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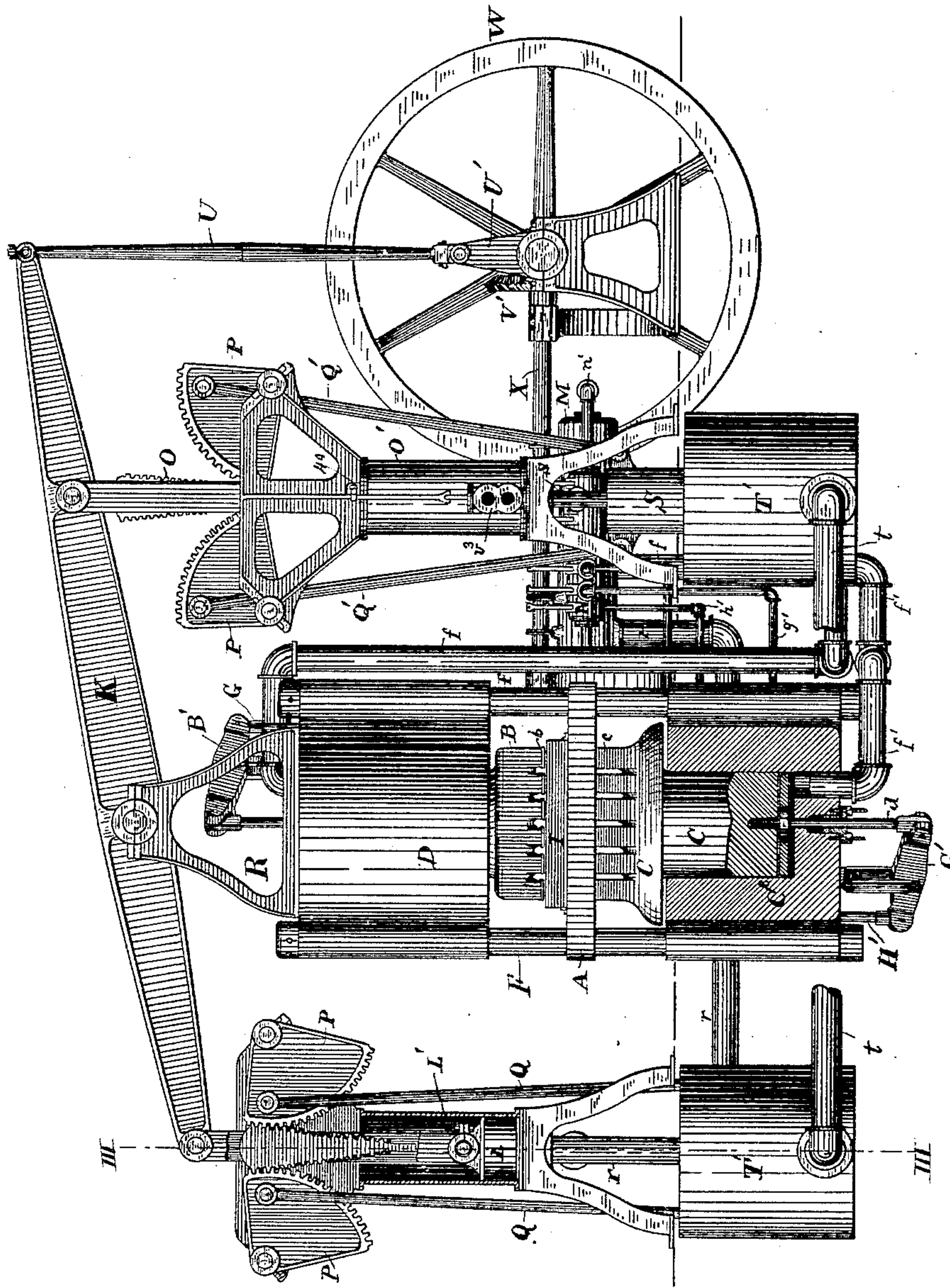
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C. J. LE ROY.
HYDRAULIC BRICK MACHINE.

No. 450,770.

Patented Apr. 21, 1891.

Fig. 1.



Attest:

R. R. Sweet
A. C. Morris

Inventor:

Charles J. Le Roy

(No Model.)

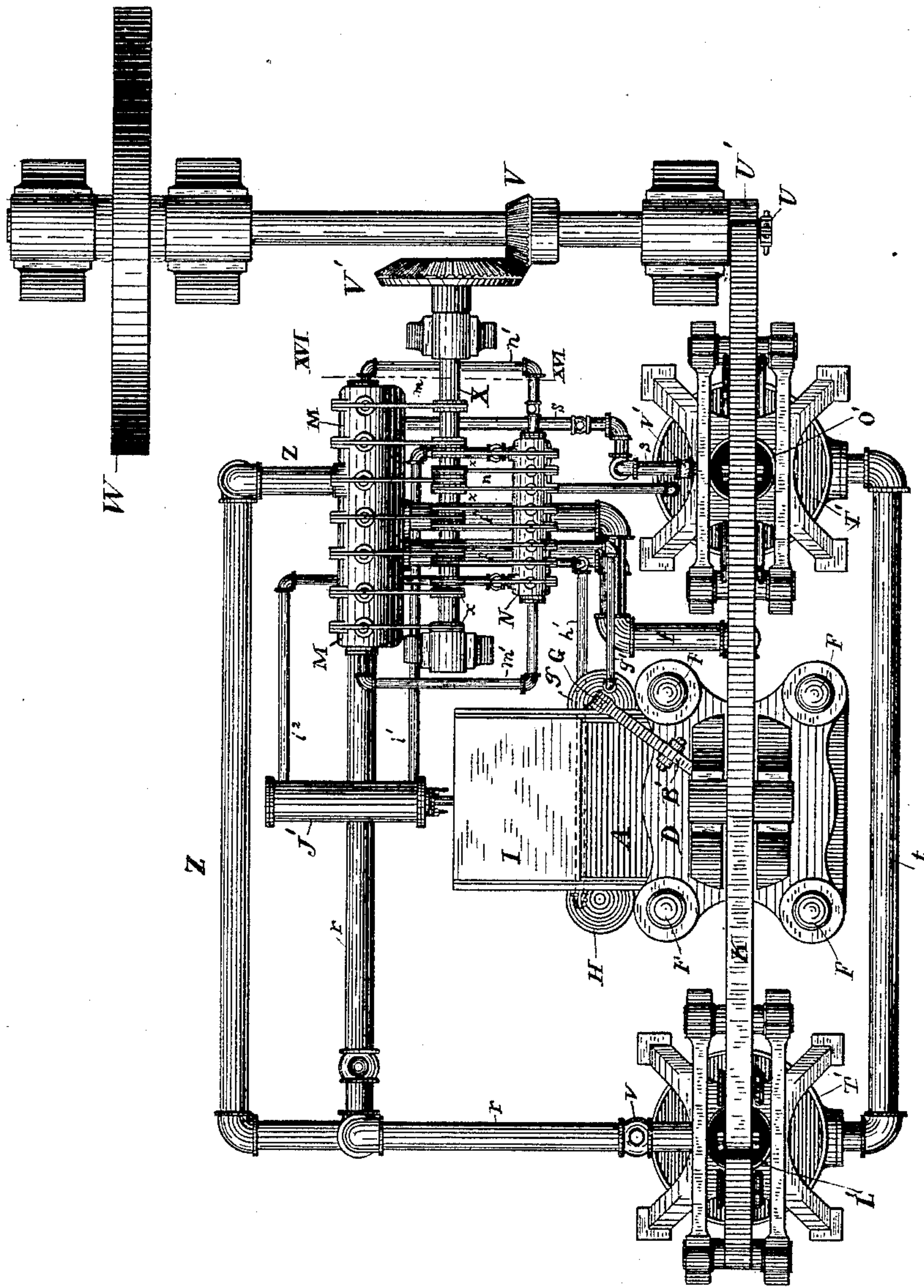
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Fig. II.



