No. 754,602. PATENTED MAR. 15, 1904.

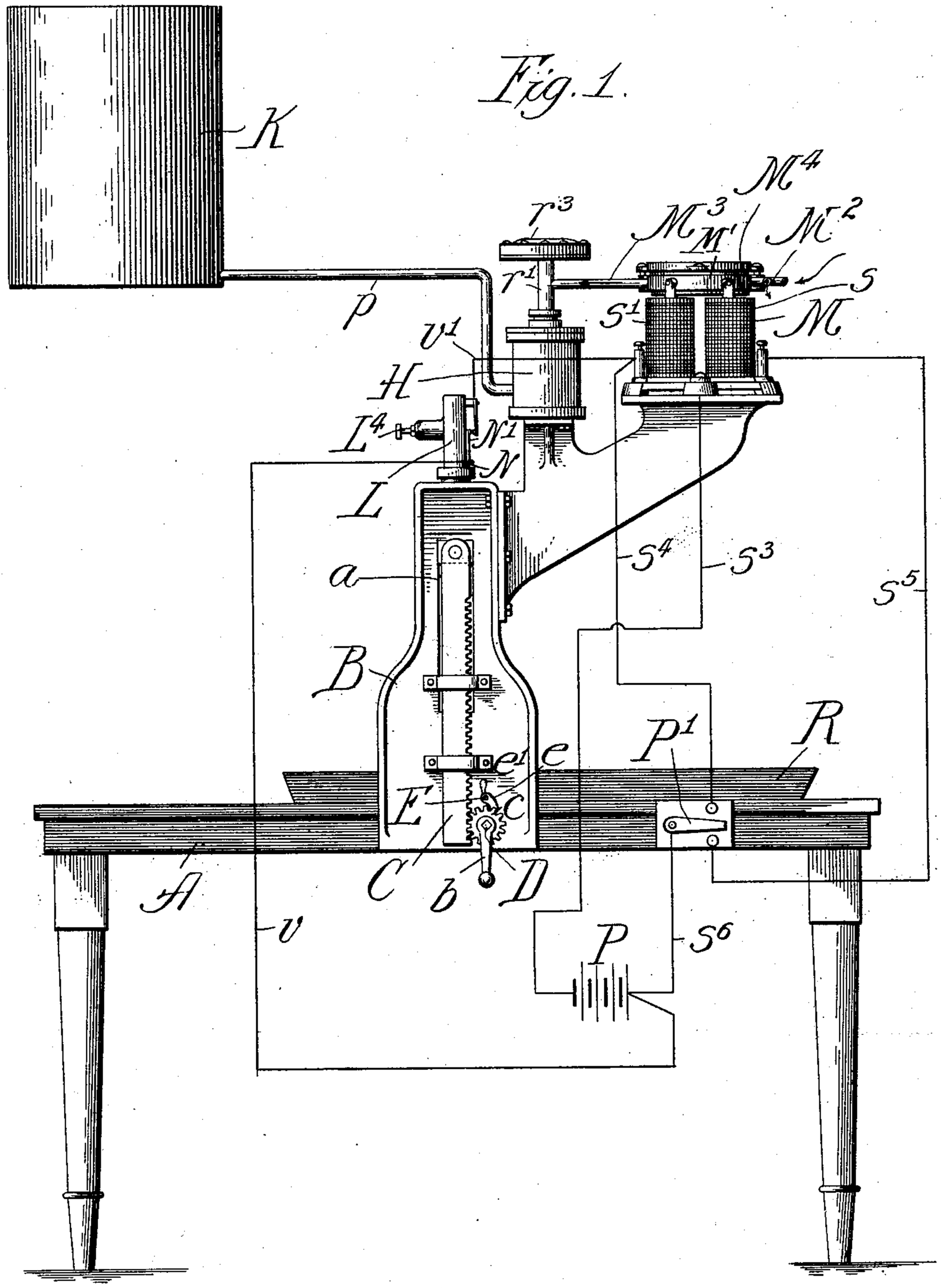
E. H. PARKER.

BOTTLE FILLING MACHINE.

