

(No Model.)

3 Sheets—Sheet 1.

W. H. McCOY.
ELEVATOR.

No. 520,697.

Patented May 29, 1894.

Fig. 1

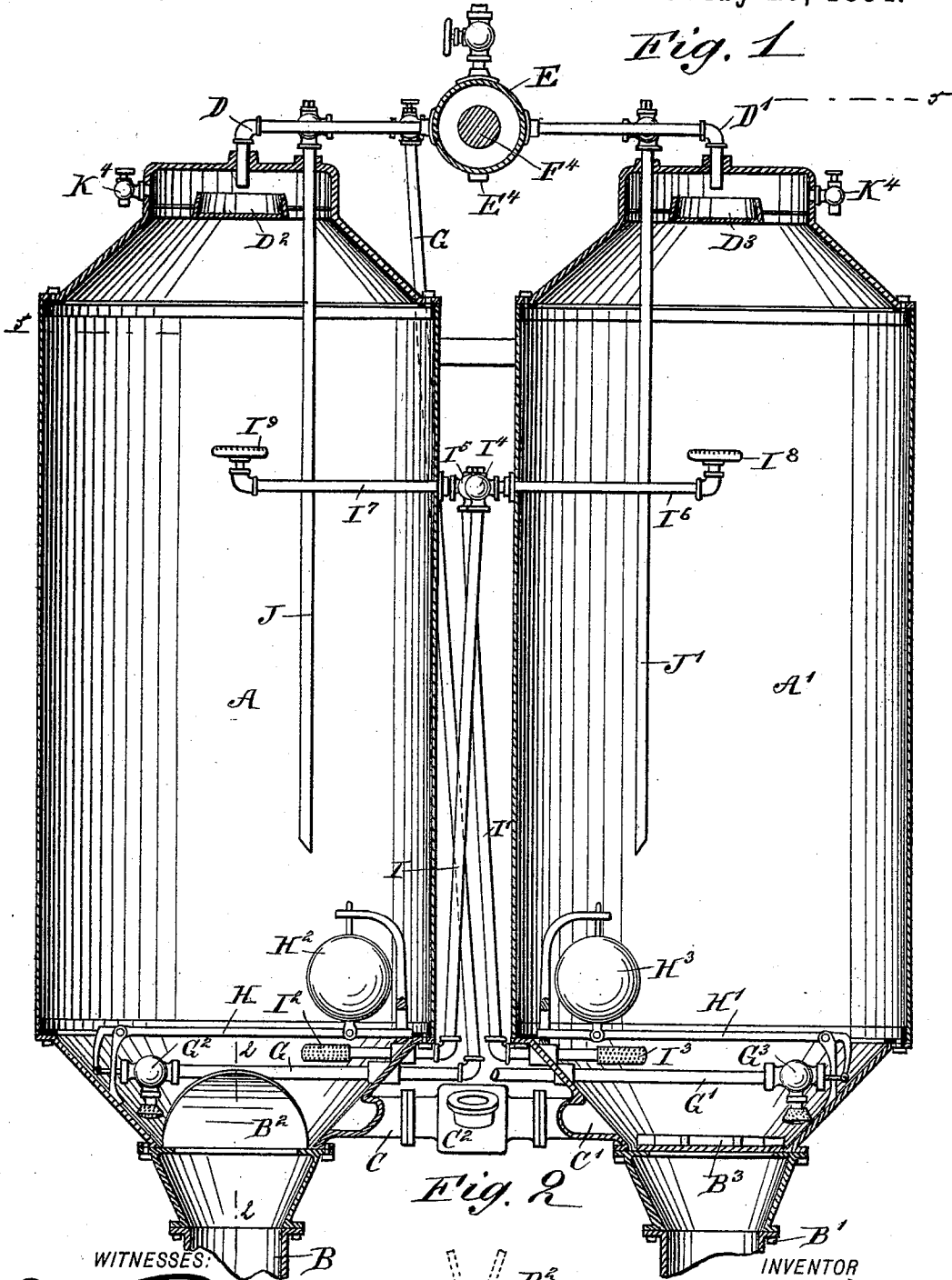
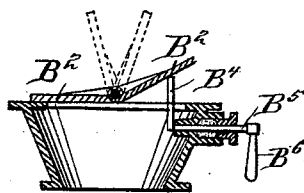