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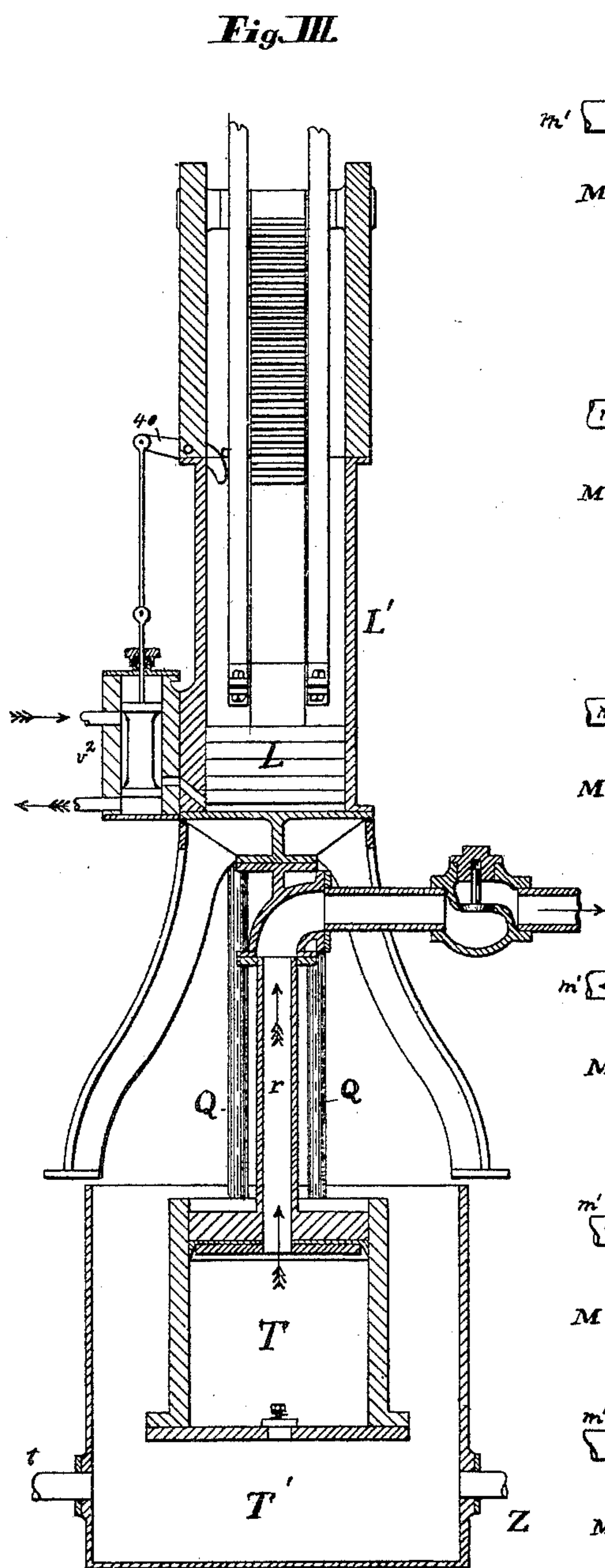
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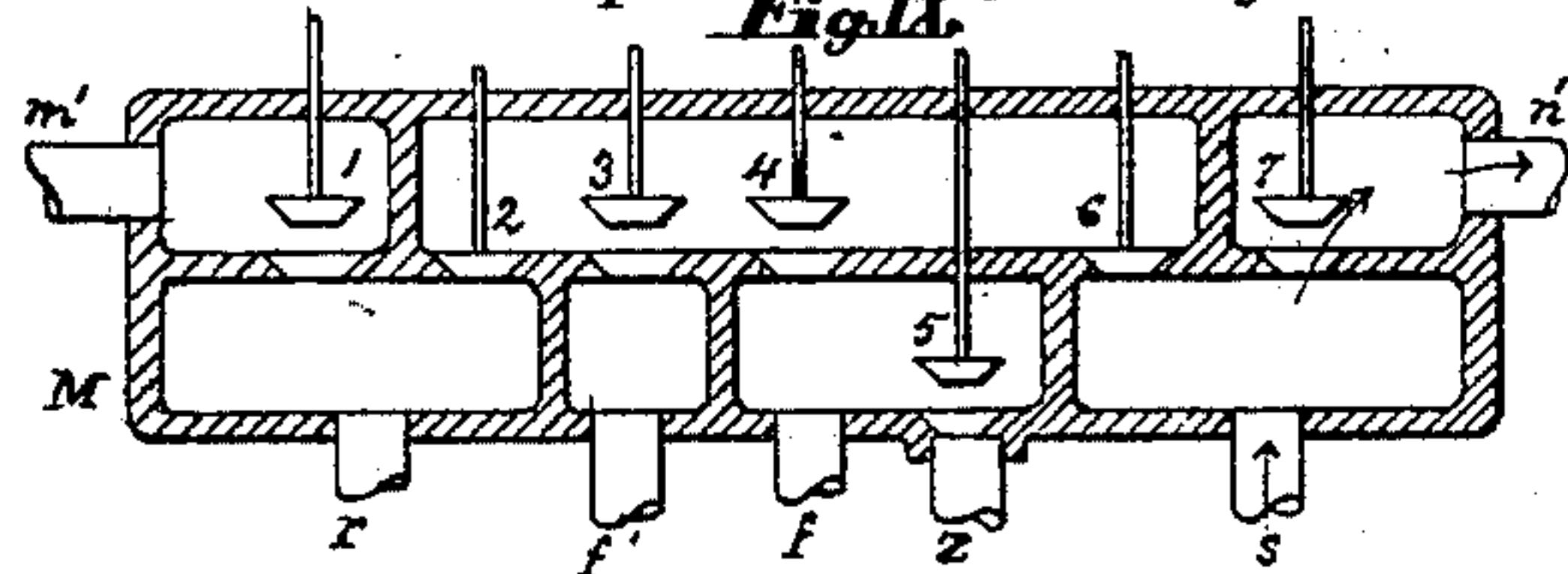
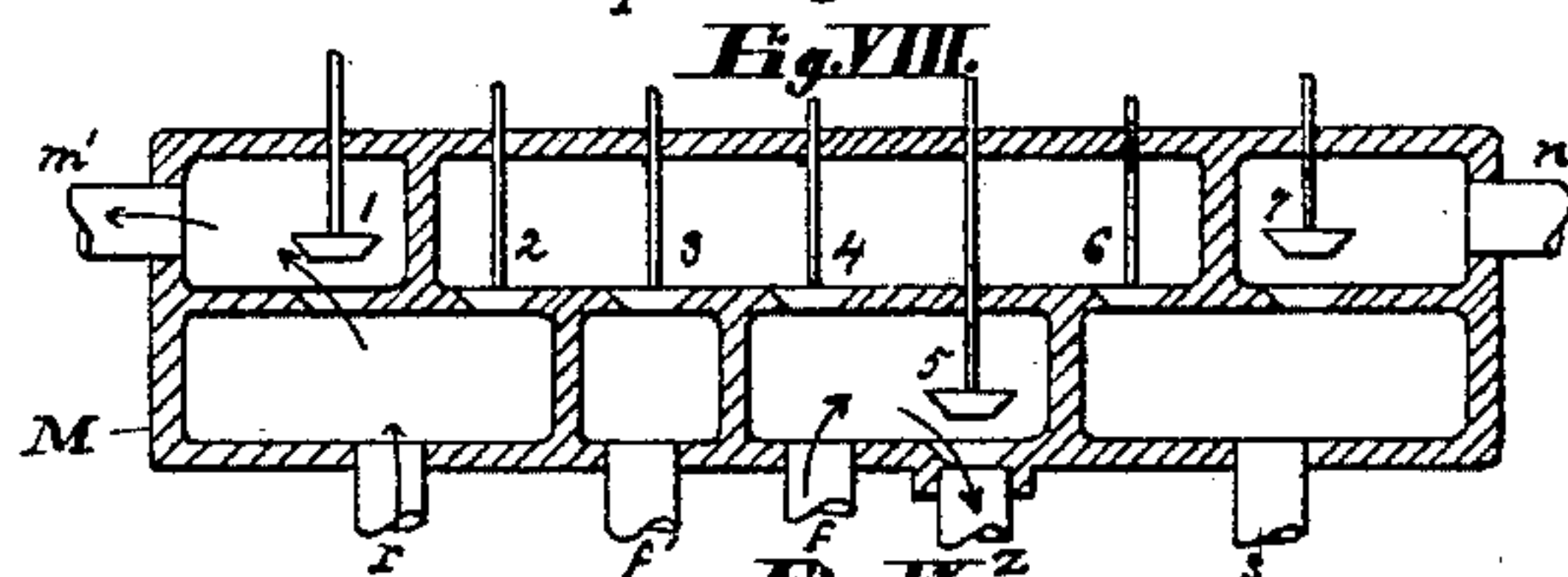