APPLICATION FILED DEC. 7, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

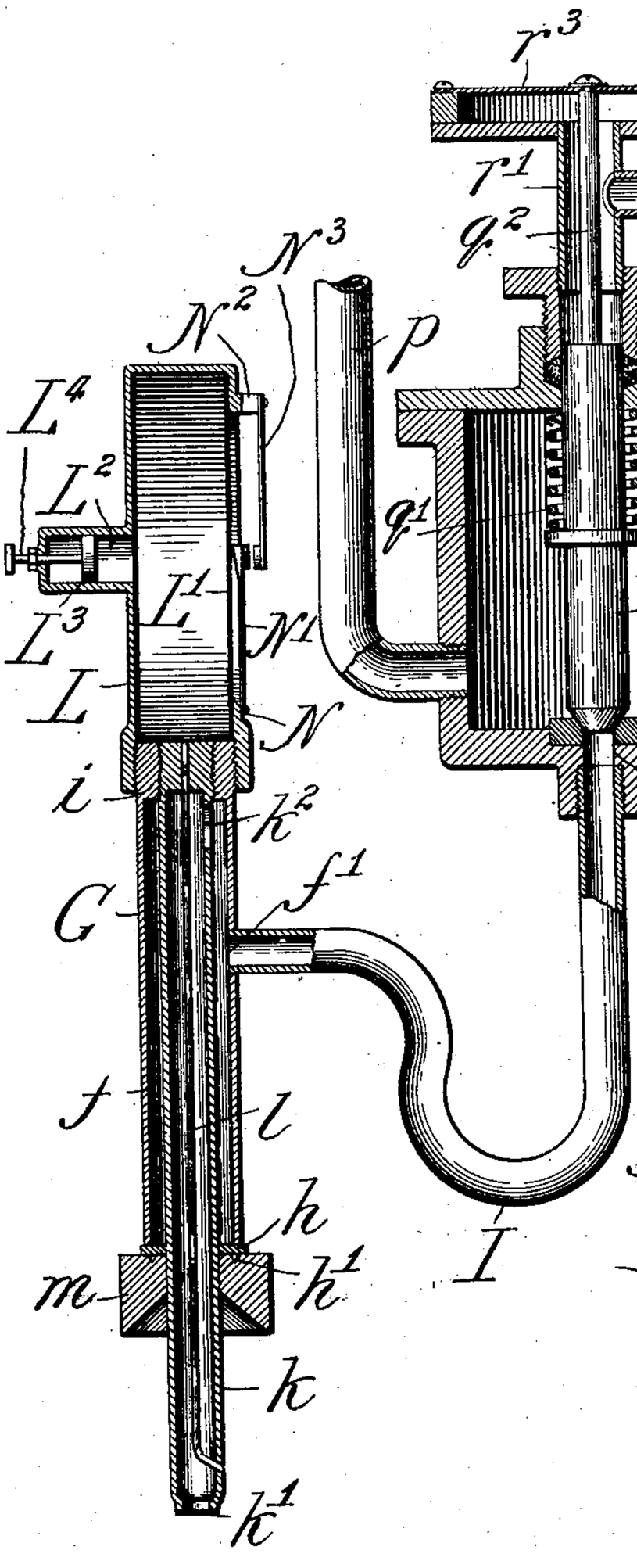