Fig. 2



WITNESSES:

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Fig. 3

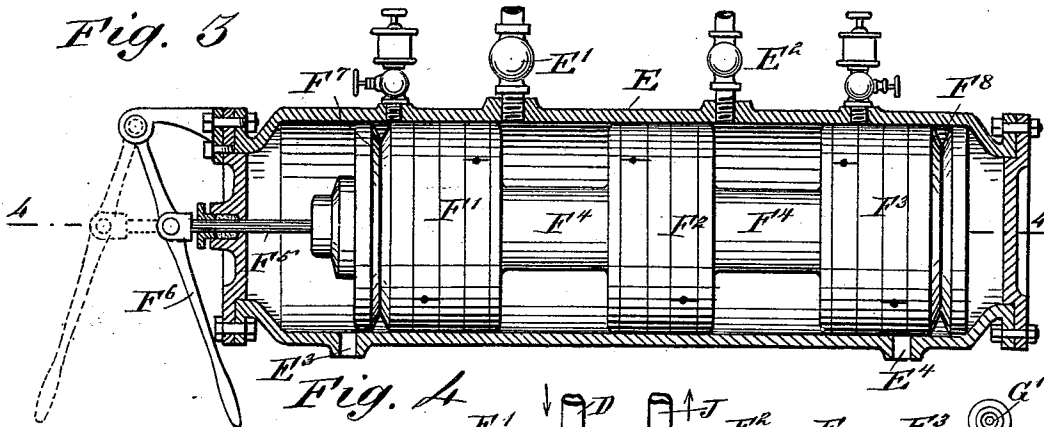


Fig. 4

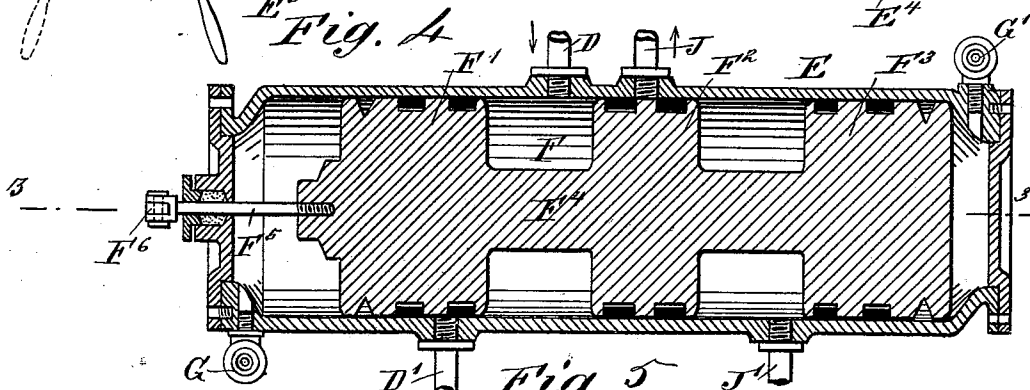


Fig. 5

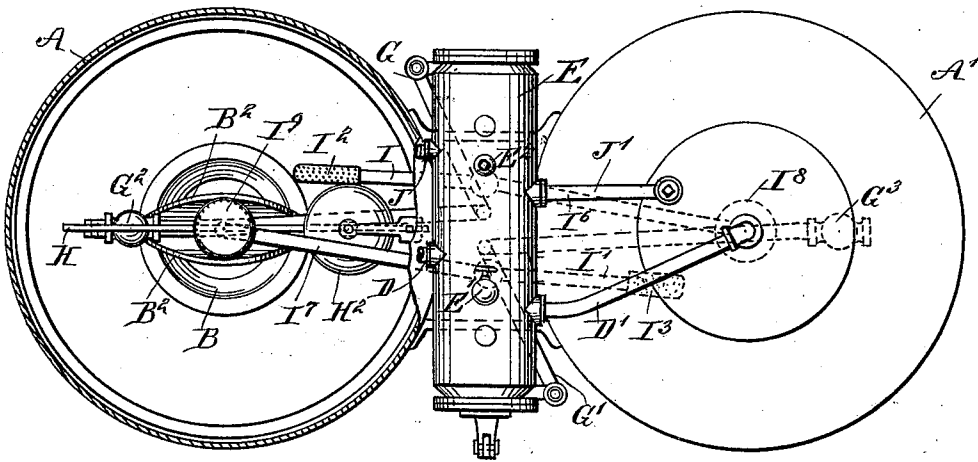
