(No Model.)

2 Sheets—Sheet 1.

E. F. OSBORNE.

PUMP REGULATOR.

No. 298,771. Patented May 20, 1884.

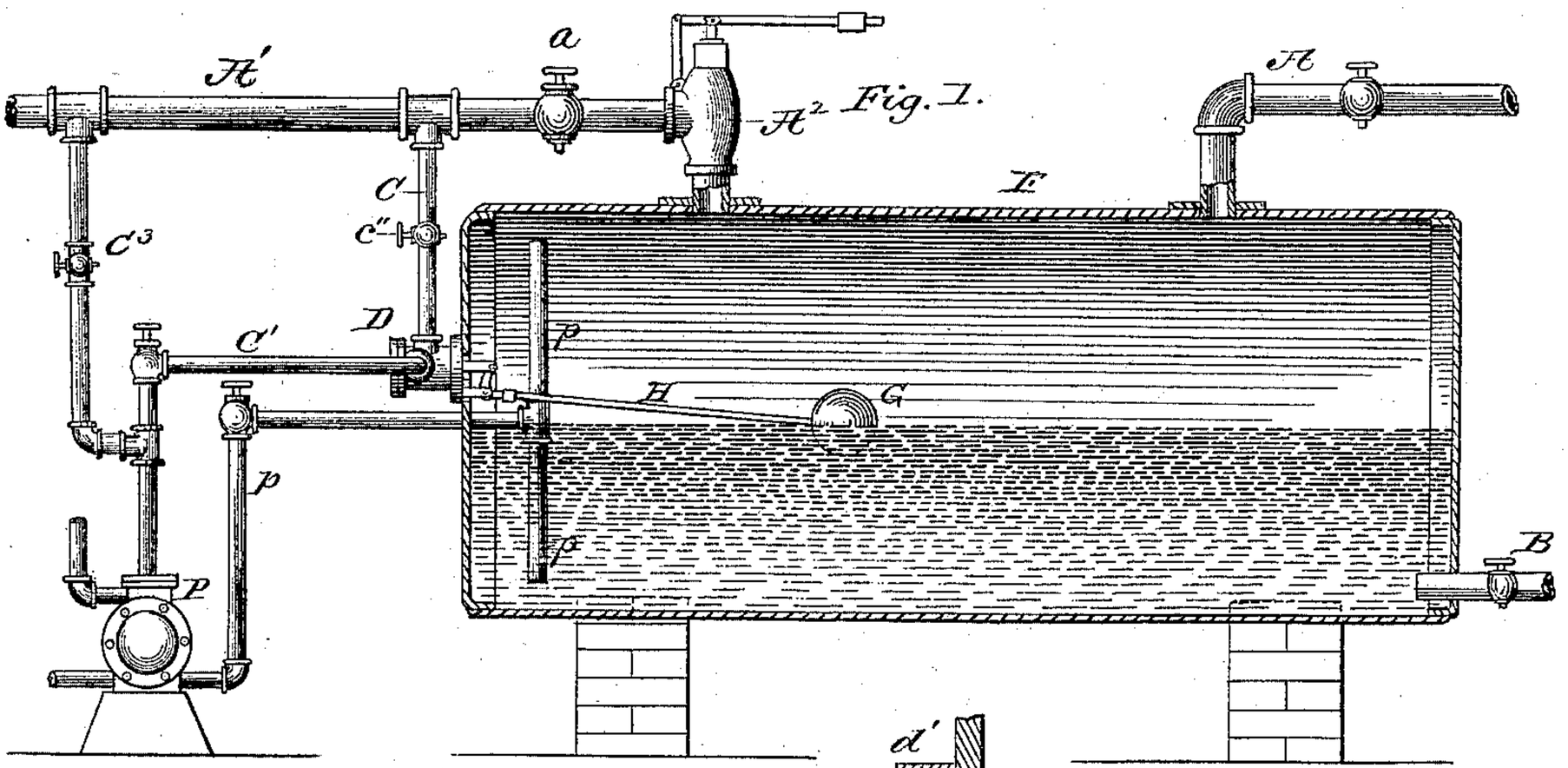

Fig. 1.