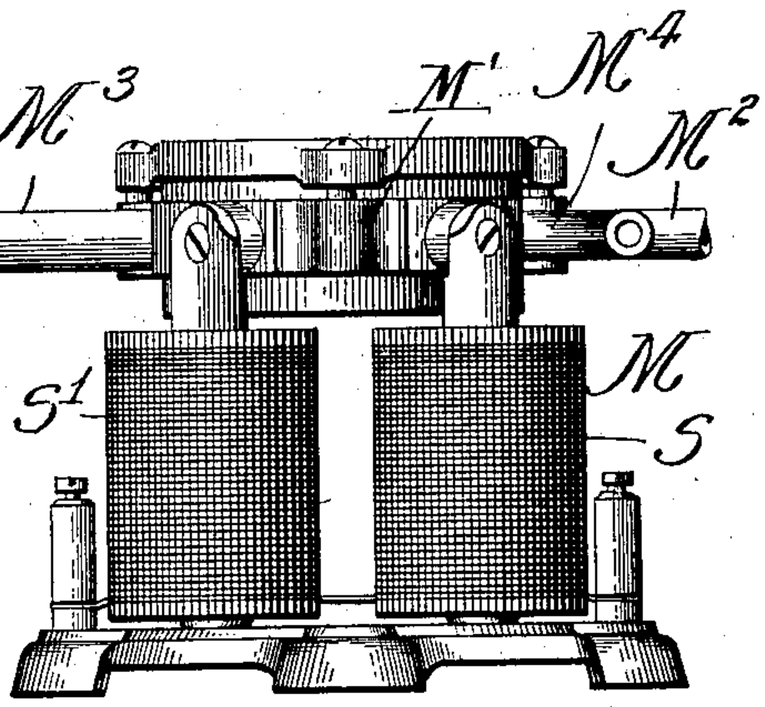
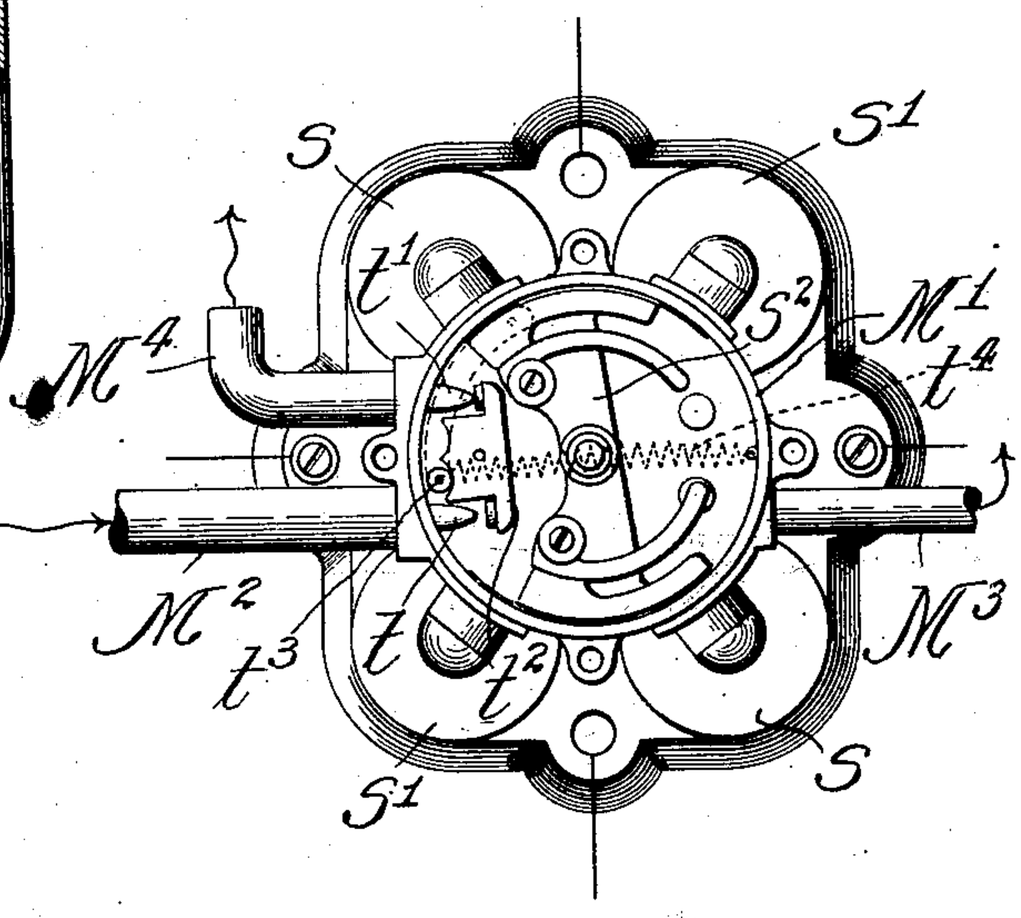


Fig. 3.