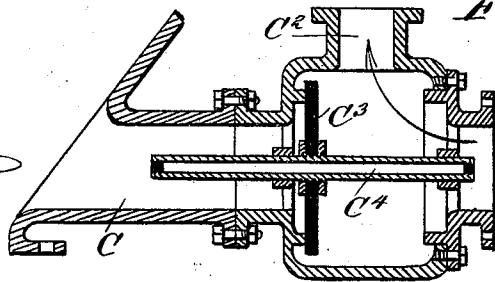


Fig. 6



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W. H. McCoy.
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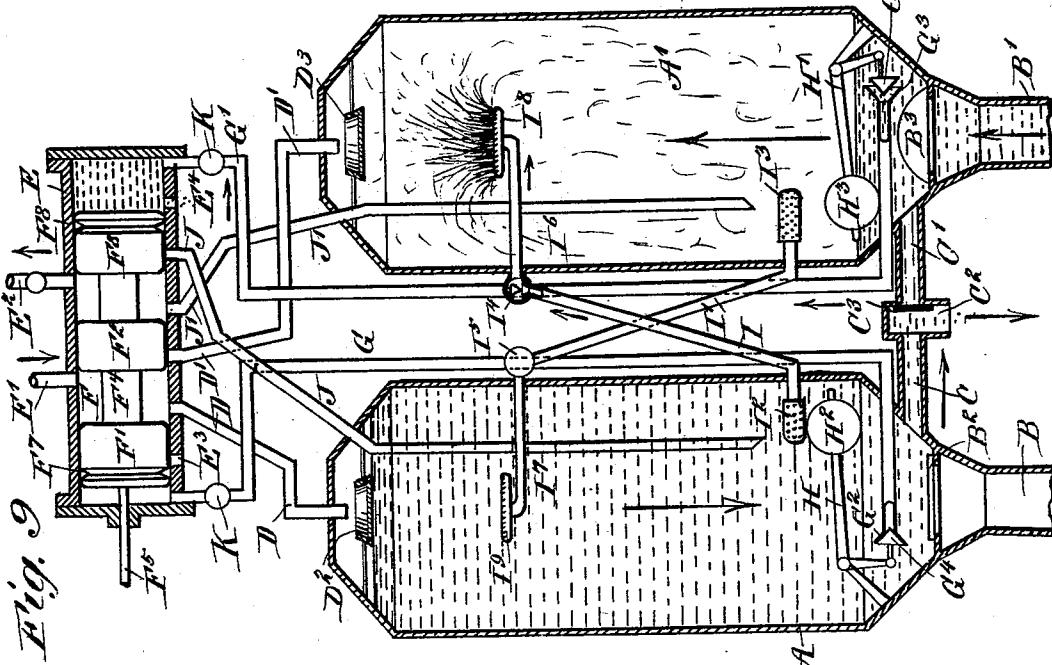


