No. 754,495. PATENTED MAR. 15, 1904.

R. A. PENROSE.

MOLDING APPARATUS.

APPLICATION FILED APR. 7, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

FIG. 5.

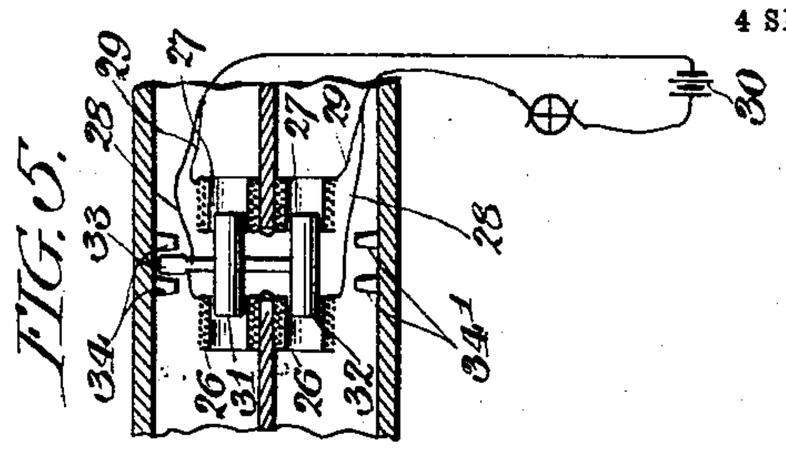


FIG. 2.

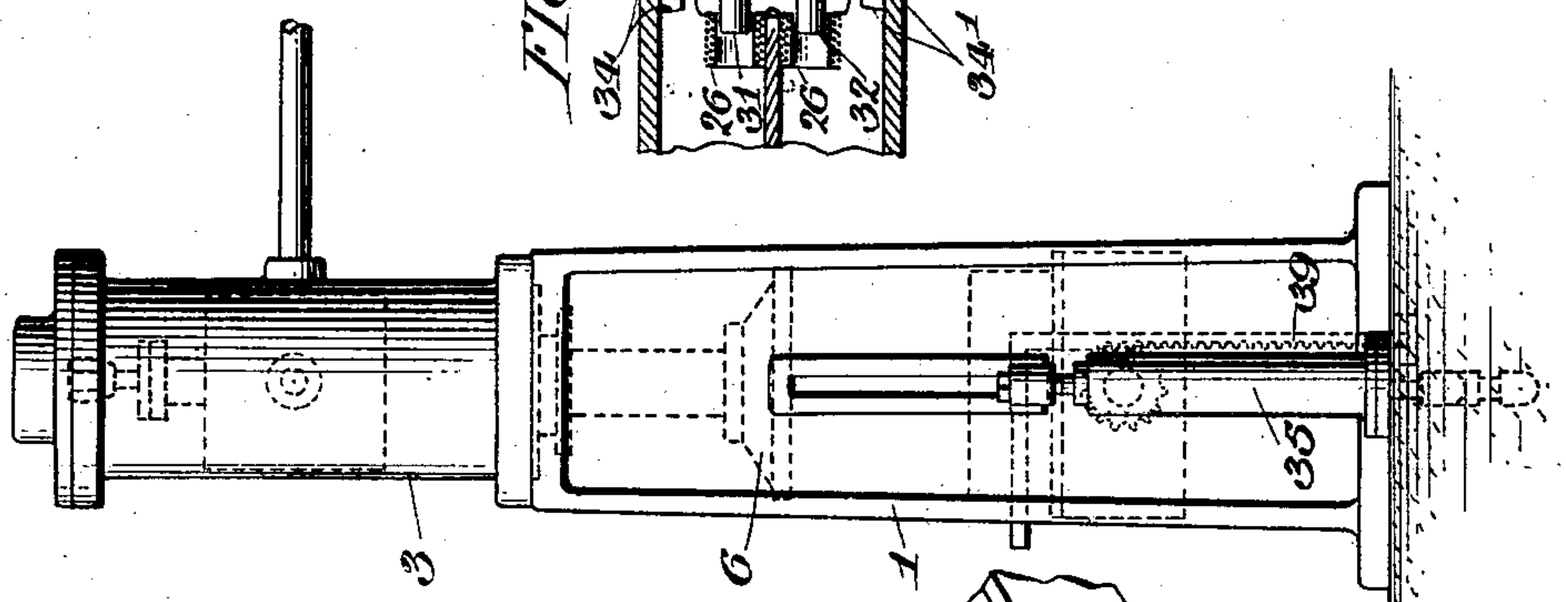


FIG. 3.

