cylinder B being arrested by the engagement of the end B^1 with the washer B^2 supported by the shoulder A^2. The upper end of the member B terminates in a somewhat massive support B^3 forming the jarring table or molding table of the machine. A valve casing C has a valve actuated by the intermittent engagement of the part B^4 carried by the member B with the member C^1 mounted on the valve casing, which serves to alternately connect the cylinder chamber above the piston A^3 with a fluid pressure supply pipe 3 and to exhaust when it is desired to jar the table B. The particular form of this portion of the mechanism forms no part of my present invention and may be like that shown by my copending application, Serial Number 327,631, filed July 25, 1906, or like any other known form of mechanism suitable for the purpose.

The member A supports bearings A^4 in which are journaled a shaft D passing through an aperture formed for the purpose in the extension A^1 and carrying at its ends heads D^1. Each head D^1 has secured to it the flange E^1 of the collar E integrally secured to a cylinder F. Each cylinder F forms a guide into the upper end of which extends a lifting device in the form of a piston F^1. The pistons F^1 may be substantially identical in construction, but the head F^2 carried by the right hand piston F^1 in Fig. 4 differs somewhat from the head F^3 carried by the left hand piston. Each of the heads F^2 and F^3 has secured to it a trunnion F^4 and a trunnion bearing support F^5. The trunnion bearing supports F^5 have formed in their upper sides open bearings F^6 in which are received the trunnions G carried by trunnion blocks G^1 adjustably secured to brackets G^2 extending from the pattern support or frame G^3. The trunnion block G^1 adjacent the piston head F^2 is provided with arms G^4 each provided with a lower notch G^6 and an upper notch G^5. Pins H slidingly mounted in tubular guides H^1 formed for the purpose on the head F^2 may be slid into and out of the notches G^5 or G^6 to lock the frame G^3 aganist rotation relative to the pistons by any suitable mechanism such as the cam shaft H^2 operated by the handles H^3. Links I pivoted to the trunnions F^4 at their upper ends and at then

lower ends to pins I^2 carried by arms I^3 rigidly secured to a shaft I^4 journaled in brackets A^5 extending from the main frame assist in preventing independent movement of the pistons F^1 without limiting their capacity for simultaneous movement.

The shaft D is rotated to carry the cylinders F out of the vertical position by a fluid pressure device comprising a cylinder J and piston J^1. The piston J^1 is connected by links J^2 to an arm J^3 secured to the shaft D. The shaft D is returned to its original position with the cylinders F vertical by means of a helical compression spring K adjustably connected at its upper end to an arm K^1 secured to the shaft D and at its lower end to an abutment K^2 adjustably secured to the frame member A. Bracket arms L support buffer springs L^1 and L^2, which cushion the movements of the cylinders away from and back to the vertical position respectively. It will be understood that the buffer springs L^2 are under initial loads and act only to absorb shock at the instant at which the cylinders return to the vertical position, after which they act as stops against which the spring K^2 holds the cylinders in the truly vertical position.

O indicates the pipe leading from a source of air or liquid under pressure. Suitable valves, 51, 52, 53, and 54, control connection from the pipe O to pipes 1, 2, 3 and 4, respectively. Pipe 1 leads to a reservoir 6 from which lead pipes 7 each terminating in line with the axis of the shaft D in a coupling member 8 pivotally connected to a coupling member 9. The coupling members 9 are connected by pipes 10 to the cylinder spaces formed in the cylinders F. The pipe 2 leads through a flexible connection 11 to a pipe 12 connected by a coupling 13 to a pipe 14 supported by the trunnion engaged by the crosshead F^3. From pipe 14, connection is made to suitable mechanism for vibrating or jarring the pattern supported by the frame G^3 to facilitate the drawing of the pattern. As the particular construction of this vibrator forms no part of my present invention, I have not thought it necessary to illustrate it. The pipe 3 leads to the valve casing C and supplies the fluid pressure for jarring the table B. The pipe 4 leads to a reservoir 15 from which the pipe 16 leads to the cylinder J.