Fig. 9

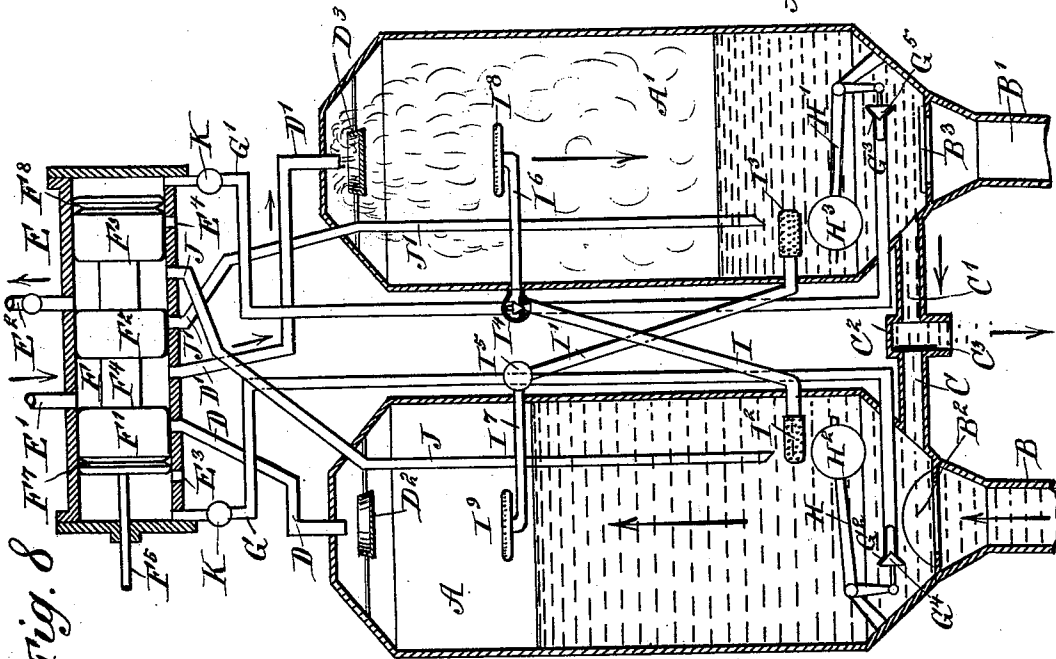
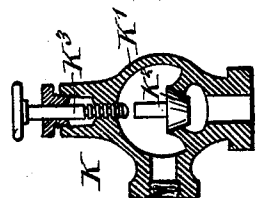


Fig. 8

WITNESSES:
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Fig. 7



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UNITED STATES PATENT OFFICE.

WILLIAM HARRISON MCGOY, OF LOS ANGELES, CALIFORNIA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 520,697, dated May 29, 1894.

Application filed October 18, 1893. Serial No. 488,458. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HARRISON MCGOY, of Los Angeles, in the county of Los Angeles and State of California, have invented a new and Improved Elevator, of which the following is a full, clear, and exact description.

The invention relates to vacuum elevators, and its object is to provide a new and improved elevator which is simple and durable in construction, very effective in operation, and more especially designed for raising water to a desired level for irrigating or other purposes.

The invention consists of certain parts and details and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a transverse section of one of the suction valves on the line 2—2 of Fig. 1. Fig. 3 is an enlarged sectional side elevation of the steam cylinder, on the line 3—3 of Fig. 4. Fig. 4 is a sectional plan view of the same on the line 4—4 of Fig. 3. Fig. 5 is a sectional plan view of the improvement on the line 5—5 of Fig. 1. Fig. 6 is an enlarged sectional side elevation of the water discharge. Fig. 7 is an enlarged sectional side elevation of the regulating valve. Fig. 8 is a diagrammatical view of the improvement; and Fig. 9 is a similar view of the same, with parts in a different position.

The improved elevator is provided with the water-receiving receptacles A and A', provided at their lower ends with suction pipes B and B' respectively, connected with a suitable water supply, the suction pipes being provided with upwardly-opening suction valves B² and B³ respectively, adapted to close when the water is discharged from the respective receptacle. Each of the valves B² or B³ can be opened by hand from the outside by means of an arm B⁴ adapted to engage the under side of the hinged valve, as illustrated in Fig. 2, the said arm being attached to a

shaft B⁵ mounted to turn in the side of the suction pipe and carrying at its outer end a handle B⁶, under the control of the operator. This device is necessary in starting the elevator, as hereinafter more fully described.

From the lower ends of the water receiving receptacles A and A' lead the discharge pipes C and C' respectively, connected with a common outlet C² containing a valve C³, (see Fig. 6,) held on a valve stem C⁴ fitted to slide longitudinally in suitable bearings arranged in the outlet C², the said valve being adapted to alternately close the connection between the outlet and the discharge pipes C and C'.