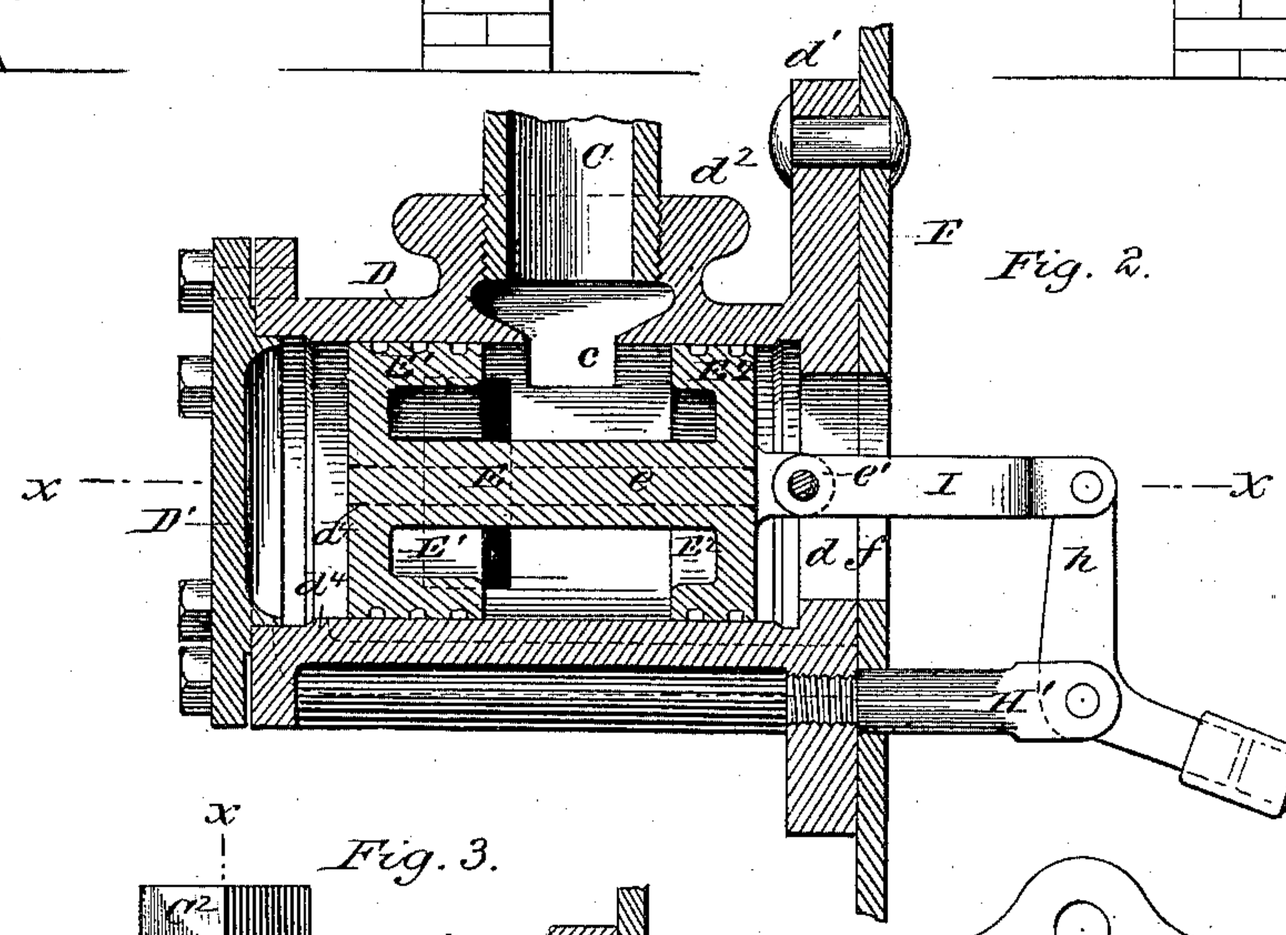

Fig. 2.