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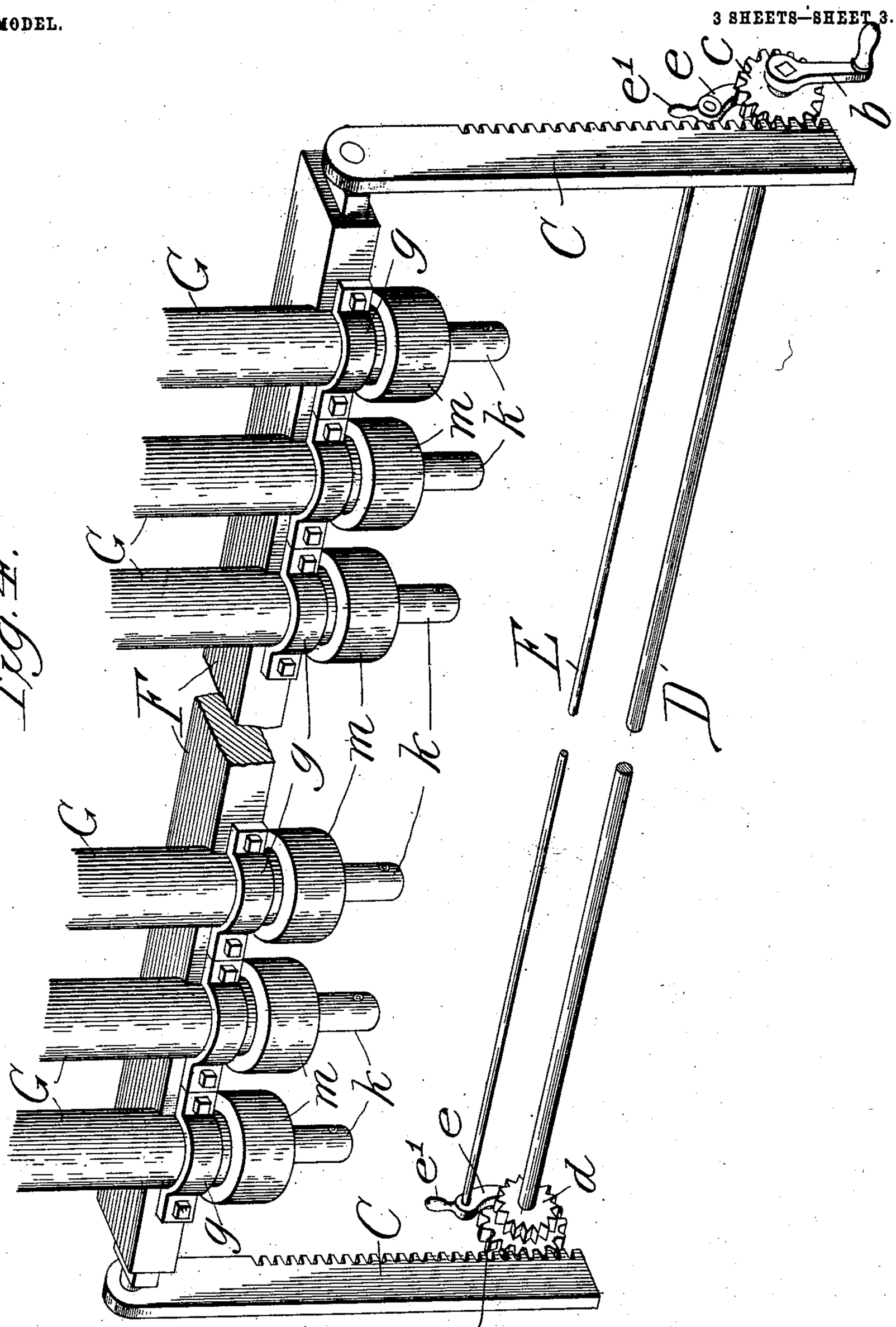
APPLICATION FILED DEC. 7, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

EMER H. PARKER, OF EVANSTON, ILLINOIS.

BOTTLE-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 754,602, dated March 15, 1904.