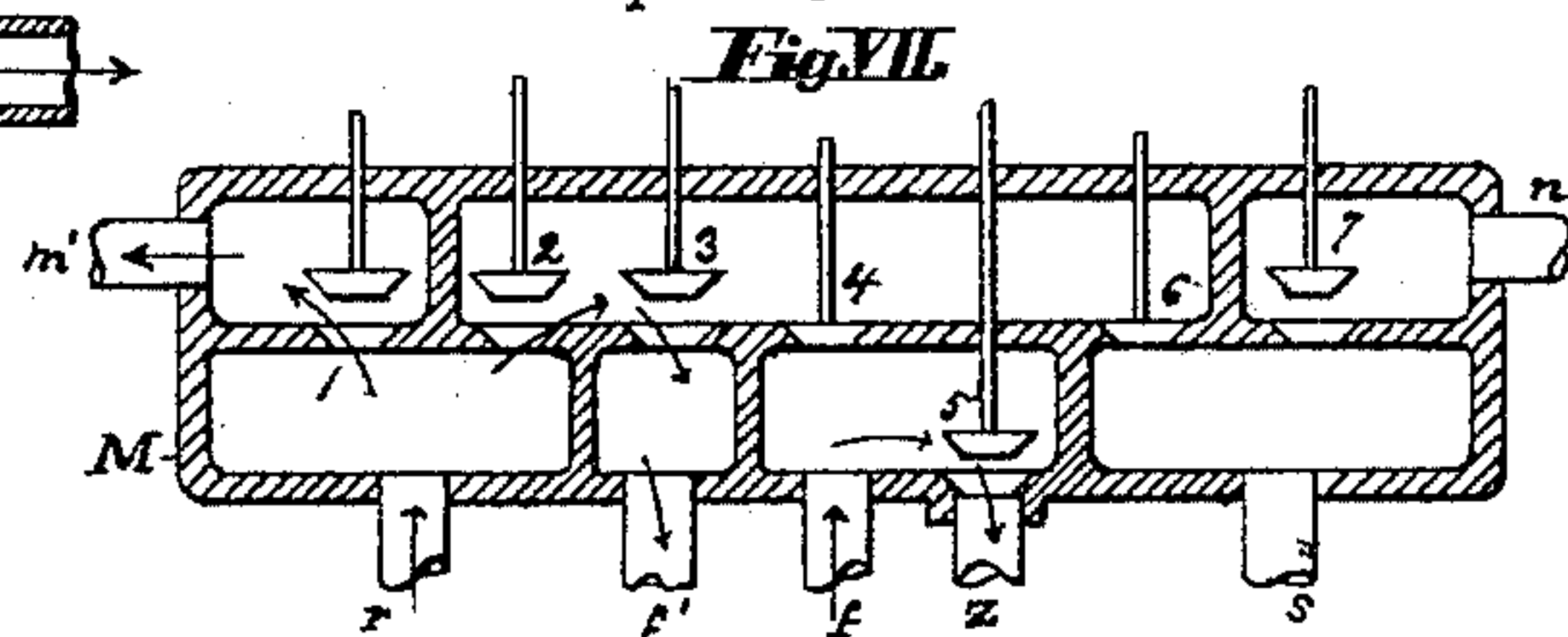
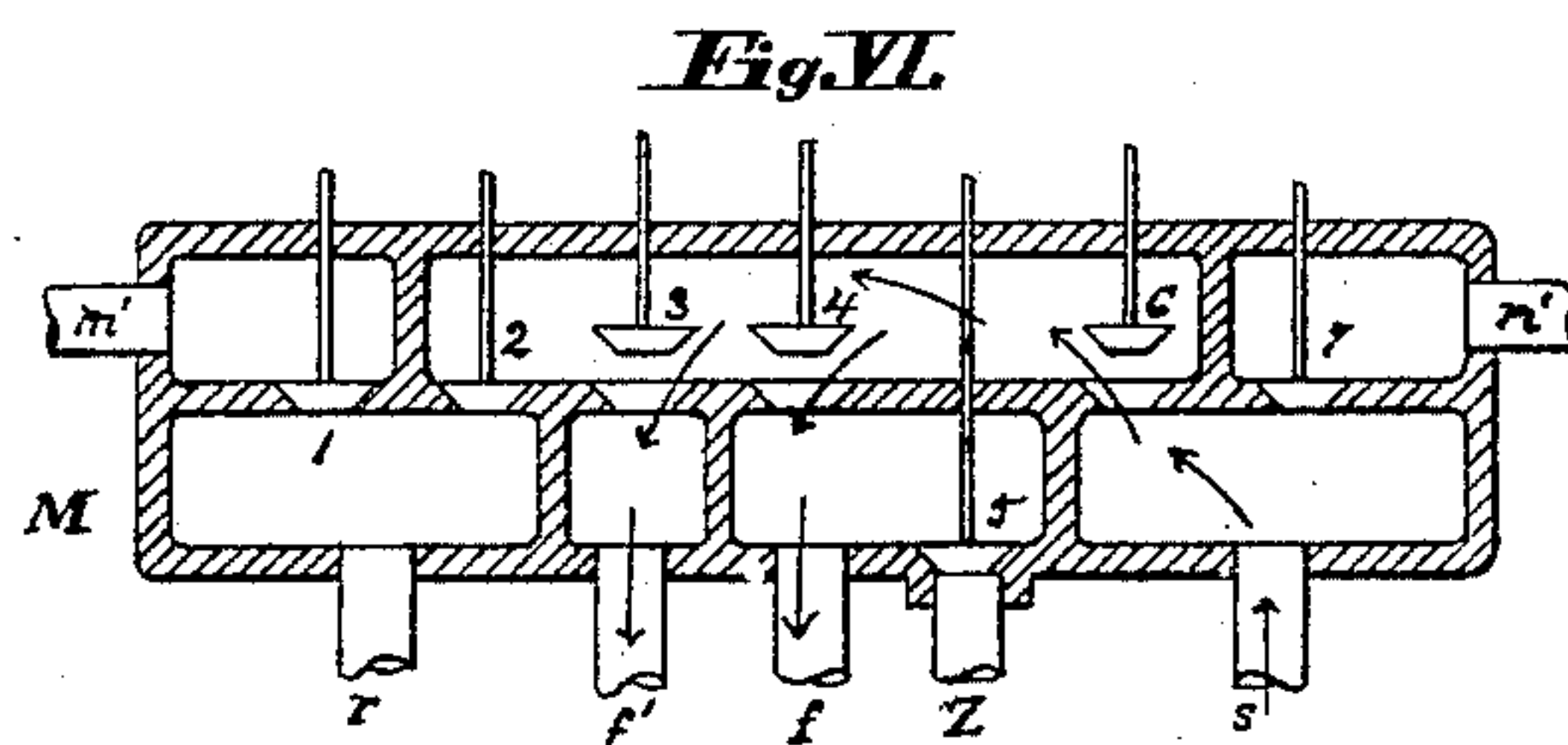
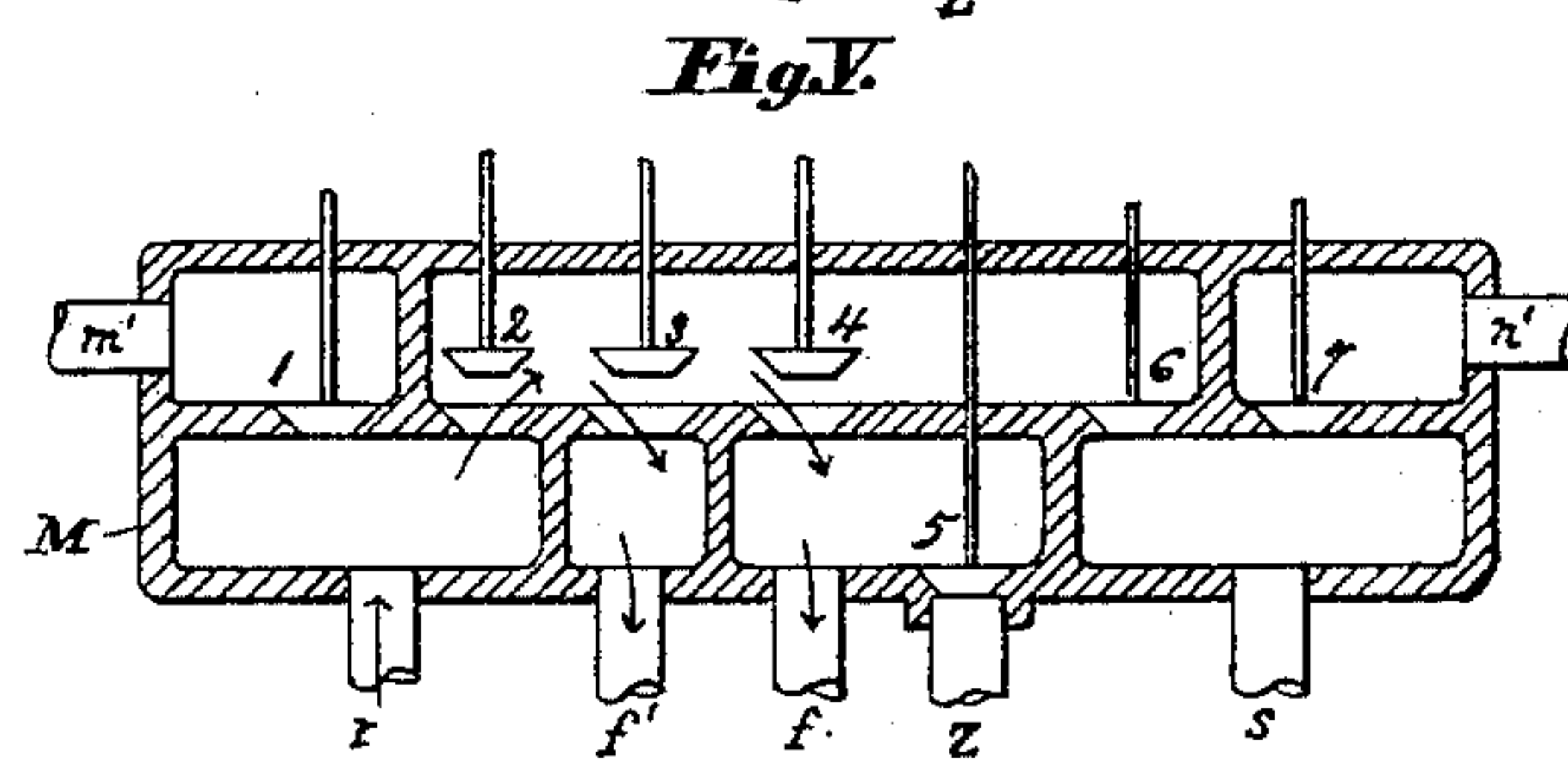
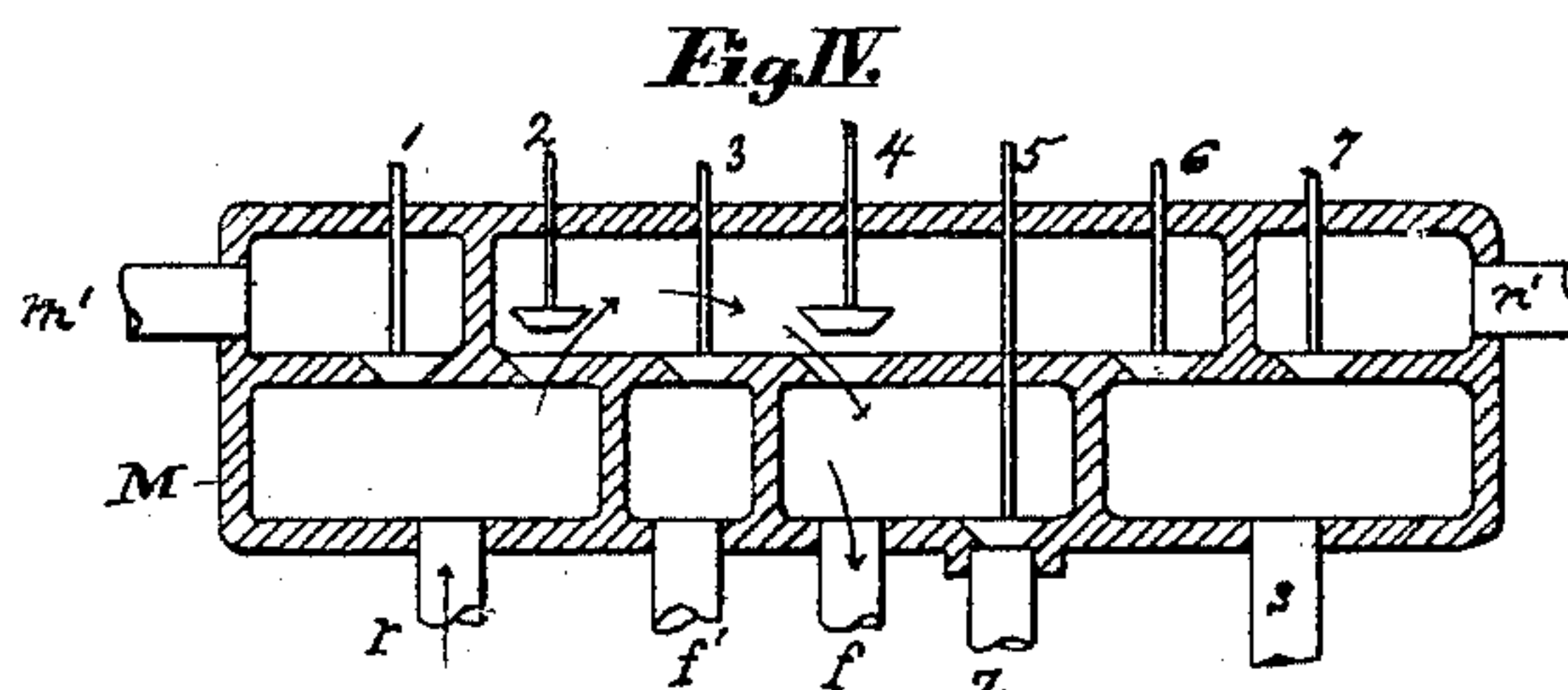
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Fig. X.