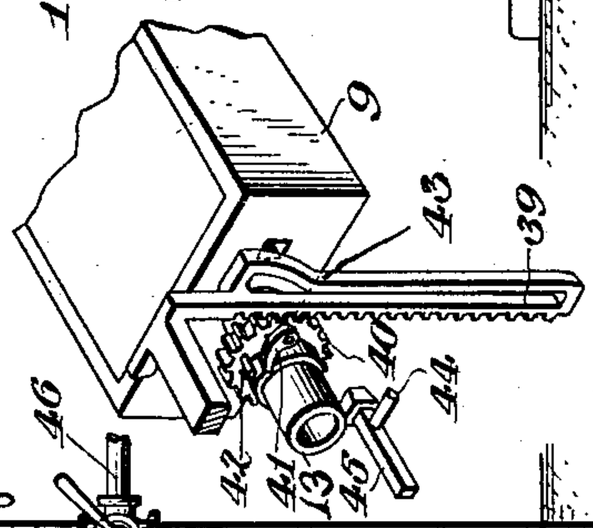
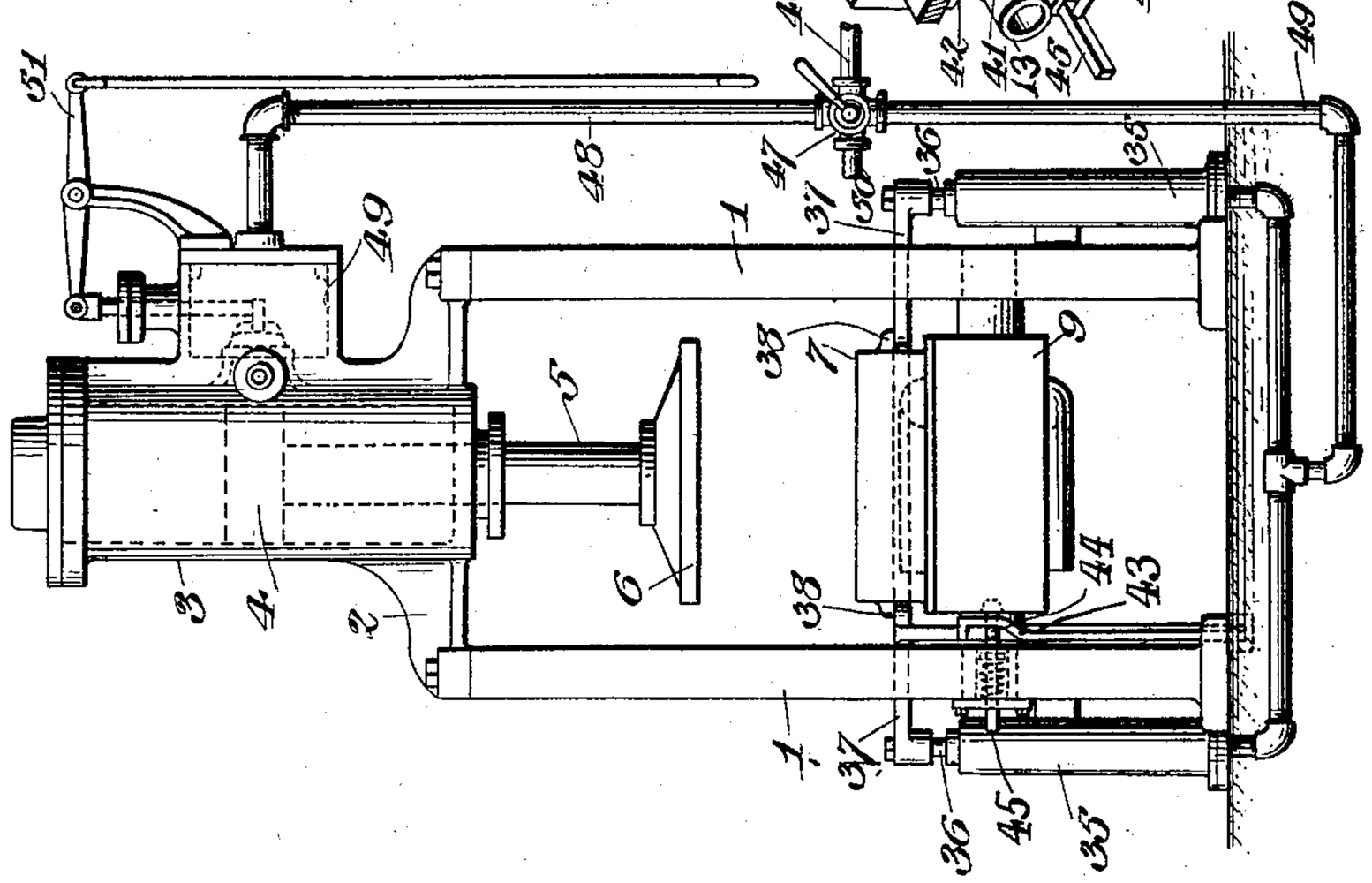