In operation the mold is formed by opening the valve 53 and jarring the table B to settle sand contained by the flask P resting on the platform or frame G^3 about the pattern Q secured to the frame G^3. The condition of the apparatus at that time is shown in Fig. 1. During the jarring operation the frame G^3 rests upon the table B, the pistons F^1 being dropped so that the trunnions G are slightly above their bearings in the bearing supports F^5. When the sand has been firmly settled about the pattern and the valve 53 is closed, the mold board R is clamped in place in any suitable manner, as by means of clamps R^1 and R^2 which engage the rabbeted edges G^7 of the frame G^3. The pins H are then slid into position to engage the notches G^6 and the valve 51 is turned to admit pressure from the pipe O through the pipe 1, reservoir 6, pipes 7, coupling members 8 and 9, pipes 10 to the cylinders F. This causes the pistons F^1 to move out of their cylinders and lift the frame G^3, and parts supported by it, above the table B. The spring K acting on the arm K^1 prevents any angular movement of the cylinders F at this time. When the platform G^3 is raised above the table B, a sufficient distance, the pins H are withdrawn and the frame G^3 and parts carried by it are turned over. Ordinarily the center of gravity of the member G^3 and parts carried by it is then above the axis of the trunnions G so that this turning over movement occurs automatically when the pins are withdrawn. The controlling valve 51 is then turned to connect the pipe 1 to the exhaust port 55 and the flask is dropped down upon the table B. The clamps R^1 and R^2 are then removed and the pins H having been thrown into position to engage the walls of the notches G^5, valves 51 and 52 are operated to admit pressure to the vibrator through the valve and connections 2, 11, 12, 13 and 14 and to again admit pressure through the pipe 1 to raise the pistons F^1 and draw the pattern from the mold, which with the flask remains upon the table B.

As the pattern clears the mold and the pistons move to the upward limit of their movement, valve 54 is opened to admit pressure through the pipe 4, reservoir 15 and pipe 16 to the cylinder J to raise the piston J^1 and turn the shaft D in its bearings. This swings the cylinder F and pistons and parts carried by them to position shown in dotted lines in Fig. 3. This moves the frame G^3 and the pattern away from the flask to permit the latter to be removed in any suitable manner. Usually this removal is brought about by means of an overhead traveling crane, or the like. When the flask is removed, the pipe 4 is connected to the exhaust 56 by the operation of its valve and the cylinders are returned to the vertical position by the action of the spring K^2. Similarly the pipe 1 is connected to exhaust and the pistons F^1 drop down in their cylinders, the pins H^1 having been withdrawn in the mean time, the frame swings back to the position shown in Fig. 1 and again rests on the table when the pistons F^1 approach the lower limit of their movement.

The apparatus described has been found in practice to be simple and reliable in operation and to greatly facilitate and expedite

the formation of molds. It will be obvious, however, to those skilled in the art, that changes may be made in the form of my invention without departing from its spirit. In particular it will be readily understood that some of the advantages of my invention may be obtained when other than fluid pressure means are employed for raising the frame G^3 and rocking the shaft D.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is

1. In a molding machine, a frame, a molding table, supported thereon, a horizontal shaft journaled therein, cylinders connected to said shaft at opposite ends of the table, pistons in said cylinders, a pattern support engaged by said pistons, means for moving said pistons in said cylinders to lift the support off the table and means for rocking the shaft to swing said support transversely of said table.

2. In a molding machine, in combination, a frame, a molding table supported thereby, a pattern support, a cylinder pivoted to said frame, a piston in said cylinder adapted to engage said support and lift it off the table and means for swinging said cylinder relative to said frame to move the pattern support transversely of the molding table.

3. In a molding machine, a frame, a molding table and lifting devices mounted on said frame, a pattern support pivotally connected to said lifting devices, locking devices arranged to lock said pattern frame against pivotal movement relative to said lifting devices in either of two positions of said support relative to said lifting devices.