Application filed December 7, 1903. Serial No. 184,081. (No model.)

To all whom it may concern:

Be it known that I, EMER H. PARKER, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Bottle-Filling Machines, of which the following is a specification.

My object is to provide a bottle-filling machine of improved construction adapting it for filling bottles with, more especially, still liquids rapidly and with great accuracy as to quantity in each instance without danger of any waste of the liquid.

In carrying out my invention I provide a filling-tube or plurality of such tubes upon a raising and lowering support, with which tubes a like number of bottles will register when moved into the filling position. Lowering of the support causes the filling-tubes to enter and seal the bottles. An electric switch is then moved to cause electrically-actuated controlling devices to direct air under pressure against valve-operating diaphragms to open the flow of liquid to the filling-tubes and bottles. The air from each bottle displaced by the incoming liquid enters a chamber having a movable electric-contact actuating-diaphragm, which is caused by the pressure of the air at the moment the bottle is filled to close an electric circuit and cause the particular controlling device to effect closing of the valve which governs the flow of liquid to the bottle.

The mechanism for bringing about the operations set forth is illustrated in the accompanying drawings, in which—

Figure 1 is an end view of the filling-machine, electric circuits being indicated diagrammatically; Fig. 2, an enlarged broken and partly sectional view of the filling mechanism for a bottle; Fig. 3, a plan view of an electric controlling device of a construction suitable to my purpose with the cover removed, and Fig. 4 an enlarged broken perspective view of a battery of filling-tubes and their adjustable support.

A is a table, on opposite ends of which are standards B, having vertical openings *a*. Movable in guides on the standards are vertical rack-bars C. A shaft D, journaled in opposite ends of the table, carries a crank *b*, pinions *c c*, meshing with the racks C C, and ratchet-wheels *d*. Pawls *e*, carried by a shaft E, parallel with the shaft D, engage the ratchets, and on the pawls are operating-handles *e'*.

F is a supporting-bar passing at opposite ends through the guide-openings *a* in the standards and connected with the upper ends of the racks C. On the bar or support F is a battery of filling devices G. Each device G is formed with a cylinder *f*, at which it is fastened by a clip *g* to the support. At the base of the cylinder *f* is an inward-projecting ring or flange *h*, provided on its under side with an annular sharpened ridge *h'*. The upper end of the cylinder *f* is formed with an annular inward-projecting part *i*, internally threaded to receive and secure the threaded upper end of a removable filling-tube *k*, having a slightly-reduced lower open end *k'*. The upper end of the filling-tube is closed, and extending through the tube from near the lower end to the top is a small air-vent tube *l*. Cemented or otherwise fastened around the tube *k* is a preferably rubber sealing-head *m*, having a concave under side to fit upon and seal the mouth of a bottle. The tube *k* is fastened in position in the cylinder *f* by screwing it at its upper end in the part *i*, causing the sharpened ridge *h'* to indent itself in the upper surface of the rubber *m*, and thus produce a liquid-tight joint at the lower end of the cylinder. Near the upper end of the filling-tube *k* is an opening k^2, and below the plane of the said opening is an opening *f'* in the cylinder *f*.

H is a reservoir having an outlet-opening *n* in its lower end surrounded by a valve-seat *n'* at the inner side. The reservoir H and cylinder *f* are connected by a flexible hose I, extending from the opening *n* in the former to the opening *f'* in the latter. The reservoir H communicates through a supply-pipe *p* with a liquid-supply tank K. In the reservoir H and seating upon the seat *n'* is a valve *q*, extending upward through a stuffing-box *r* at the top of the reservoir. A spring *q'* tends to press the valve normally to its seat. Ex-

tending from the upper end of the valve is a stem q^2. On the stuffing-box r is a tube r', opening into a chamber r^2, closed at its upper side by a flexible diaphragm r^3, with which the valve-stem q^2 connects.

On the upper end of the cylinder G is a shell or chamber L, one wall of which is a flexible diaphragm L′. At one side of the shell L is a chamber enlargement L^2, fitted with an adjustable piston L^3, having a stem L^4, extending to the outside of the shell. Fastened against the shell is a binding-post N and insulated spring-contact N′ in the path of movement of the diaphragm L′. Also upon the shell is a binding-post N^2 and a spring-contact N^3 in the path of the contact N′.