FIG. 1.



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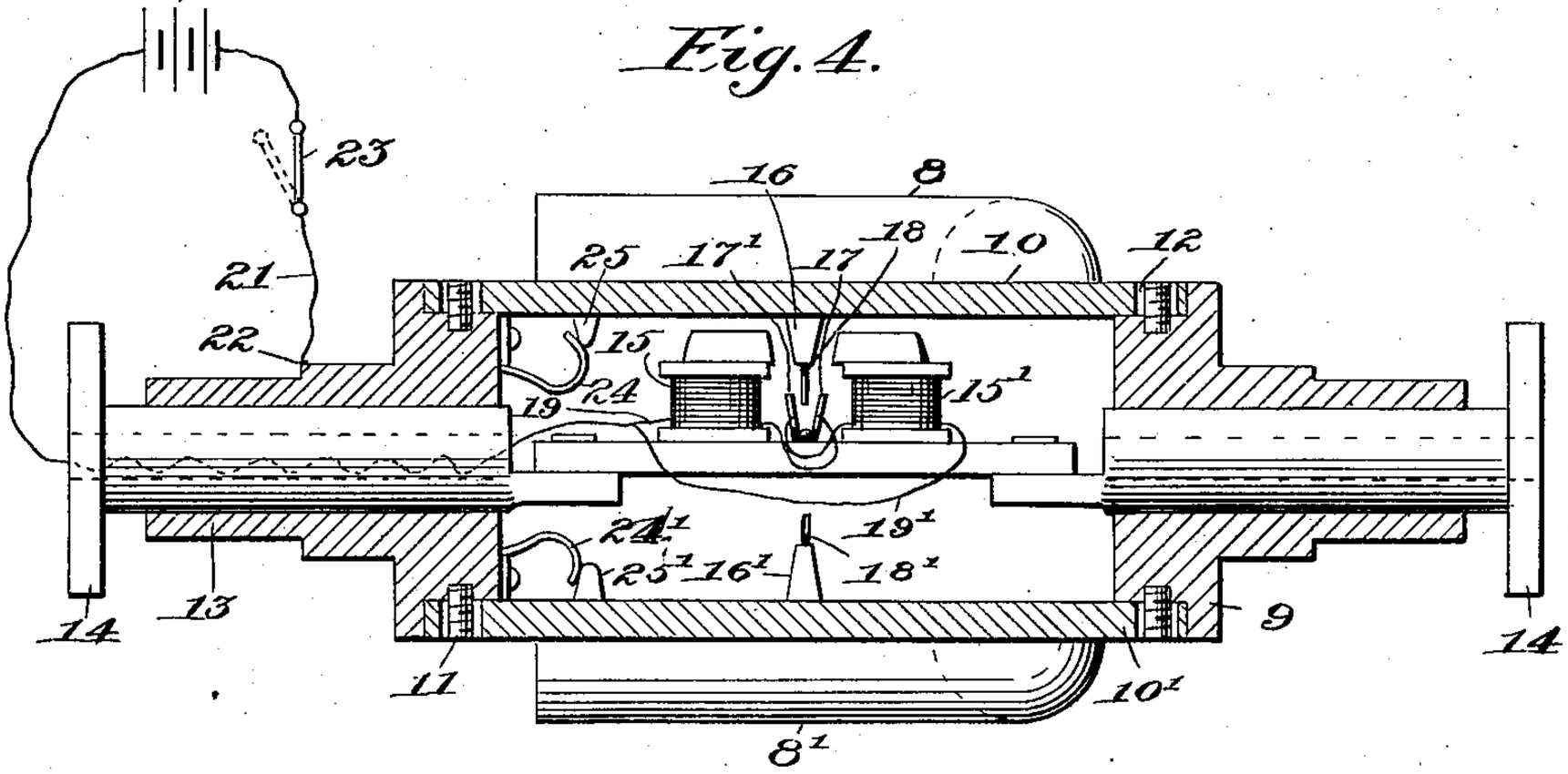
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 4.