The water is drawn into the receptacles A and A' alternately, by forming vacuums therein, and the water in a filled receptacle is discharged or forced out through the corresponding discharge pipe C or C', by pressure of steam admitted into the upper end of the respective receptacle by means of pipes D and D' respectively, connected with a steam cylinder E, provided with a steam inlet pipe E' connected with a boiler or other source of steam supply. The pipes D D' discharge into cups D² D³ respectively suspended in the receptacles A A' respectively as plainly shown in the drawings. By this arrangement the steam on entering either receptacle through the corresponding pipe D or D' will pass into the corresponding cup D² or D³ so as to break or check its momentum and allow it to expand and press quietly down onto the water with its full expansive force. The cylinder E is also provided with an exhaust pipe E² having a suitable check valve, and in the bottom of the said cylinder, near the ends thereof, are arranged outlet openings E³ and E⁴ for draining the water from the ends of the cylinder after the piston valve F fitted to slide in the said cylinder has been shifted by the water pressure, as hereinafter more fully described. The piston valve F is provided with three pistons F¹, F² and F³, held on a common piston rod F⁴ and placed suitable distances apart, as plainly illustrated in Figs. 3, 4, 8 and 9. One end of the piston rod F⁴ is formed with a reduced extension F⁵ passing through a stuffing box in one head of the cylinder E, the outer end of the said extension being pivotally con-

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nected with a handle lever F⁶ for shifting the said piston valve by hand when starting the machine, as hereinafter more fully described.

Near the outer ends of the pistons F' and F² are arranged V-shaped peripheral grooves F⁷ and F⁸ respectively, which serve to permit leakage of steam to reduce the steam pressure in the cylinder E for the purpose hereinafter mentioned. Into the ends of the cylinder E open the water supply pipes G and G' connected at their lower ends with the interior of the receptacles A and A', directly above the suction valves B² and B³, as plainly shown in the drawings. The inner ends G² and G³ of the said water pipes G and G' form valve seats for valves G⁴ and G⁵ respectively, connected with levers H and H' respectively, fulcrumed in the receptacles A and A' respectively, and carrying floats H² and H³ respectively, adapted to actuate the said levers on the rise and fall of the water in the receptacles, so as to close or open the said valves G⁴ and G⁵ to connect and disconnect the water receptacles A and A' by the pipes G and G' with and from the ends of the cylinder E.

Into the lower end of the water receptacle A extends a pipe I, and a similar pipe I' passes into the lower end of the receptacle A'. The inner ends of the pipes I and I' are provided with perforated suction caps I² and I³ respectively, and the said pipes are provided at their upper ends, outside of the receptacles, with check valves I⁴ and I⁵ respectively. From the check valve I⁴ leads a branch pipe I⁶ into the upper end of the receptacle A', and a similar branch pipe I⁷ leads from the check valve I⁵ into the upper end of the receptacle A. The branch pipes I⁶ and I⁷ are provided at their inner ends with water sprayers I⁸ and I⁹ respectively, through which water passes in jets or sprays into the upper end of the respective water receptacle A' or A. From the water receptacles A and A' also lead exhaust pipes J and J' respectively, reaching with their lower ends to about the caps I², I³; the upper ends of the said pipes connect with the steam cylinder E so that the steam from the corresponding receptacle can pass into the cylinder E between the pistons F² and F³ to be discharged through the exhaust pipe E².

In the water pipes G and G', near the cylinder E, are arranged regulating valves K, each provided with a valve body K' and a check valve K², the stroke of which is limited or regulated by a screw rod K³ screwing in the valve body K', as illustrated in Fig. 7. A similar regulating valve K⁴ is arranged in the upper end of each of the water receptacles A and A'.

The pipes J J' are provided with holes of sufficient size near their entrance to the cylinder E so as to let steam into the said pipes to discharge any water therein, at the same time water is discharged from the cylinder. By these means steam is kept above the water

and the pipes are kept clear to properly exhaust through the same.