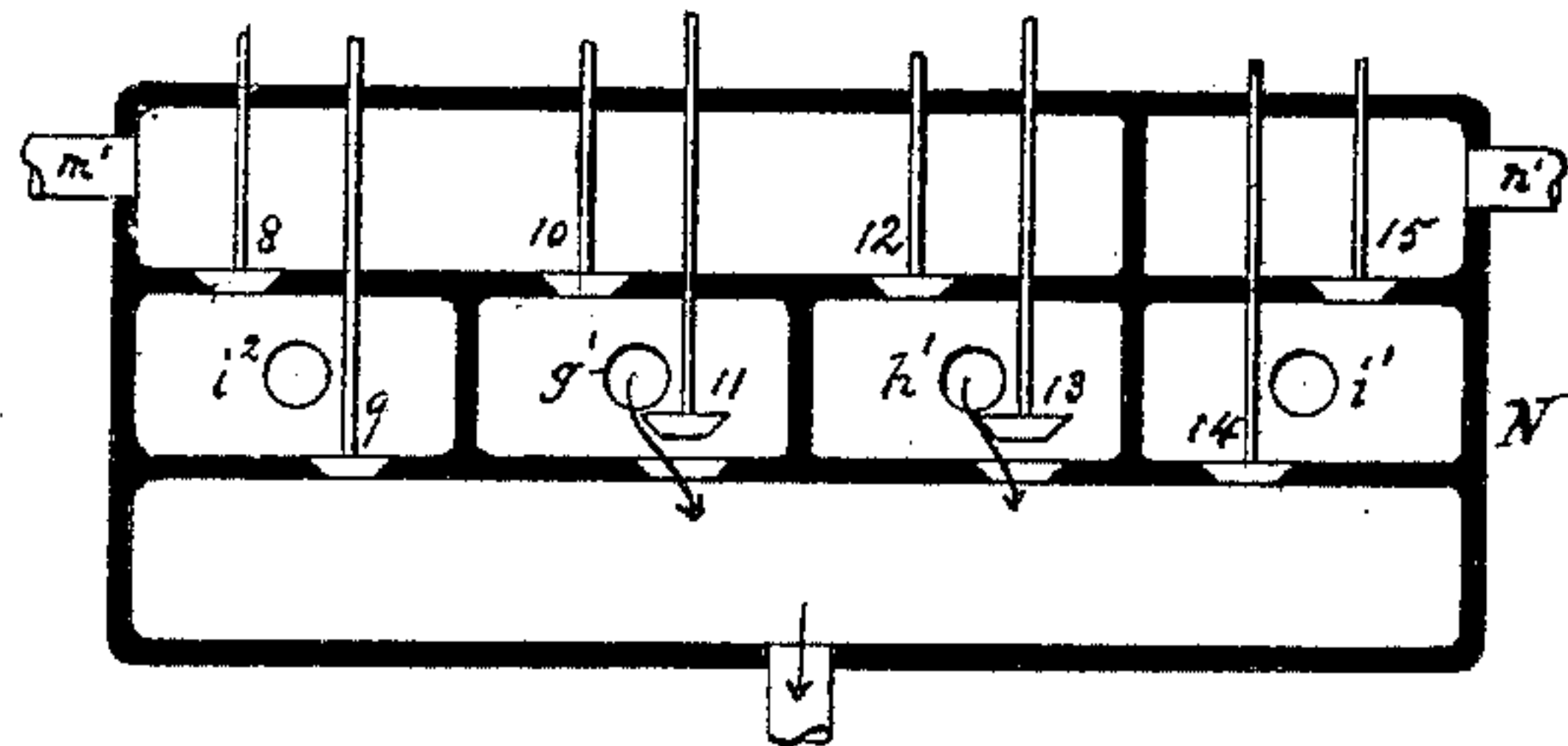


Fig. XIII.

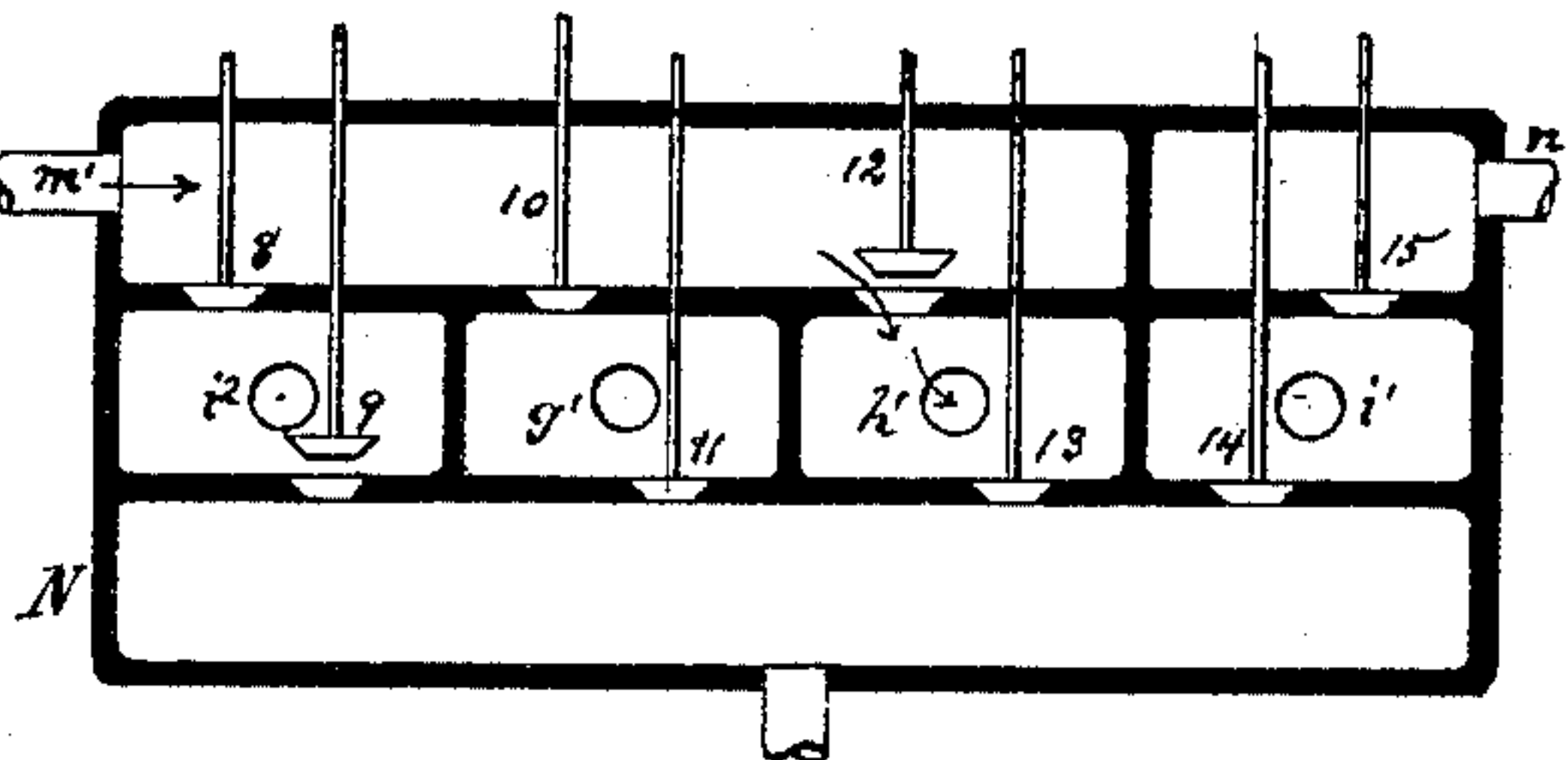


Fig. XI.

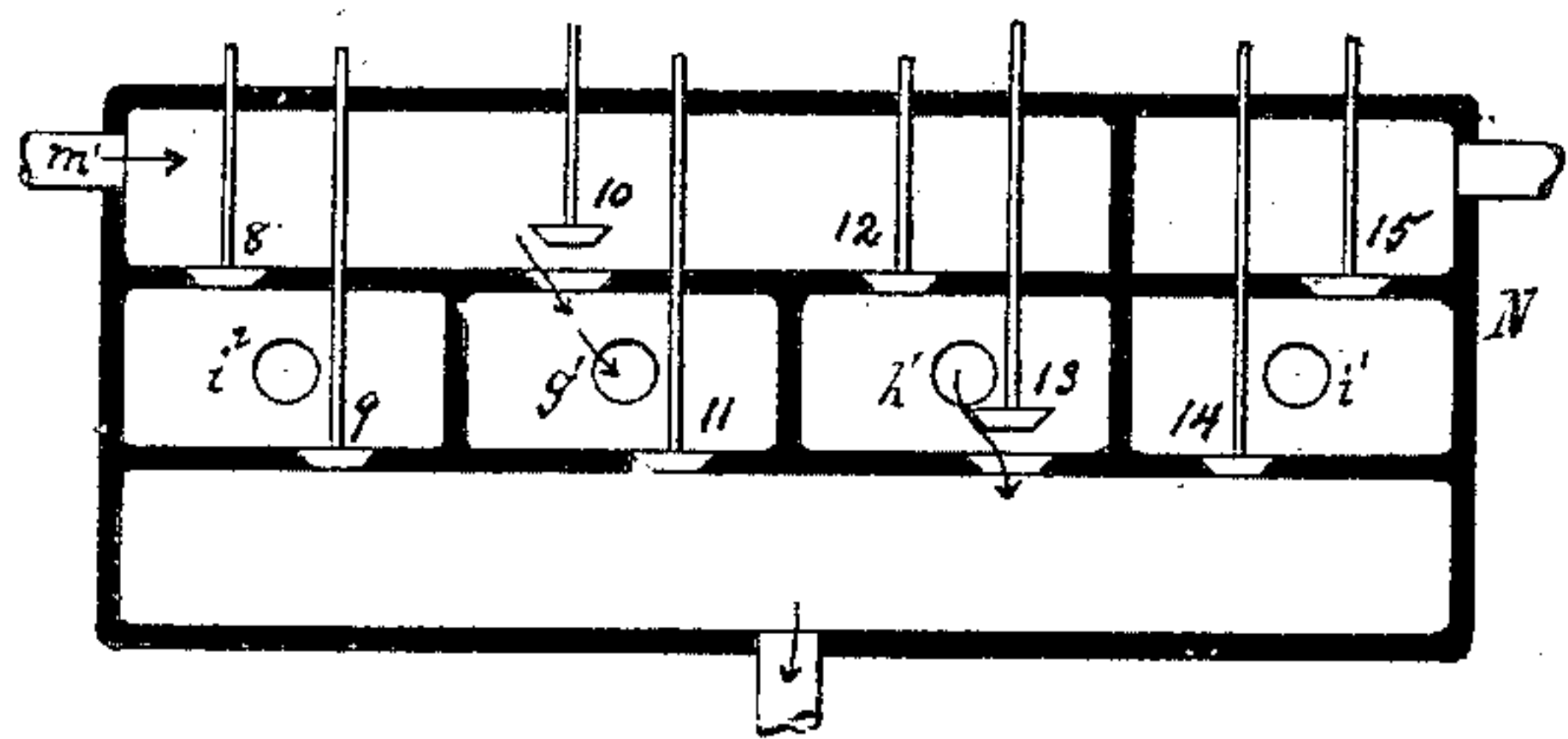


Fig. XIV.