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NO MODEL. 4 SHEETS—SHEET 3.

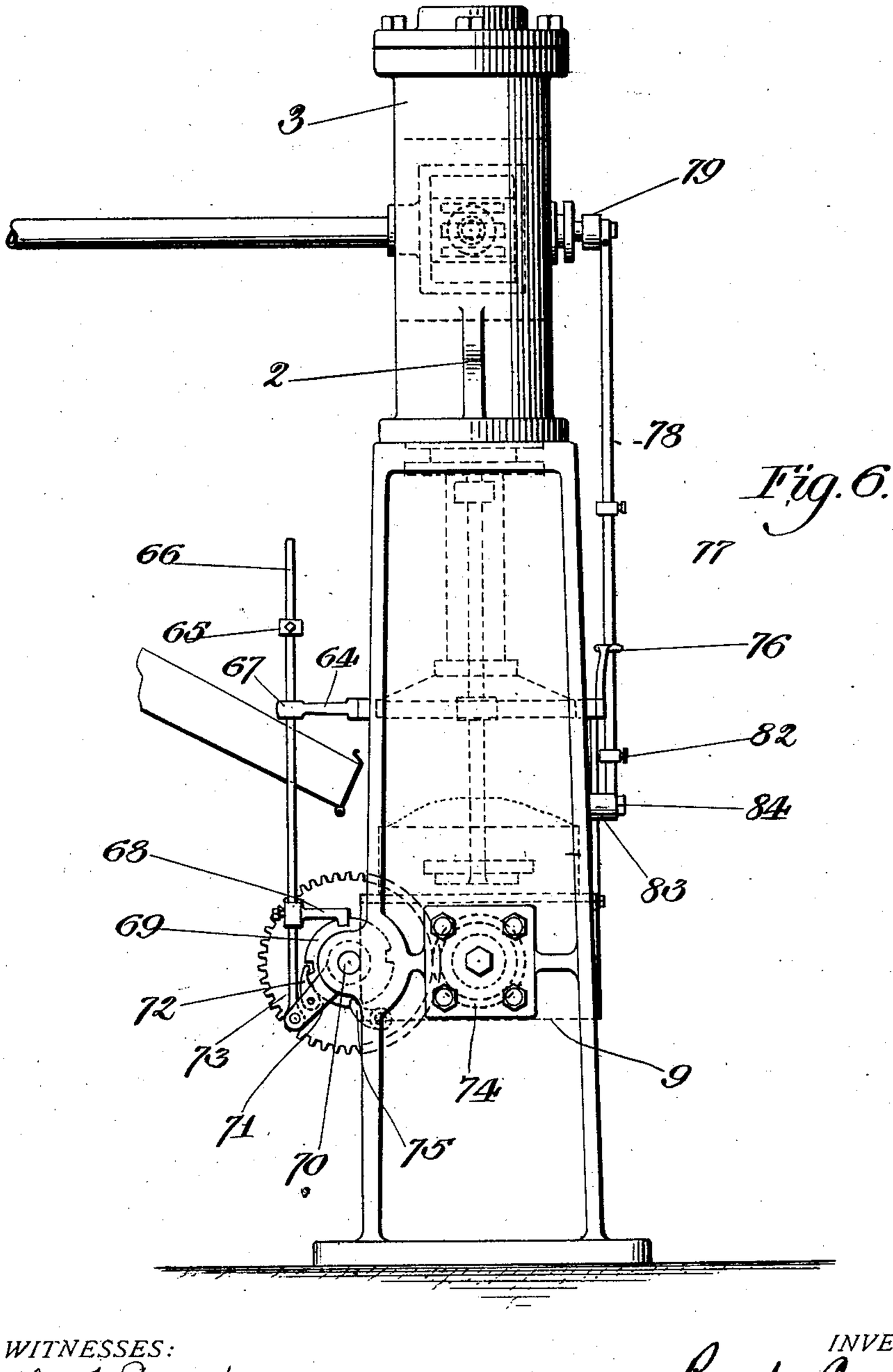

Fig. 6.

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No. 754,495. PATENTED MAR. 15, 1904.