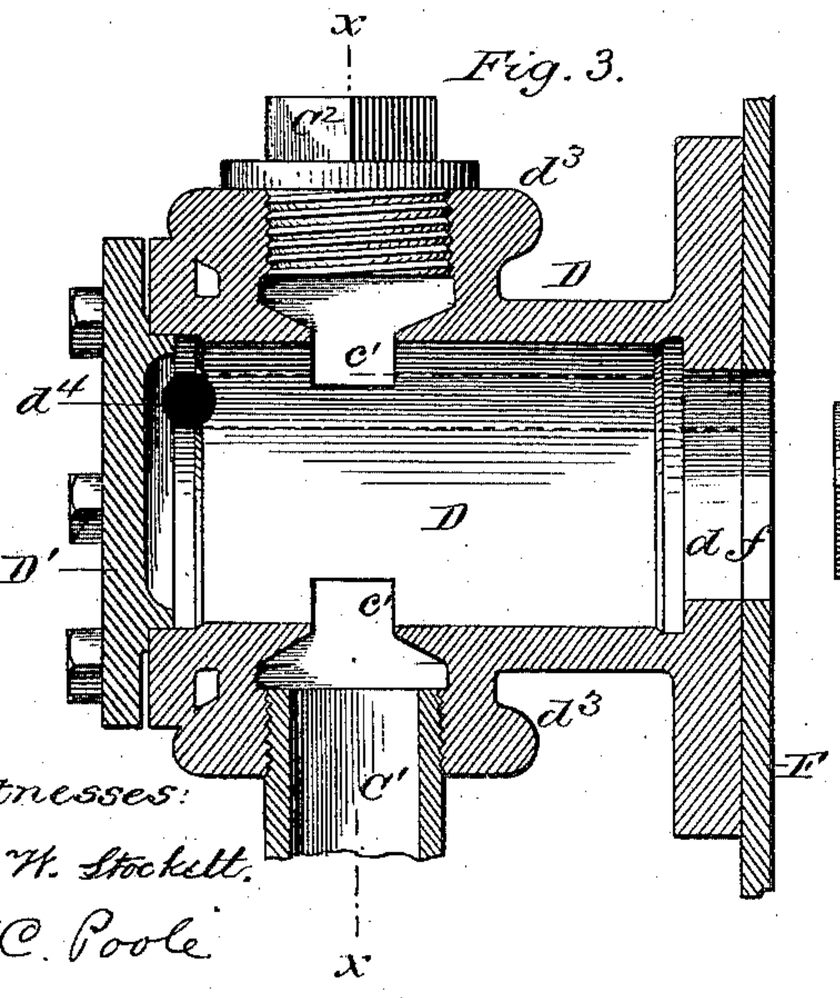

Fig. 3.