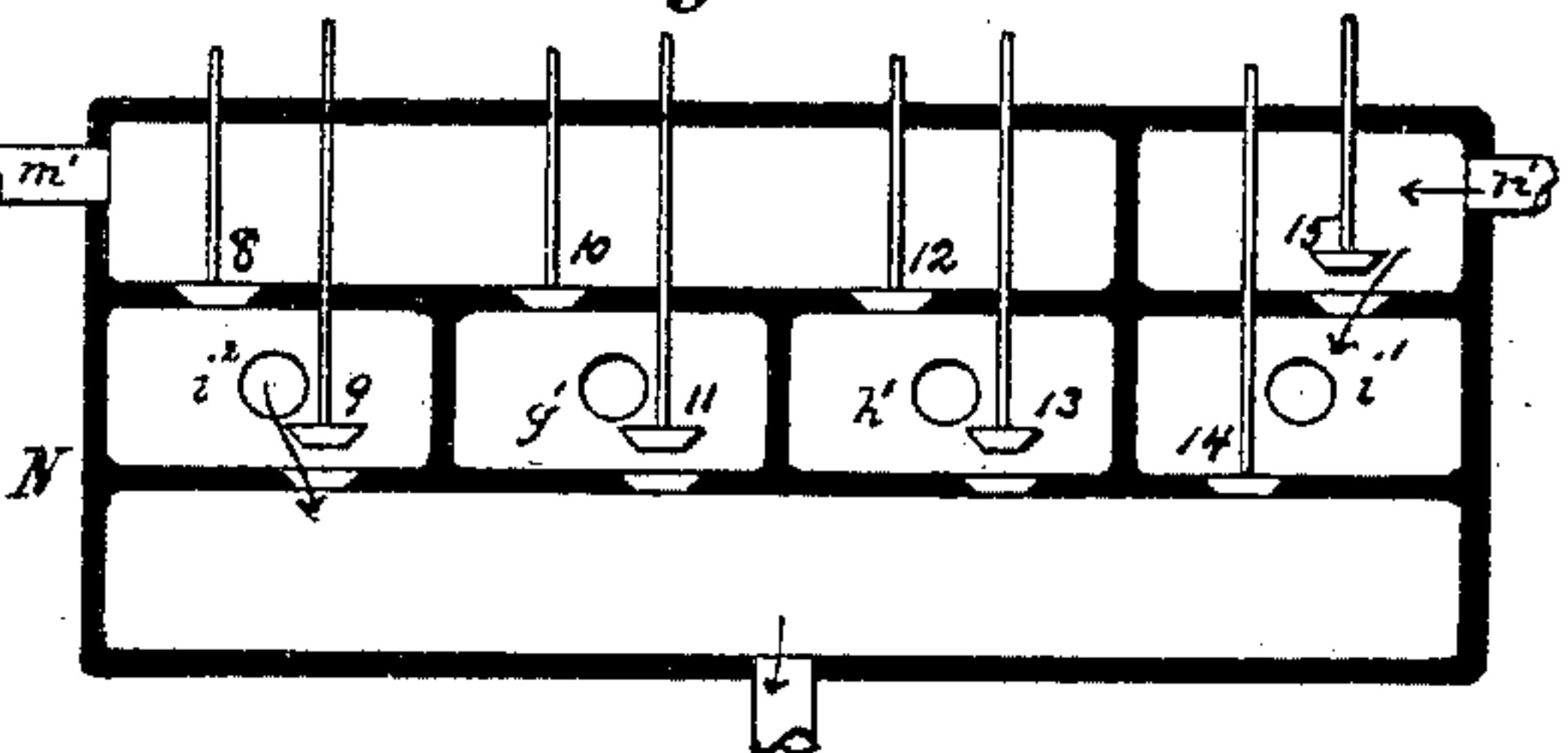


Fig. XII.

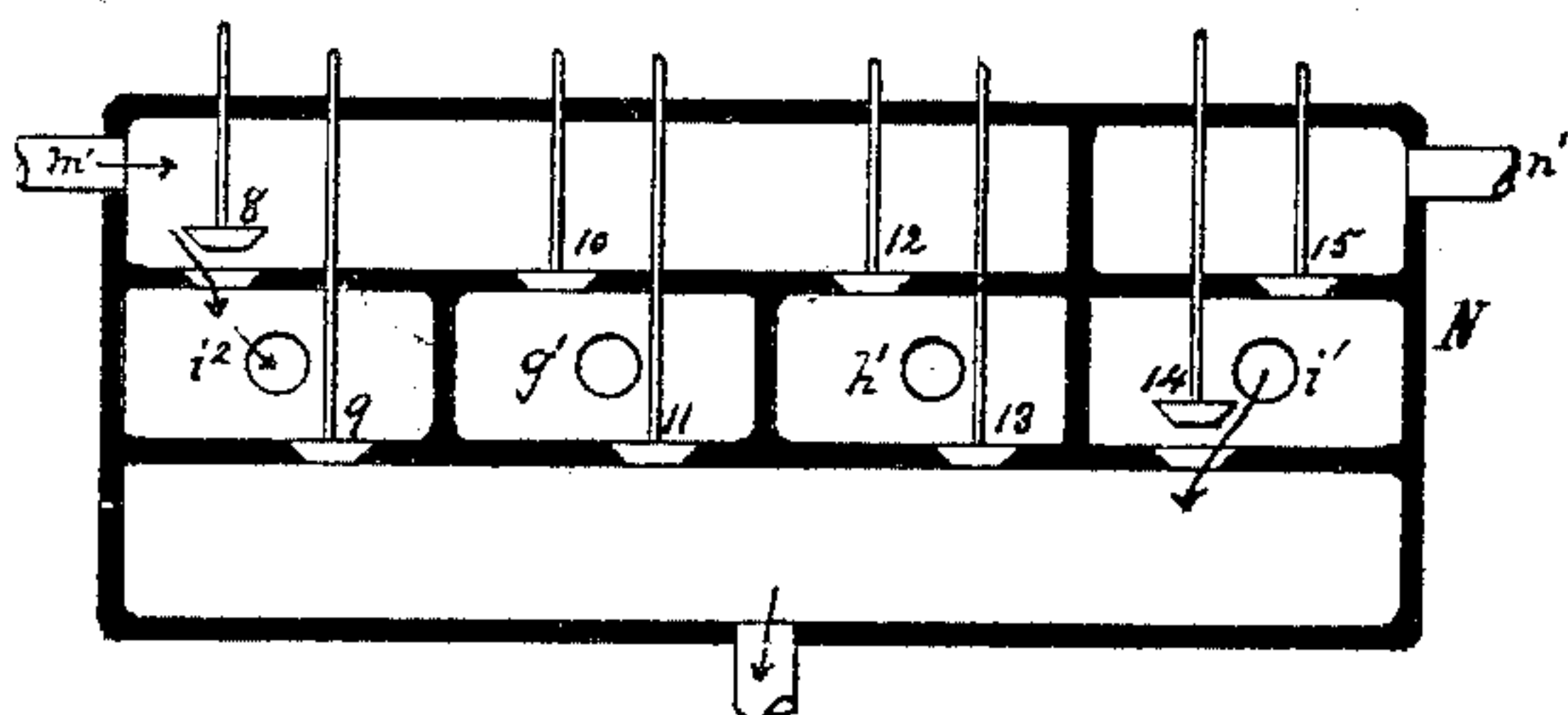


Fig. XV.