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MOLDING APPARATUS.

APPLICATION FILED APR. 7, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7.

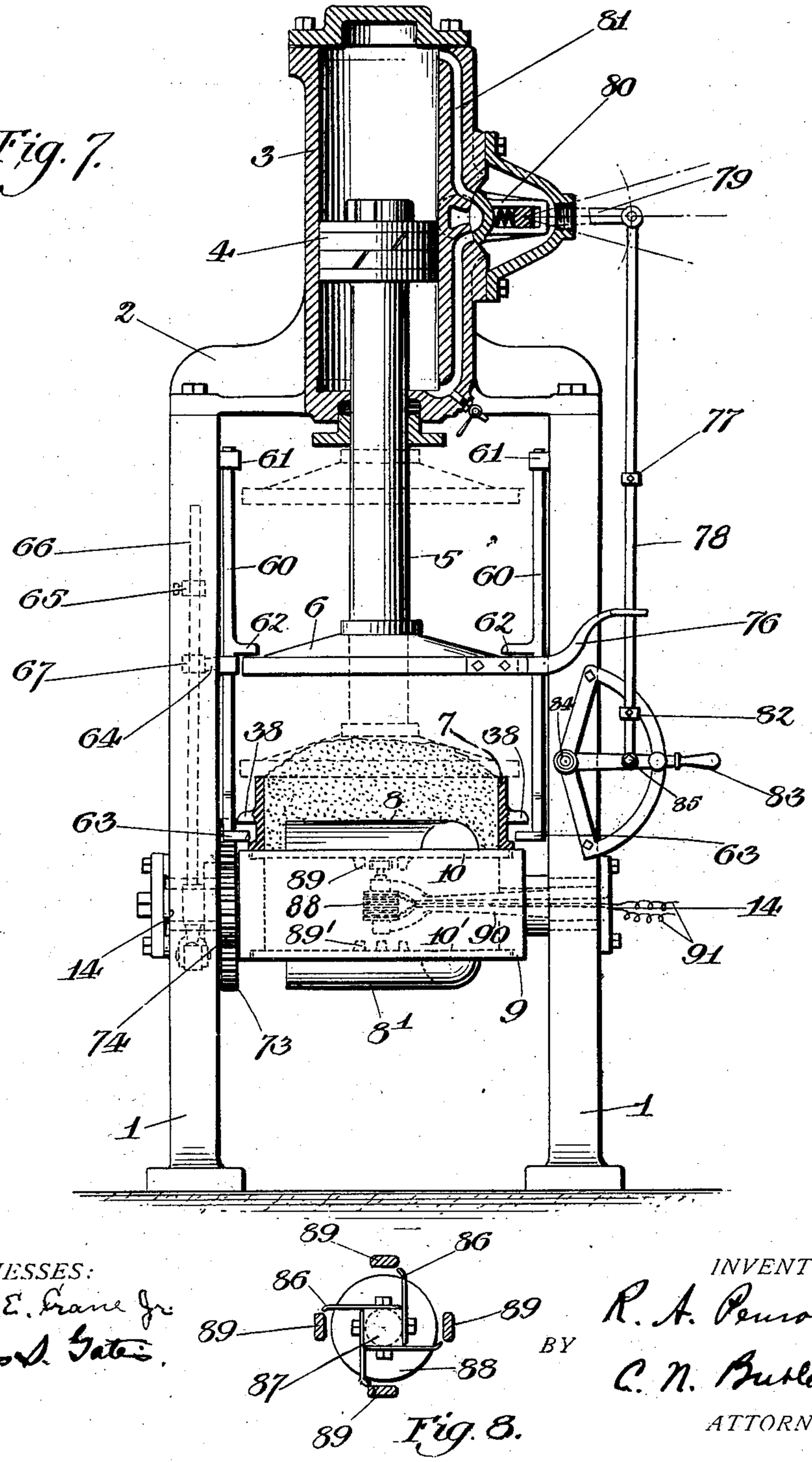

Fig. 8.

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No. 754,495. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

RICHARD A. PENROSE, OF PHILADELPHIA, PENNSYLVANIA.

MOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 754,495, dated March 15, 1904.

Application filed April 7, 1903. Serial No. 151,458. (No model.)

To all whom it may concern:

Be it known that I, RICHARD A. PENROSE, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Molding Apparatus, of which the following is a specification.