The operation is as follows:—When the machine is in operation and the several parts are in the position illustrated in Fig. 8, then the water, previously drawn into the water receptacle A', is discharged from the same by the pressure of steam passing, by means of the pipe D', from the cylinder E into the upper end of the said receptacle A', it being understood that the valve in the supply pipe E' is open and steam passes from the boiler into the cylinder, between the pistons F' and F². The water passes from the receptacle A' into the discharge pipe C' and into the outlet C² against the valve C³, which is forced to its opposite seat, thus closing the discharge pipe C. The water is conducted from the outlet C² to the place where the water is to be used, by suitable pipes or other means. During this operation in the receptacle A' water is drawn into the receptacle A, as a vacuum had previously been formed in the said receptacle. When the level of the water in the receptacle A' has fallen so that the receptacle is nearly empty, then the float H³ on the float lever H' sinks, whereby the float lever H' causes the valve G⁵ to open and water under pressure still contained in the receptacle A', can pass into the pipe G' and into the right-hand end of the cylinder E, to press against the piston F³ so as to shift the piston valve F to the left into the position shown in Fig. 9. In doing so, the steam is cut off from the receptacle A', as the pipe D' is now closed by the piston F² and steam is admitted from the cylinder E through the pipe D into the upper end of the receptacle A, which has by this time filled completely. The pressure of steam on the water in the receptacle A forces the latter through the discharge pipe C, against the valve C³, whereby the latter is shifted to its opposite seat and communication is established between the said pipe C and outlet C² while the discharge pipe C' is closed. As soon as steam presses on the water in the receptacle A part of the water passes through the perforated cap I² into the pipe I and past the check valve I⁴ into the branch pipe I⁶ and into the water sprayer I⁸, so that now jets of water pass into the steam-filled receptacle A' to condense the steam therein so as to form a vacuum in this receptacle A'. The vacuum causes suction of water through the pipe B' and suction valve B³ into the receptacle A', so that the latter now begins to fill in about the same ratio as the water is discharged from the other receptacle A. As soon as the water begins to rise in the receptacle A' it lifts the float H³ so that the lever H' seats the valve G⁵ in the pipe G', whereby the receptacle A' is disconnected from the right-hand end of the cylinder E. The water in this end of the cylinder drains out through the opening E⁴. Any excess of steam pressure in the receptacle A is permitted to

escape through the pipe J' into the cylinder between the pistons F² and F³, and through the exhaust pipe E² to the outer air or to any other desired place. When the water in the receptacle A is nearly all discharged, the float H² drops and its lever H causes the valve G⁴ to open so that part of the water in the lower end of the receptacle A is forced under pressure into the pipe G and to the left-hand end of the cylinder E, whereby the water presses on the piston F' and shifts the piston valve F to the right into the position shown in Fig. 8. The above described operation is then repeated, that is, one receptacle is filled while the other discharges, and vacuums are alternately formed after the water is discharged to draw a new supply of water into the respective receptacle.

When first starting the elevator it is necessary that the operator should shift the piston valve F by hand, by manipulating the lever F⁶, so as to cause live steam to pass into one of the receptacles, so as to drive the air contained therein out of the same through the suction pipe, the valve B² or B³ therein having previously been opened by hand by the operator manipulating the lever B⁶, as shown in Fig. 1. As soon as the air has been discharged from this receptacle, the valve B² is permitted to close by the operator throwing the arm B⁴ downward. The vacuum then formed by the condensing of the steam in this receptacle, draws water into this receptacle to fill the same, and the above described operation then takes place automatically.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an elevator of the class described, the combination with water receptacles connected with a water supply, a steam cylinder connected with the receptacles, and a piston in the cylinder for alternately admitting steam to the said receptacles, of pipes connecting the receptacles with the ends of the steam cylinder, and valves for controlling the admission of water to said pipes, said valves being controlled by the rise and fall of the water in said receptacles substantially as described.

2. In an elevator of the class described, the combination with water receptacles connected with a water supply, a steam cylinder connected with the receptacles, and a piston in the cylinder for alternately admitting steam to the receptacles, of pipes connecting the receptacles with the ends of the steam cylinder, valves for closing the ends of the said pipes, and floats connected with and operating said valves, substantially as described.