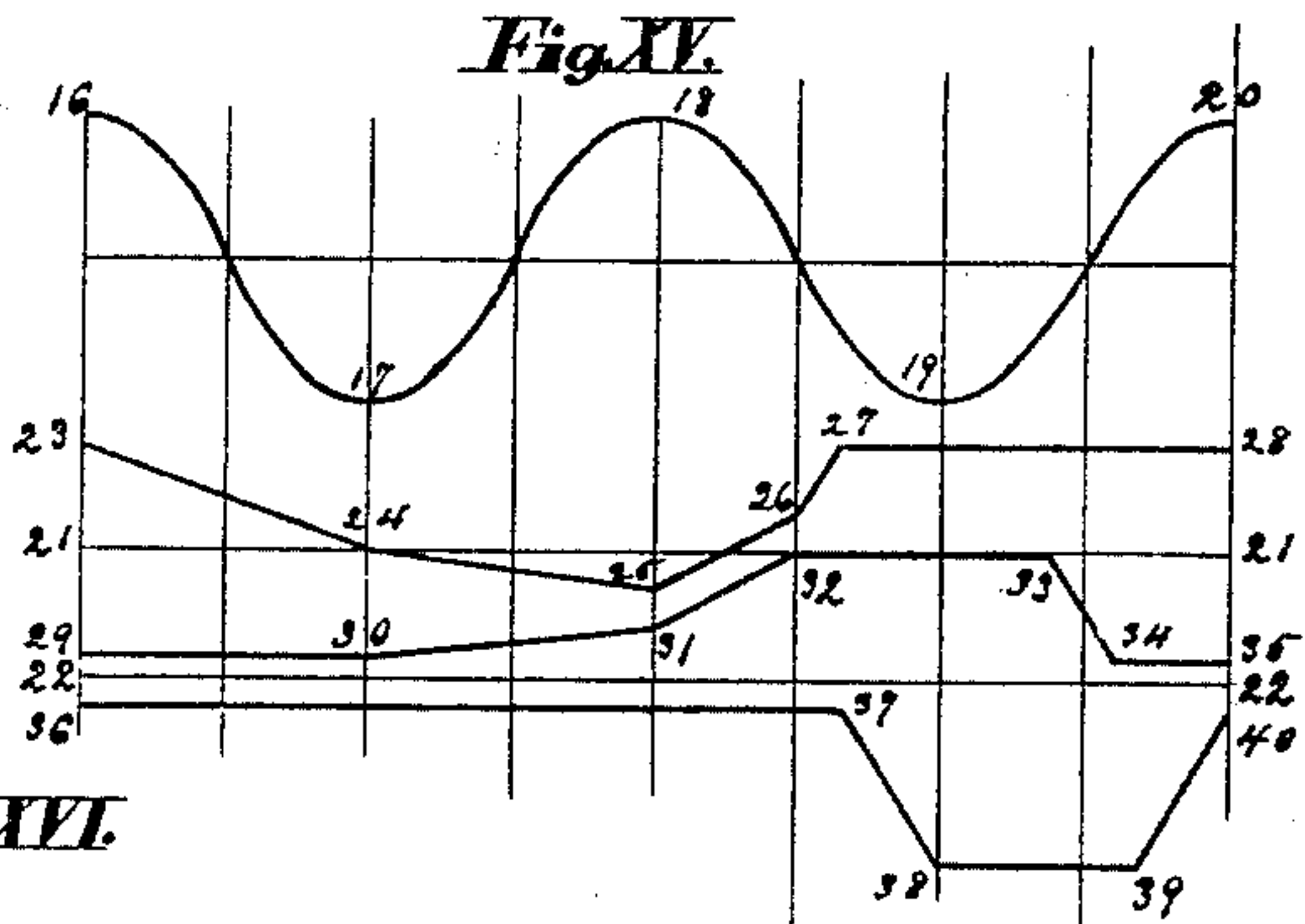
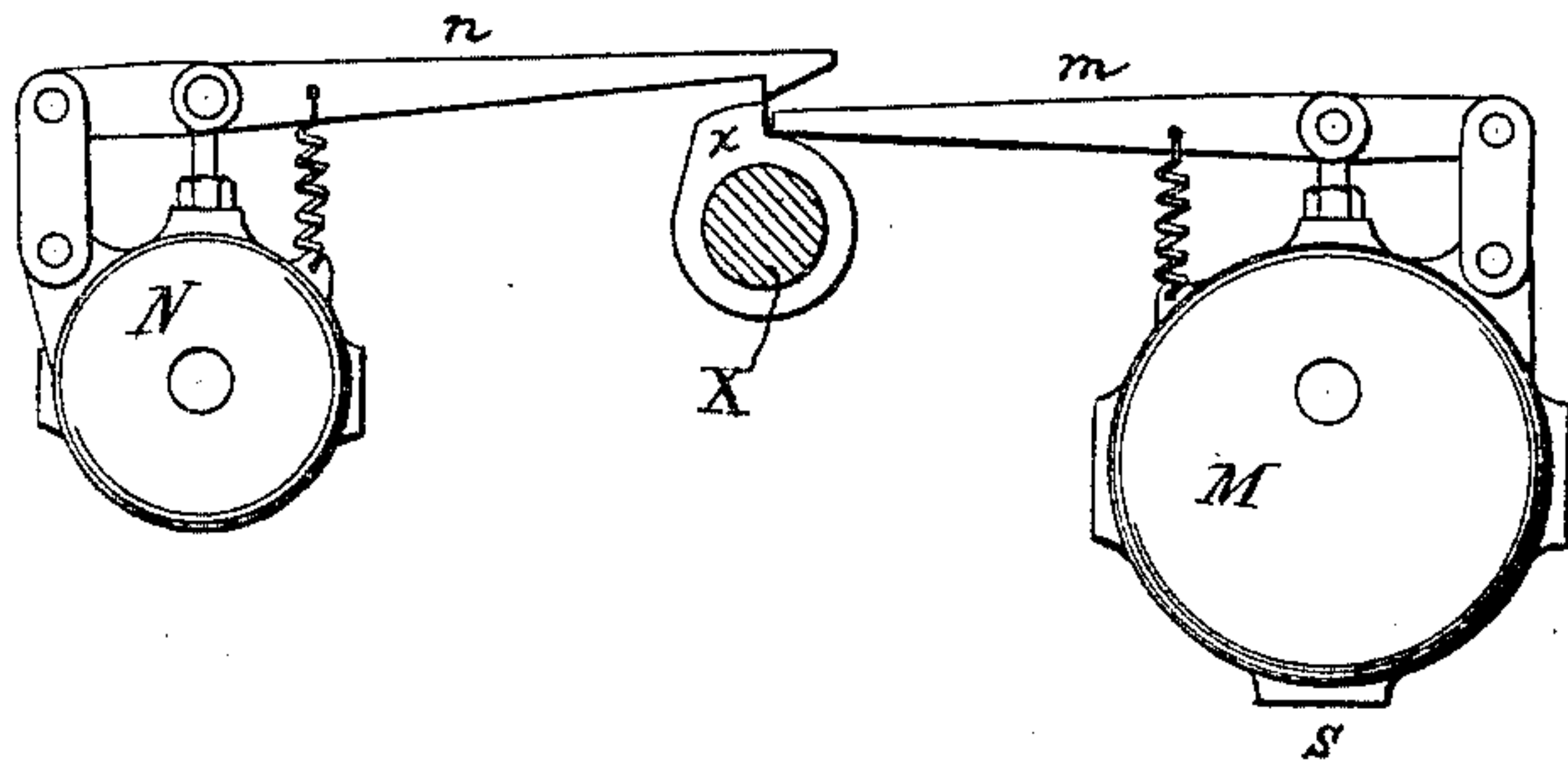


Fig. XVI.



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Fig. XVII.