M is an electric controlling device which in itself contains no features of novelty, but which I have found answers my purpose satisfactorily. The device M has a chamber M′, provided with an inlet-pipe M^2, an outlet-pipe M^3, and a vent-pipe M^4. It also contains four electromagnets s s' and a swinging armature s^2. One magnet s and a magnet s' may be connected with a common conductor-wire s^3, extending from one pole of a battery P. The other magnet s may have a conducting-wire s^4 and the remaining magnet s' a conducting-wire s^5. The wire s^6 may extend to a switch P′ conveniently located upon the table, whereby either the wire s^4 or s^5 may be thrown into the circuit from the wire s^6. The pipe M^2 communicates with a suitable compressed-air supplier, (not shown,) while the pipe M^3 communicates with the tube r'. The pipes M^2 M^4 of the device M have reduced nozzles t t', respectively, in the path of a swinging lever or trigger t^2, carrying valves adapted to close said nozzles. When the current is directed by the switch P′ through one of the wires s^4 s^5, it causes the armature s^2 to swing and a roller t^3, carried by an arm thereon, to bear against the lever t^2 at one side and open the nozzle t to cause compressed air to pass from the pipe M^2 to the pipe M^3 and exert pressure against the under side of the diaphragm r^3, while when the current is switched through the other said wire the armature is turned to cause the roller t^3 to swing the lever t^2 to open the nozzle t' and close the nozzle t. This shuts off the supply of compressed air through the pipe M^2 and permits the air to vent from beneath the diaphragm r^3 and out through the vent-pipe M^4. It will be noticed that the roller t^3 slides into sockets in the lever or trigger t^2 at opposite sides of its pivot and that a spring t^4 tends to draw the roller into the sockets, and thereby press the valves alternately to their seats against the nozzles.

The binding-post N is connected by a conducting-wire v with one pole of the battery P, and the binding-post N^2 is connected by a conducting-wire v' with one of the magnets of the device M. When the circuit is closed by interengagement of the contacts N′ N^3, those magnets are excited, which will shut off the supply of air through the pipe M^2 and open the vent M^4.

A rack or the like R, holding a number of rows of bottles, with the bottles of each row a distance apart equaling that of the filling-tubes, is placed upon the table A and slid to bring the first row of bottles into register with the filling-tubes. The operator then presses upon one of the levers e' to disengage the pawls from the ratchet-wheels d, when by turning the crank b the support F is lowered to thrust all the filling-tubes into the mouths of the row of bottles and cause the sealing-heads m to seal the same. The switch P′ is then turned to open the inlet-pipes M^2 of all the controlling devices M and permit in each instance the compressed air to pass into the tube r' and against the under side of the diaphragm r^3 to lift the same and raise the valve q against the resistance of its spring. This causes liquid to flow from the reservoir H through the pipe I into the cylinder G and overflow through the opening k^2 into the filling-tube and escape into the bottle through the outlet k'. Air displaced by the liquid entering the bottle escapes through the vent-tube l into the chamber L. The spring t^4 of each controlling device M is capable of holding the lever t^2 in either nozzle-closing position, so that after the switch P′ has been turned to open the supply-pipe M^2 of all the controlling devices it may be turned to the intermediate position, (shown in Fig. 1,) leaving the springs t^4 to maintain the nozzles t' closed and the nozzles t open. The piston L^3 of each chamber enlargement L^2 may be adjusted to increase or diminish the capacity of the chamber L, so that the air rising into it from a bottle will be compressed just sufficiently when the bottle is properly filled to move the diaphragm L′ to press the contact N′ against the contact N^3. The parts are so adjusted that this contact will be made when the desired amount of liquid has entered the bottle. The instant therefore that a bottle is filled with liquid to the desired level contact will be made between the contacts N′ N^3, causing the armature of the particular controlling device to produce closing of the particular compressed-air inlet-pipe M^2 and a simultaneous opening of the respective vent M^4, whereby pressure is immediately released from the under side of the particular diaphragm r^3, so that the valve q, connected therewith, will close and shut off the flow of liquid to the bottle. When all the bottles of the row have thus been filled, the switch P′ may be turned to the contact, which will excite the magnets of all the devices M to hold the armatures in the position of shutting off the air-inlets M^2. The crank b may then be

turned to raise the support F and filling-tubes to release the row of filled bottles and permit the rack R to be moved to bring the next row into position.