3. A machine of the class described, comprising water-receiving receptacles having suction pipes connected with a water supply, valved pipe connections between the said receptacles for conducting water from one receptacle into the other to condense steam therein to produce a vacuum, a steam cylin-

der having a piston valve for alternately connecting the said cylinder with the said water receptacles to force the water out of the said receptacles after they are filled, water pipes connecting the lower ends of the said water receptacles with the ends of the said cylinder, and float valves for opening and closing the said water pipes within the said receptacles, substantially as shown and described.

4. In a machine of the class described, the combination with a steam cylinder connected with a steam supply and provided with drain openings, of a piston valve fitted to slide in the said cylinder and provided with three pistons connected with each other, steam supply pipes leading from the said cylinder, water receptacles into which discharge the said steam supply pipes, and water pipes connected with the ends of the said cylinder and opening into the lower ends of the said water receptacles, to permit the water under pressure to pass alternately into the ends of the cylinder to shift the piston valve therein, substantially as shown and described.

5. In a machine of the class described, the combination with a steam cylinder connected with a steam supply and provided with drain openings, of a piston valve fitted to slide in the said cylinder and provided with three pistons connected with each other, steam supply pipes leading from the said cylinder, water receptacles into which discharge the said steam supply pipes, water pipes connected with the ends of the said cylinder and opening into the lower ends of the said water receptacles, to permit the water under pressure to pass alternately into the ends of the cylinder to shift the piston valve therein, valves arranged in the lower ends of the said water pipes, and floats held in the said receptacles and controlling the said valves, substantially as shown and described.

6. In a machine of the class described, the combination with a steam cylinder connected with a steam supply and provided with drain openings, of a piston valve fitted to slide in the said cylinder and provided with three pistons connected with each other, steam supply pipes leading from the said cylinder, water receptacles into which discharge the said steam supply pipes, water pipes connected with the ends of the said cylinder and opening into the lower ends of the said water receptacles, to permit the water under pressure to pass alternately into the ends of the cylinder to shift the piston valve therein, and pipes for connecting the lower end of one water receptacle with the upper end of the other water receptacle, the upper ends of the said pipes being provided with water sprayers, substantially as shown and described.

7. In a machine of the class described, the combination with a steam cylinder connected with a steam supply and provided with drain openings, of a piston valve fitted to slide in the said cylinder and provided with three pistons connected with each other, steam supply

pipes leading from the said cylinder, water receptacles into which discharge the said steam supply pipes, water pipes connected with the ends of the said cylinder and opening into the lower ends of the said water receptacles, to permit the water under pressure to pass alternately into the ends of the cylinder to shift the piston valve therein, pipes for connecting the lower end of one water receptacle with the upper end of the other water receptacle, the upper ends of the said pipes being provided with water sprayers, and each pipe being provided with a check valve, substantially as shown and described.

15 8. In a machine of the class described, the combination with a steam cylinder connected with a steam supply and provided with drain openings, of a piston valve fitted to slide in the said cylinder and provided with three pistons connected with each other, steam supply pipes leading from the said cylinder, water receptacles into which discharge the said steam supply pipes, water pipes connected with the ends of the said cylinder and opening into

25 the lower ends of the said water receptacles, to permit the water under pressure to pass al-

ternately into the ends of the cylinder to shift the piston valve therein, an exhaust pipe leading from the said cylinder between two of the pistons, and pipes leading from the receptacles into the said cylinder between the same pistons, substantially as shown and described.

9. In an elevator of the class described, the combination with water receptacles having discharge pipes connected with a common outlet provided with a valve, of a steam cylinder, steam pipes leading from the cylinder to the receptacles, a piston in the cylinder for controlling the admission of steam to the receptacles, pipes leading from the lower portions of the receptacles to the ends of the cylinder and provided with valves controlled by the rise and fall of the water in the receptacles, and valved pipe connections between the receptacles for conducting water from one receptacle to the other to produce a vacuum, substantially as herein shown and described.

WILLIAM HARRISON MccOY.

Witnesses:

H. E. CORNWELL,
WM. RILEY.