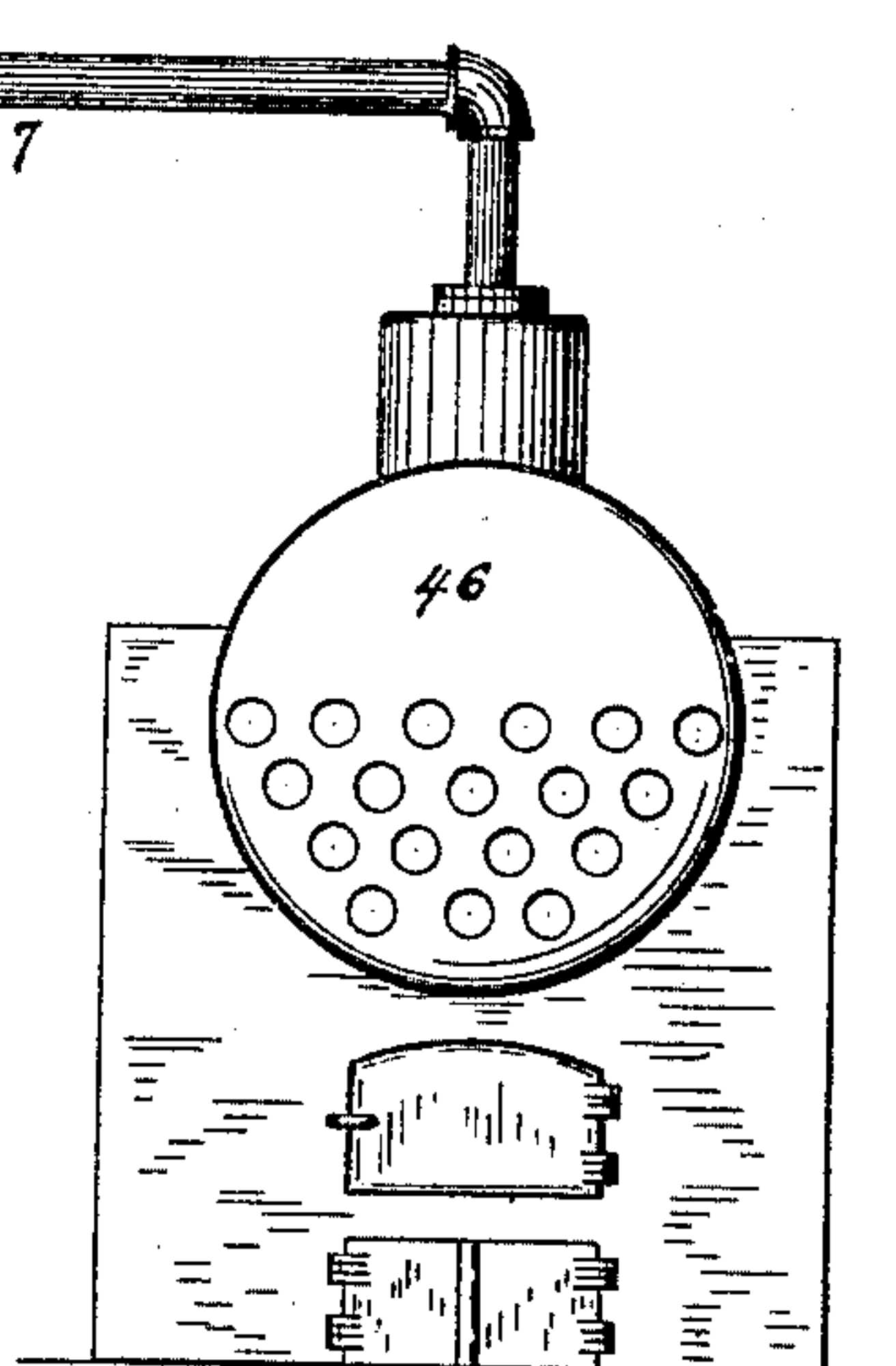
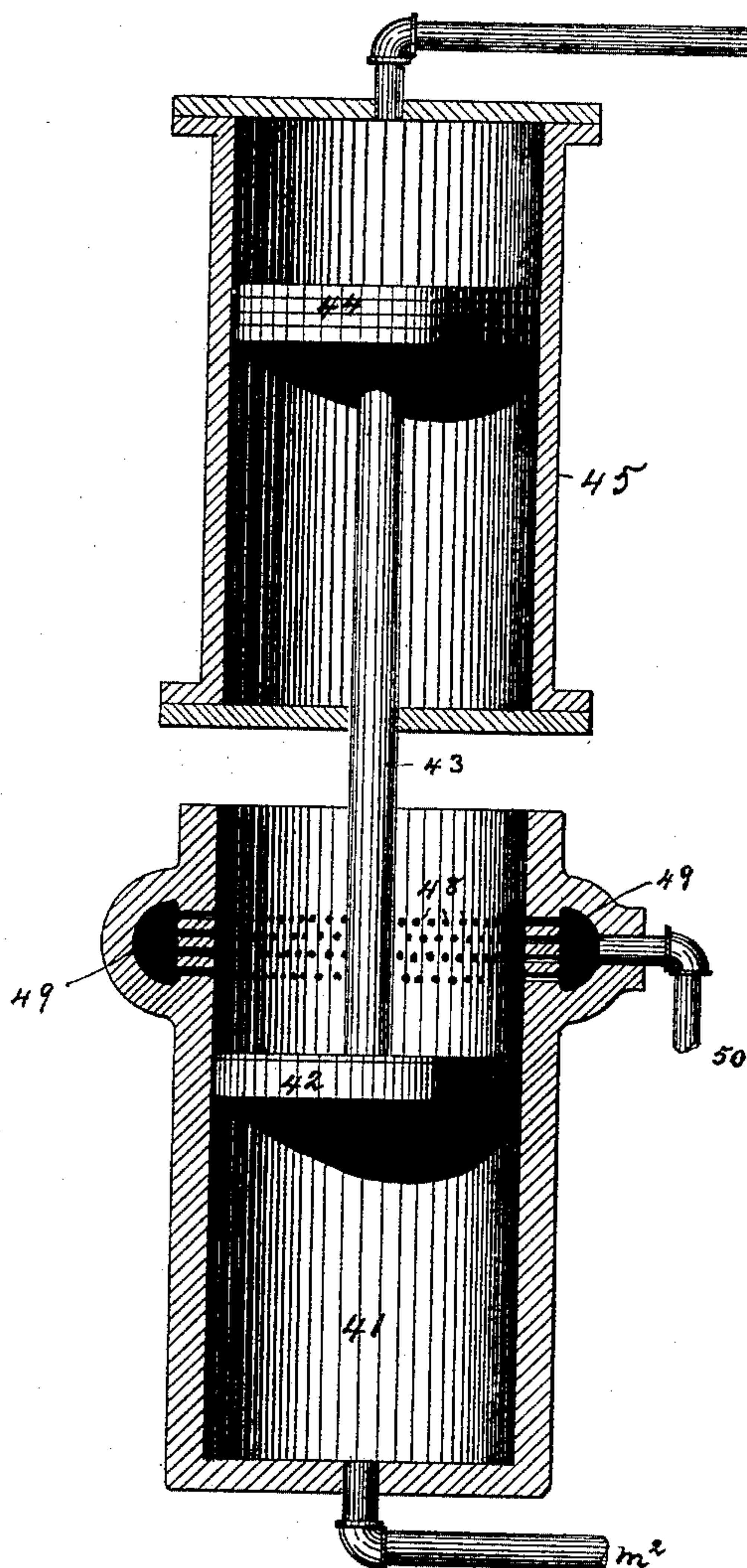
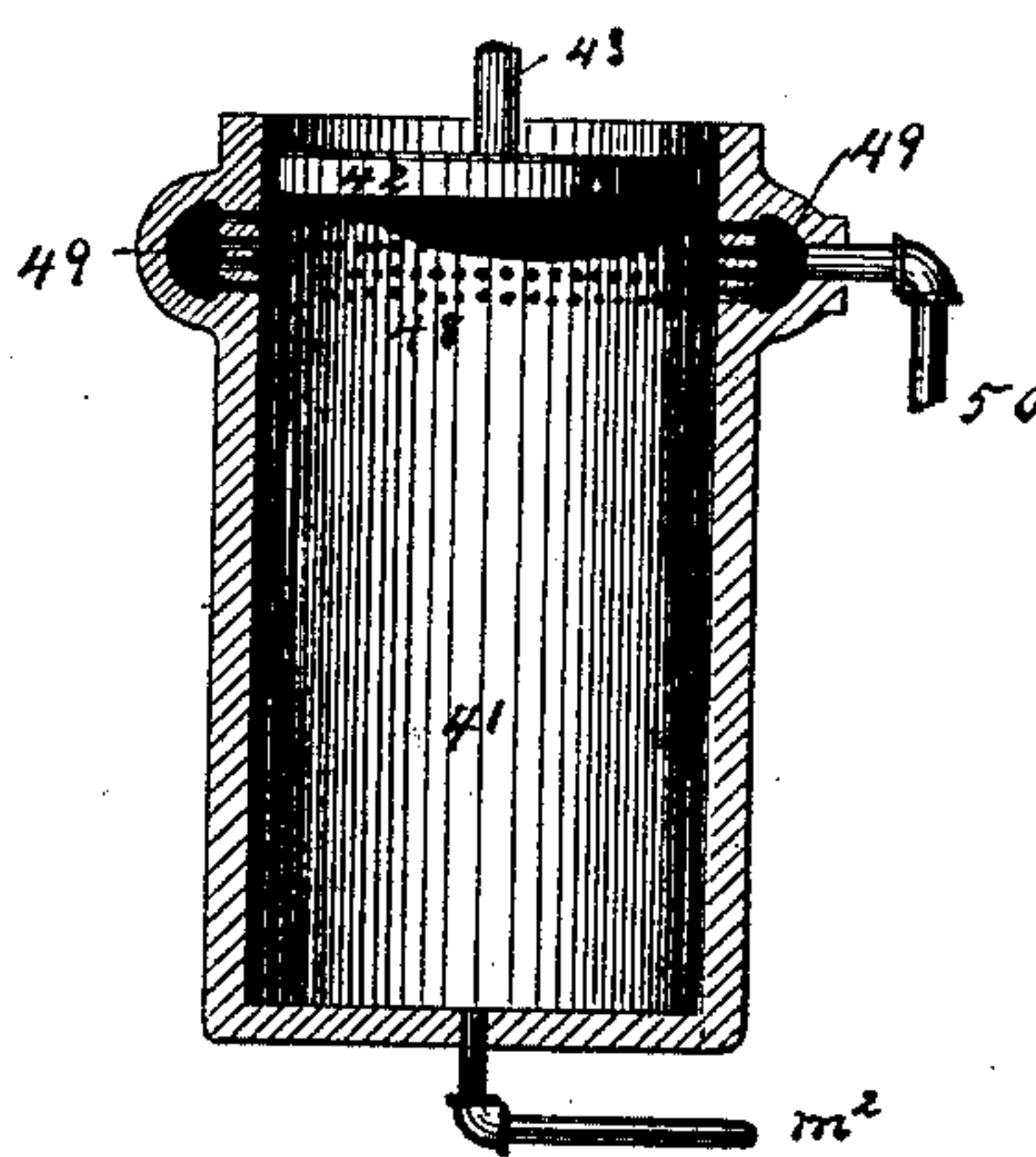


Fig. XVIII.



Attest:

H. H. Sweet
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Inventor:

Charles J. Le Roy

UNITED STATES PATENT OFFICE.

CHARLES J. LE ROY, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO
RICHARD T. HILL, OF SAME PLACE.

HYDRAULIC BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 450,770, dated April 21, 1891.

Application filed November 29, 1890. Serial No. 373,092. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. LE ROY, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Brick-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, constituting a specification thereof.

My invention relates to improvements in brick-machines; and the objects of my improvements are to make a brick-machine that will impose the greatest amount of pressure upon the brick at the finishing touch of the same, and at the same time to perform the operation of pressing the brick in the molds in a quick and rapid manner, so as to enable the machine to accomplish more work in the same length of time than any other machine heretofore used.

My invention consists in the arrangement and combination of parts hereinafter described, and pointed out in the claims. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure I is a front elevation of my machine. Fig. II is a plan of the same. Fig. III is a section on line III III of Fig. 1. Figs. IV, V, VI, VII, VIII, and IX are diagram views of the large valve-box M. Figs. X, XI, XII, XIII, and XIV are diagram views of the small valve-box N. Fig. XV is a diagram showing the movements of the upper and lower presses of the machine. Fig. XVI is a section drawn on line XVI XVI of Fig. II. Fig. XVII is a view of an accumulator which is to be used with my machine. Fig. XVIII is a view of the lower part of Fig. XVII with piston in a changed position.

Referring to Figs. I and II, it will be seen that my machine is designed to operate a hydraulic press substantially like those already in use, which press consists of a mold-plate A, upper and lower plungers B and C, said upper plunger having projections *b*, and said lower plunger having projections *c*, which support, respectively, the upper and lower molds in which the brick is formed. These plungers B and C work, respectively, in their cylinders D and C². These cylinders are connected together by tie-rods F F, which hold them together and take the strain of the press-

ure on the brick. To the upper plunger B is connected by rods R and G and lever B' a piston which moves in the cylinder *g*. The plunger C is connected with the cylinder H by means of a lever C', a piston-rod *d*, and a piston-rod H'. These cylinders, with their connections with the plungers B and C, serve to return said plungers quickly and positively to their normal positions after they have finished their forward strokes.

I is a charger-box for the machine, and is moved over the mold-plate A by means of a piston in the cylinder J'.