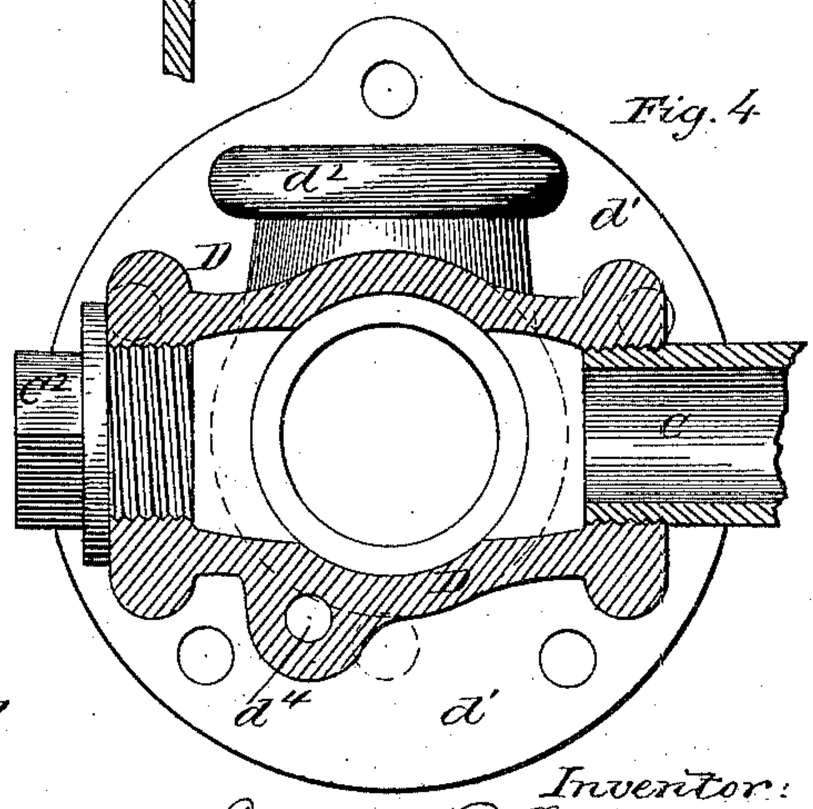

Fig. 4

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Inventor:
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per W. W. Dawson.
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(No Model.) 2 Sheets—Sheet 2.

E. F. OSBORNE.

PUMP REGULATOR.

No. 298,771. Patented May 20, 1884.

Fig. 5.

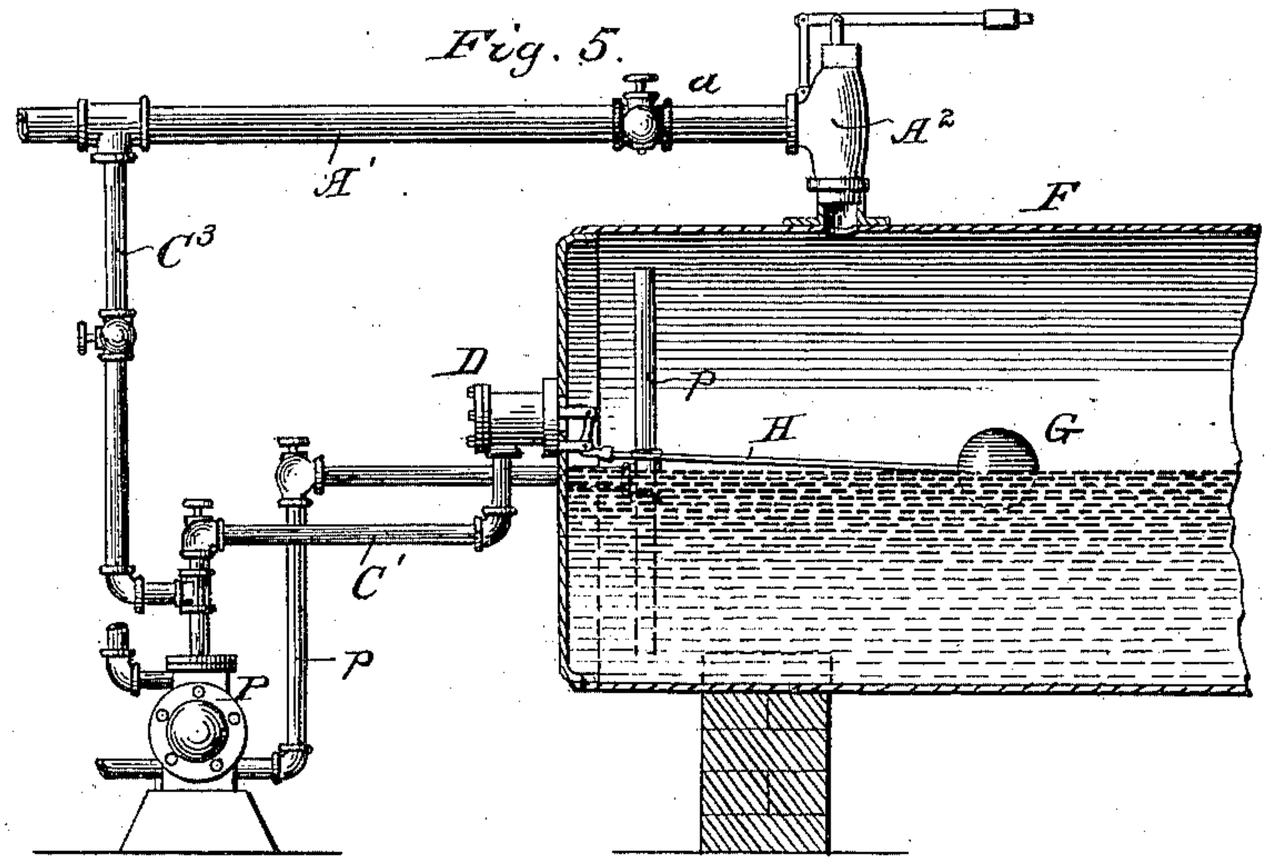


Fig. 6.