4. In a molding machine, a frame, a molding table and lifting devices mounted on said frame, a pattern support pivotally engaged by said lifting devices, locking devices for locking said pattern support against pivotal movement relative to said lifting devices in either of two positions, and means for moving said lifting devices transversely of said table.

5. In combination a supporting frame, a molding table carried thereby, lifting devices one at each side of the table supported by said frame, a pattern support adapted to be engaged by said devices, means for operating said devices to cause them to engage the pattern support and lift it off the table and means for swinging said lifting devices relative to the supporting frame to move the pattern support transversely of the molding table.

6. In a molding machine, a molding table, a pattern support, lifting mechanism, means for causing it to engage the pattern support and lift it vertically off the molding table and separate means for acting on the lifting mechanism to cause it to move the pattern support transversely of said table.

7. In a molding machine, a horizontal molding table, a pattern support normally resting on said table and provided with trunnions, lifting mechanism provided with bearings, means for operating said lifting mechanism to cause said bearings to engage said trunnions and lift said support vertically off the table and means for moving said lifting mechanism to move said support transversely of said table.

8. In a molding machine, a horizontal molding table, a pattern support normally resting on said table and provided with trunnions, lifting mechanism provided with bearings, means for operating said lifting mechanism to cause said bearings to engage said trunnions and lift the frame vertically off the table, means for moving said lifting mechanism to move said support transversely of said table, and means for locking said pattern support against turning movement relative to said lifting mechanism in either of two positions.

9. In a molding machine, a horizontal molding table, a pattern support normally resting on said table and provided with trunnions, lifting mechanism provided with bearings means for operating said lifting mechanism to cause said bearings to engage said trunnions and lift the frame vertically off the table, means for moving said lifting mechanism to move said support transversely of said table, means for locking said pattern support against turning movement relative to said lifting mechanism in either of two positions, a flask and means for detachably securing the flask to the pattern support.

10. In a molding machine, a supporting frame, a horizontal molding table supported thereby, a shaft journaled in said frame, guides carried by said shaft one at each end of the table, lifting devices mounted in said guides and movable therein toward and away from the shaft, means for moving said lifting devices in their guides, a pattern support normally resting on said table, but adapted to be engaged and lifted off of said table by said lifting devices and means for rotating the shaft to move the pattern support transversely of said table.

11. In a molding machine, a supporting frame, a molding table supported thereby, a shaft journaled in said frame, guides carried by said shaft, lifting devices movable in said guides toward and away from said shaft and provided with trunnion bearings, a pattern support provided with trunnions normally resting on said molding table, means for moving said lifting devices in said guides to cause the bearings to engage said trunnions and lift the support off the table, and means for rotating the shaft while the pattern support is held above the table.

12. In a molding machine, a supporting

frame, a horizontal molding table supported by and vertically movable with respect to said frame, a horizontal shaft journaled in said frame, a pair of cylinders secured to said shaft, one at each side of said table, pistons located in said cylinders, a pattern support normally resting on said table, means carried by said pistons for engaging said support, an arm secured to said shaft, a piston linked to said arm, a cylinder in which said piston is movable, fluid pressure actuated means for jarring the table relative to the frame, means for admitting fluid pressure into said cylinders to cause the pistons to engage and lift the pattern support, and means for admitting fluid pressure to said cylinder to rotate said shaft.

13. In a molding machine, a supporting frame, a horizontal molding frame supported thereby, a shaft journaled in said frame, guides carried by said shaft one at each end of the table, lifting devices mounted in said guides and movable therein toward and away from the shaft, a pattern support normally resting on said table, means for moving said lifting devices in their guides, means for rotating the shaft to move the pattern support transversely of said table and means for causing said lifting devices to move in unison, said means comprising a second shaft journaled in said frame, arms secured to said shaft and links extending from said arms to said lifting devices.

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