This invention relates to improved power molding apparatus. Its leading objects are to provide simple and efficient mechanism for consolidating the sand in the flask and forming the pattern-mold therein, for jarring the pattern and freeing the mold therefrom, for effecting the withdrawal of the flask with the mold and simultaneously placing the second pattern or part of the pattern.

The character and advantages of the improvements will more fully appear by reference to the following description and the accompanying drawings in illustration thereof, of which—

Figure 1 represents a front elevation of a machine embodying the improvements. Fig. 2 represents a side elevation thereof. Fig. 3 represents a perspective view of the end of the revolving table and mechanism for operating it. Fig. 4 represents a vertical longitudinal sectional view of the table, showing electromagnetic mechanism for jarring the patterns supported thereby. Fig. 5 represents a sectional view of further electromagnetic mechanism for jarring the patterns. Fig. 6 represents a side elevation of a machine embodying a modified form of the improvements. Fig. 7 represents a front elevation, partially in section, of the construction shown in Fig. 6; and Fig. 8 represents a plan view of an electric hammer used for jarring the patterns.

Referring to the drawings, the frame-struts 1 support the cross-head 2, which carries the cylinder 3. A piston 4, acting in the cylinder, has its piston-rod 5 connected with a plate 6, adapted for ramming or consolidating the sand and forming the mold in the flask 7, which is supported, together with the pattern 8, on the table 9. The table is a hollow rectilinear structure provided with the oppositely-placed plates 10 and 10′, which are connected in slightly-movable relation upon their bearings, as by the screws 11, passing through holes 12 of sufficient size to admit of such movement, and the consequent movement of the respective patterns or pattern-sections 8 and 8′, connected with the plates. The hubs 13 of the table are sleeved on the spindles 14, which are fixed to the frame, the table being thereby adapted for revolving the pattern-sec-sections into position for forming successive molds. Within the table and supported on the spindles, as shown in Fig. 4, are electromagnets 15 and 15′, adapted to be alternately excited to alternately attract the respective armatures 16 and 16′, projecting from the plates and adapted to be revolved successively into the field between the poles of the magnets. These magnets may be alternately excited in any desired manner, as by placing them in the respective circuits of the independent contacts 17 and 17′ and the contact 18, which is adapted to oscillate between and alternately close the circuits of the respective contacts 17 and 17′ by engagement therewith. This action may be effected by carrying the conductors 19 and 19′ of the respective magnets through one of the hubs 14 and connecting the same with a source of electric energy 20, which is connected by a wire 21 with the revoluble hub 13 by a contact 22, electrically connected by the table with the contact 18, the electromagnets being excited and the jarring action thereof effected by closing the switch 23. To provide a closed circuit upon the closing of the switch 23, the respective contacts 18 and 18′ may be thrown into engagement with the contact 17 by the respective springs 24 and 24′, which bear against the table and the respective lugs 25 and 25′ on the plates—that is to say, when the table has been revolved to bring the armature 16 or 16′ between the poles of the electromagnets 15 and 15′ the movement of the corresponding plate 10 or 10′ to the position required for securing the contact of the conductors 17 and 18 or 18′ may be effectuated by the springs 24 and 24′ or in any other suitable manner, as manually, if desired. It will be understood that the wires 19 and 19′ are insulated from the hub 13.

As shown in Fig. 5, the pattern may be jarred by means of an electromagnetic ham-

mer, comprising two pairs of electromagnets 26 and 27, connected by their respective circuits 28 and 29 with a source of electric energy 30, the magnets of the respective pairs being coupled to permit the movement therein of the cores 31 and 32, which are connected together and carry the head 33, adapted to oscillate between the plate-bosses 34 and 34′. It will be understood that when the table has been revolved so that the bosses 34 or 34′ lie on either side of the head 33 upon closing the circuit and alternating the current by any usual mechanism the hammer will be operated to vibrate the pattern.

The mold having been formed and the pattern jarred loose in the mold, the rammer 6 is carried up and the flask 7 is lifted from the table-plate 10 by the cylinders 35 and piston-rods 36, the latter having lugs or arms 37, which engage with lugs 38 on the flask. When the flask and mold have risen sufficiently to clear the pattern, the table 9 is revolved by the engagement of a rack 39, carried by the arm 37, with a gear-wheel 40, which is engaged with the hub 13 by a pawl 41 and a ratchet 42, the rack having the cam 43 connected therewith, which engages the pin 44 on a spring-pressed draw-bolt 45 and withdraws the bolt from engagement with the table 9 as the upwardly-moving rack engages the gear-wheel 40. The table having been turned through a half-revolution, the piston-rods 36 are carried down, moving down the rack and cam connected therewith, and the draw-bolt again engages the table to hold the same in position for forming the mold of the succeeding pattern.