The lower end k' of each filling-tube k is slightly contracted, as stated, so that when the supply of liquid thereto is shut off by the closing of the valve q the flow of liquid into the bottle ceases instantly, and when the tube is lifted out of the bottle not a drop of the liquid will flow from any of the filling-tubes.

The filling-tubes k are removable from the cylinders f, as stated, whereby tubes of different lengths and of different diameters at their lower ends may be employed, as required by the nature of the liquid or the size of the bottle. The construction involving the chamber enlargements L^2 and pistons L^3 forms a convenient and desirable means for regulating the capacity of each chamber L, so that the flow of liquid may be cut off, as described, at the right moment, and thus regulate with great exactness the amount of liquid flowing to a bottle in each operation.

The construction shown and described performs the filling operation in a manner both quick and desirable, and while I prefer to provide the construction throughout as shown and described it may be variously modified in the matter of details without departing from the spirit of my invention as is set forth in the claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a bottle-filling machine, the combination with the filling-tube, of a liquid-supplying reservoir communicating with the filling-tube, a valve governing the flow of liquid from the said reservoir to the filling-tube, a chamber having an actuating-diaphragm for said valve movable under variations of air-pressure, and an electrically-actuated device controlling the pressure of air against the said diaphragm to effect opening and closing movements of said valve.

2. In a bottle-filling machine, the combination with the filling-tube, of a liquid-supplying reservoir communicating with the filling-tube, a valve governing the flow of liquid from the said reservoir to the filling-tube, a chamber having an actuating-diaphragm for said valve movable under variations of air-pressure, a compressed-air-supply pipe communicating with said chamber, and an electrically-actuated controlling device interposed in said pipe and governing the flow of compressed air to and its exhaust from said chamber, to effect opening and closing movement of said valve.

3. In a bottle-filling machine, the combination with the filling-tube, of a liquid-supply reservoir communicating with the filling-tube, a spring-closed valve governing the flow of liquid from the said reservoir to the filling-tube, a chamber having a diaphragm operatively connected with said valve and movable under the force of air-pressure to open said valve, and an electrically-actuated device controlling the pressure of air against the said diaphragm, substantially as and for the purpose set forth.

4. In a bottle-filling machine, the combination of a sealing-head, a filling-tube, a closed chamber having a movable diaphragm, an electric circuit having contacts in position to be made and broken by movement of said diaphragm, a vent-passage extending from beneath the sealing-head to said chamber, a liquid-supply conduit extending to said filling-tube, a valve interposed in said conduit, and an electrically-actuated controlling device governing the opening and closing movement of said valve and in circuit with said contacts, whereby air compressed and displaced by liquid entering the bottle flows to said chamber and moves said diaphragm to actuate said contacts, causing the said controlling device to effect closing movement of said valve, substantially as and for the purpose set forth.

5. In a bottle-filling machine, the combination of a sealing-head, a filling-tube, a closed chamber having a movable diaphragm, means for regulating the capacity of said chamber, an electric circuit having contacts in position to be made and broken by movement of said diaphragm, a vent-passage extending from beneath the sealing-head to said chamber, a liquid-supply conduit extending to said filling-tube, a valve interposed in said conduits, and an electrically-actuated controlling device governing the opening and closing movements of said valve and in circuit with said contacts, whereby air compressed and displaced by liquid entering the bottle flows to said chamber and moves said diaphragm to actuate said contacts, causing the said controlling device to effect closing movement of said valve, substantially as and for the purpose set forth.

EMER H. PARKER.

In presence of—
WALTER N. WINBERG,
WILLIAM B. DAVIES.