On the top of the cylinder is a frame-work or stays which support the walking-beam K, which walking-beam carries the pistons L and O, which have appropriate piston-heads which operate to and fro in the open-headed steam-cylinders L' and O'. These piston-rods are provided at their upper ends with racks the edges of which gradually recede from each other from the bottom of the rack to the top, and are provided with spurs which are adapted to engage spurs on segmental spur-wheels P P. These segmental spur-wheels are journaled on supports connected with the top of the cylinders L' and O', and their peripheries gradually recede from their journaled centers so as to adapt them to engage the spurs on the racks at the top of the pistons L and O. These segmental spur-wheels are furnished with lifting-rods Q Q', which are journaled to the segmental wheels nearest their shortest diameters at their tops, and at the lower ends the rods are connected with the pump-cylinders S and T and operate to lift the cylinders S and T, which are open at their tops, against the piston-heads, which are stationary on the pipes *r* and *s*. This gives an increasing force as the pistons L and O move upward, the greatest force being exerted at the last end of the throw of the pistons L and O respectively. The pump-cylinder T is much larger than pump-cylinder S, for reasons apparent farther on.

T' T' are two tanks in which the pump-cylinders T and S operate. They are connected by a pipe *t*, which operates to equalize the water in the two tanks.

One end of the walking-beam K is provided with a rod U, the lower end of which is journaled on crank U', which crank is attached to the shaft of a fly-wheel W. The shaft of the

fly-wheel W carries a beveled spur-wheel V, which is adapted to engage another beveled spur-wheel V' made fast to a shaft X, which shaft is journaled in the frame-work of the machine and carries a series of cams α . The spur-wheels are relatively of such size that the shaft X will make but one revolution to the two revolutions of the fly-wheel W. The cams on shaft X move the series of levers m and n and operate the valves in the boxes M and N. The box M receives water through the pipes r and s from the cylinders T and S respectively. In these pipes are check-valves v and v' . The pipes f and f' lead to the main cylinders D and C², and the discharge is through the pipe Z through M to tank T'.

The two valve-boxes are connected by the pipes m' and n' , and the box N has connections as follows: g' and h' with the cylinders g and H, respectively, and i' and i^2 with the front and rear end of cylinder J', the valve v^2 , which is operated by the lever 40, coming in contact with projections on the piston L, as seen in Fig. III, and v^3 , (operated in like manner, but not shown in the drawings,) controls the passage of steam into the steam-cylinders L and O.

The working of the machine is as follows: Assuming the position of the machine to be as shown in Fig. I, the valves being in position as shown in Figs. IV and X, steam being turned on is admitted through the valve v^2 to the cylinder L' under its piston, which it forces up, and consequently turns the segmental spur-wheels and forces down the piston in the cylinder O' and fills the pump-cylinder through the valve in its lower end. The upward motion of the piston L also moves the pump-cylinder at the end of the rods Q Q' upward and forces its contents out through the pipe r to the valve-box M through the valves 2 and 4, and out of the box M into the cylinder D, forcing the plunger B down until the molds are closed. By arrangement of a suitable cam on the shaft X the valve 3 then opens and the water passes through both 3 and 4 in Fig. V, as shown, and the upper and lower plungers B and C move simultaneously till the stroke of the piston L is complete. Upon the return-stroke of the piston L, which is forced back by the admission of steam into the other cylinder O', the motion of the plungers B and C continues, and the last pressure is made upon the brick in the molds, and the valve 2 having closed and 6 opened, as shown in Fig. VI, and the valves having remained as seen in Fig. X, the water in the cylinders g and H passes out through their exit-pipes when the plungers B and C are moved toward each other. Upon the next upward stroke of the piston L, the valves being in the position of Fig. VII, valves 4 and 6 having closed and 1, 2, and 5 being open and 3 remaining open, the water passes through 2 and 3, under the lower cylinder C², and also through pipe f' and valve 10, which has opened, 11 having closed, Fig. XI, into cylinder g , forcing the

brick upward out of the mold, the water in D meanwhile escaping through its exhaust-pipe. As soon as the brick is out of the mold the valve 3 closes, as seen in Fig. VIII, and the lower plunger remains level with the top of the molds, and the upper plunger is then rapidly raised, all the water going into g for that purpose. As soon as B is up valves 8 and 14 open, while 10 and 13 close, as seen in Fig. XII, and the water passes into the rear end of the charger-box cylinder J', forcing the charger-box forward, thus pushing the bricks to the front end of the machine and carrying forward a fresh lot of clay. Then the valve 8 closes and 12 opens, as seen in Fig. XIII, permitting the passage of the water into H, and returning the lower plunger C to its first position allows the clay to follow down into the molds, the water escaping through 5, Fig. VIII. Upon the return of the downstroke of the piston L the water from S passes through the valve 7 and the valve 15, Figs. IX and XIV, to the front end of the charger-box cylinder J', the exhaust from the other end passing out through valve 9. This returns the charger-box to its original position and the process is again repeated.

In Fig. XV the relative movements of the plungers B and C are shown. The lines 16, 17, 18, 19, and 20 represent the motion of the crank, and therefore of the pumps, steam-cylinders, &c., through two revolutions. The light lines 21 21 22 22 represent the top and bottom of the molds, and the heavy lines 23 and 29 (shown) the motion of the main plungers, and the one marked 36 shows the motion of a charger-box. It will be seen that during the first half-revolution of the crank on line from 16 to 17 the mold is closed at 24 by lowering of the upper plunger only, and then both plungers approach each other at the end of the first revolution of the crank and fly wheel at the points 18, 25, and 31 in Fig. XV. Both plungers then rise and carry the brick out of the molds at the points 26 and 32, the plungers remaining in the same relative position to each other. The upper plunger then rises, the lower plunger remaining stationary until the upper plunger reaches 27, and the charger-box moves forward to 37 and 38, and the lower plunger returns at 33 and 30, and, lastly, the charger-box moves back at 39 and 40, the crank and fly wheel being at 20; the upper plunger being at 28, the lower plunger at 35, and the charger-box at 40, in which position the press is ready for another press of brick and new operation.

Relief-valves are placed in the different pipes to guard against excessive pressure, and the pipes v and s are provided with ordinary check-valves to arrest the reflow of water into R and S.

In case the supply from the pumps cannot be utilized when wanted, an accumulator is used and will be connected with the pipe m' . The accumulator which I use is shown in Figs. XVI and XVII, and consists of a wa-

ter-cylinder 41, connected with m' by the pipe m^2 . Within this cylinder works a piston 42, fastened on a rod 43. At the other end of this rod is fastened another piston 44, working within a steam-cylinder 45. This steam-cylinder is directly connected with the boiler 46 by the pipe 47. Near the upper end of the water-cylinder 41 are a series of holes 48, which open into an annular space 49, from which leads a pipe 50 to a water-tank. As will be seen, the boiler-pressure being constantly on the piston 44 will communicate the same pressure to the water in 41 and produce the same water-pressure in the pipes connected therewith, dependent upon the strain-pressure and the relative diameters of the cylinders 41 and 45. Should the supply from the pumps exceed the requirements, the piston is gradually forced up till the holes 48 are uncovered, when any surplus water will escape through the holes 48, chamber 49, and pipe 50. There is no drain on the boiler or the steam therein excepting for the small amount of steam which may be condensed in the cylinder 45, nor is there any great mass of material used in my device as is used in the common form. Of course the steam-cylinders of the machine are connected with the boiler 46 in any well-known manner. Thus by the use of twin pumps and cylinders of the superior force and power as shown in my drawings, connected and operating with the plungers B and C and the cylinders D and C, and the twin water-pumps operated by these twin cylinders by the system of valves and pipes, I am enabled to exert a great and positive force on the plungers B and C at or just before the brick is compressed to its fullest extent, and then by the same system of valves the pressure is quickly and surely released and the bricks are removed from the mold and the plungers B and C returned to their normal positions almost instantaneously by the action of the pressure in the cylinders G and H, which makes a brick-machine far superior to any machine ever before known or used in the accumulating pressure upon the brick at the last point of pressure and then keeping that pressure on the brick while it is being elevated from the mold, and also in the rapidity with which the plungers B and C are returned to their normal positions.

Now what I claim, and for which I ask Letters Patent to be granted to me, is—

1. A brick-machine composed of two steam-cylinders arranged on a frame-work and having piston-rods provided with graduated racks at their upper ends engaging graduated segmental wheels, said segmental wheels being journaled in said frame-work and being provided with lifting-rods attached at their lower ends to water-cylinders moving within water-tanks, said piston-rods being journaled to the opposite end of the walking-beam arranged above the brick-press proper, an upper and lower plunger arranged and moving in hy-

draulic cylinders, pipes connecting said pump-cylinders with said hydraulic cylinders, and the series of valves inclosed and operating within two water-chambers of different dimensions, and two with drawing-cylinders whereby the plungers are withdrawn to their normal positions after the pressure is removed therefrom, and the shaft supplied with means to open and close the valves in said water-chambers, all combined and operating to exert an accumulated force upon the brick from the time it first begins to receive pressure until the pressure is removed, substantially as described.

2. In a brick-machine, the combination of two steam-cylinders having a piston provided with a graduated rack engaging the spurs on graduated segmental spur-wheels, said spur-wheels being provided with lifting-rods journaled nearest their shortest diameters, a movable water-cylinder connected to the lower end of said lifting-rods and adapted to move upon a piston made stationary, with a walking-beam pivotally attached at either end to the steam-pistons, and an ordinary hydraulic brick-press connected with said water-cylinders by a series of pipes and valves operating to exert on the press a gradually accumulated force, substantially as described, and for the purposes set forth.

3. In a brick-press, two steam-cylinders having pistons provided with racks gradually receding on each side and adapted to engage segmental spur-wheels the arcs of which gradually recede from their journaled centers, said segmental wheels being provided with lifting-rods attached to a movable water-cylinder, the pistons of said steam-cylinders being connected by mechanism operating to cause said pistons to move in unison with each other, in combination with each other and with a hydraulic brick-press, said brick-press being connected with said water-cylinder by water-pipes, whereby the pressure in the water-cylinders may be exerted on the water in the cylinders of the press at different intervals and with different degrees of pressure, substantially as described, and for the purposes set forth.

4. In a brick-press, a water-accumulator consisting of an upper and lower piston, an upper and lower cylinder, the upper cylinder being adapted to hold steam and connected with the boiler by means of a steam-pipe, the lower cylinder being adapted to hold water under pressure, and being provided with an outlet-pipe near its upper portion and with another pipe near its lower portion and connected with the main water-pipe of the hydraulic press, in combination with a brick-press, substantially as described, and for the purposes set forth.

CHARLES J. LE ROY.

Attest:

R. R. SWEET,
FRANCIS VALLÉ.