The pistons in the cylinders 3 and 35 may be operated in any usual manner, as by hydraulic pressure. To this end the pipe 46 is connected by a valve 47 with the pipe 48, leading to the cylinder 3, the pipe 49 leading to the cylinders 35, and the pipe 50 for carrying off the waste.

As shown in Figs. 6 and 7, the struts 1 have the rods 60 connected therewith by the bearings 61, in which these rods are adapted to reciprocate. The rods are provided with lugs or arms 62, adapted to be engaged by the rammer 6 as it rises, and with lugs 63, adapted to engage the flask-lugs 38, by which the rise of the rammer carries up the rods 60 and the flask 7.

The flask and mold having been lifted clear of the pattern, the table 9 is turned by the engagement of an arm 64 on one of the rods 60 with a collar 65 on a rod 66, which moves within the collar 67 of the arm. This rod is thus carried upward, thereby withdrawing the dog 68, fixed thereon, from its engagement with the notched disk 69, fixed on the shaft 70, and the shaft is turned by an arm 71 thereon, which is pivotally connected with the rod 66, the arm having a spring-pressed pawl 72, which engages with the notches of the disk 69. This movement of the shaft 70 revolves the large gear-wheel 73, fixed thereon, which in turn revolves the small gear-wheel 74, fixed to the table 9, the latter gear turning the table through a half-revolution. When the rammer again descends, the rod 66 drops and the dog 68 engages the succeeding notch of the disk 69, which has been brought to position by the partial revolution of the disk, the latter being held against retraction by a spring-pressed pawl 75, adapted to engage the same.

The rammer 6 may be provided with an arm 76, adapted to engage a collar 77 on the valve-rod 78, whereby the arm 79, connected with the rod, is revolved, revolving the valve 80, with which it is connected, thereby opening the port 81 and admitting water to the cylinder above the piston, thus checking the rise of the same and reversing the action. This action carries the piston and the rammer down until the valve is reversed, which may be effected by the engagement of the arm 76 with the stop 82, fixed on the valve-rod. The actions of the piston and rammer are under control of the lever 83, fulcrumed at the point 84 and having the pivotal connection 85 with the valve-rod.

To effect the jarring of the plates 10 and 10′, an electrical hammer is provided, comprising the spring-arms 86, fixed to the shaft 87 of the electric motor 88 and adapted to strike the bosses 89 or 89′, depending from the respective plates. The motor 88 is journaled in the bearings of the arm 90, supported by the fixed spindle 14, upon which the table revolves, and is excited by current carried by the wires 91.

Having described my invention, I claim—

1. In a molding apparatus, a revoluble device for supporting a flask and a pattern, in combination with mechanism for ramming a mold in said flask, and mechanism for first withdrawing said flask and mold from said pattern and then revolving said supporting device, substantially as specified.

2. In a molding apparatus, a revoluble table having plates thereon adapted for supporting a pattern and flask, in combination with mechanism for ramming a mold in said flask, electrical vibratory mechanism for disengaging said mold and pattern, and mechanism for first withdrawing said flask and mold from said pattern and then revolving said table, substantially as specified.

3. In a molding apparatus, a revoluble support, in combination with a reciprocating rammer, reciprocating rods, means for engaging and lifting a flask by said rods, mechanism for vibrating said support, and gearing connected with said support for revolving the same, substantially as specified.

4. In a molding apparatus, a revoluble hollow table having plates thereon respectively adapted for supporting a pattern, a vibratory device within said table and having means for jarring the respective plates, mechanism for

lifting a flask and withdrawing a mold from said pattern, and mechanism actuated upon the withdrawal of said mold to revolve said table, substantially as specified.

5. In a molding apparatus, a revolving table having plates thereon respectively adapted for supporting a pattern and mold, a reciprocating rammer for consolidating said mold, and mechanism connecting said rammer with said table whereby said rammer revolves said table, substantially as specified.

In testimony whereof I have hereunto set my hand, this 4th day of April, 1903, in the presence of the subscribing witnesses.

RICHARD A. PENROSE.

Witnesses:

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UTLEY E. CRANE, Jr.