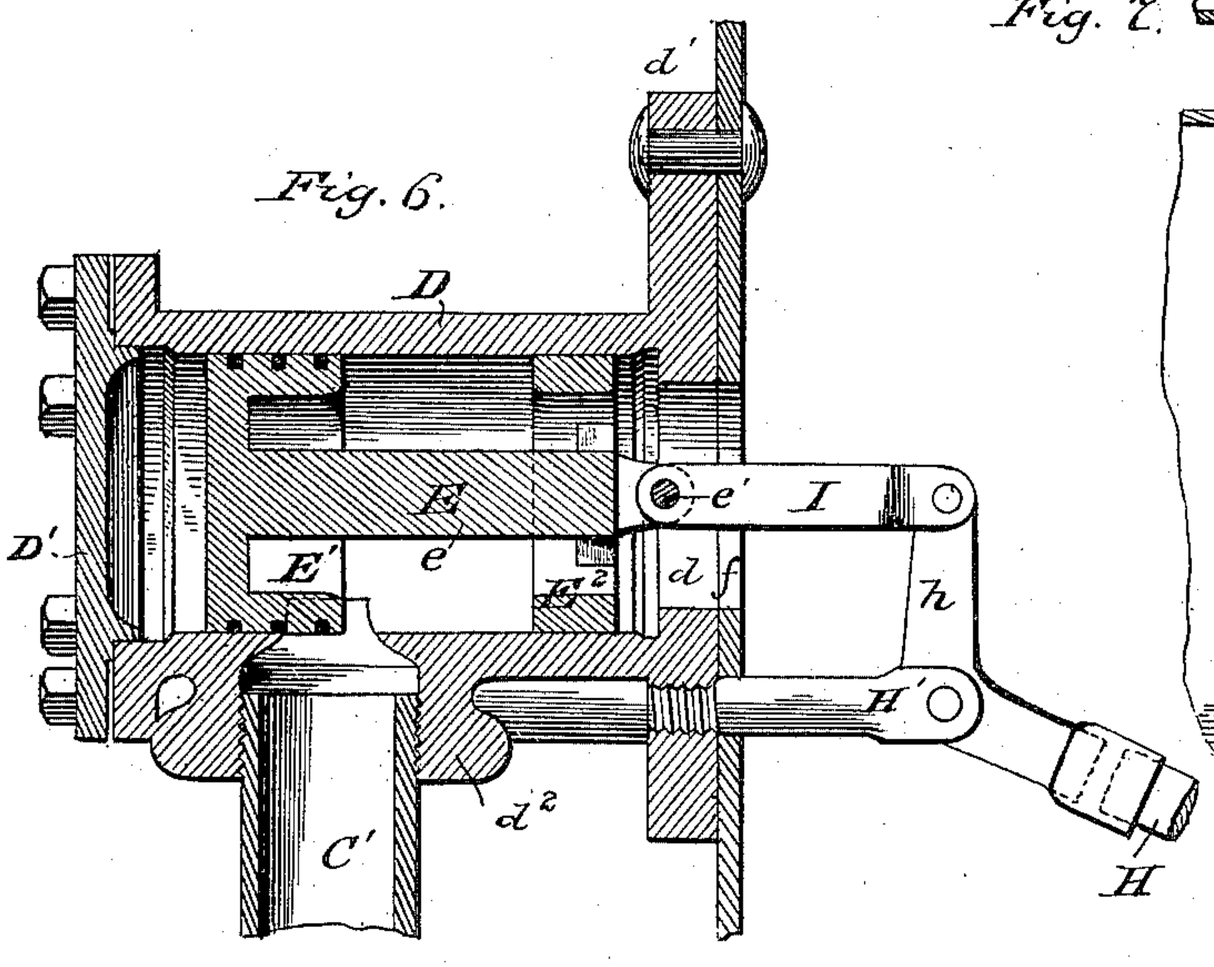
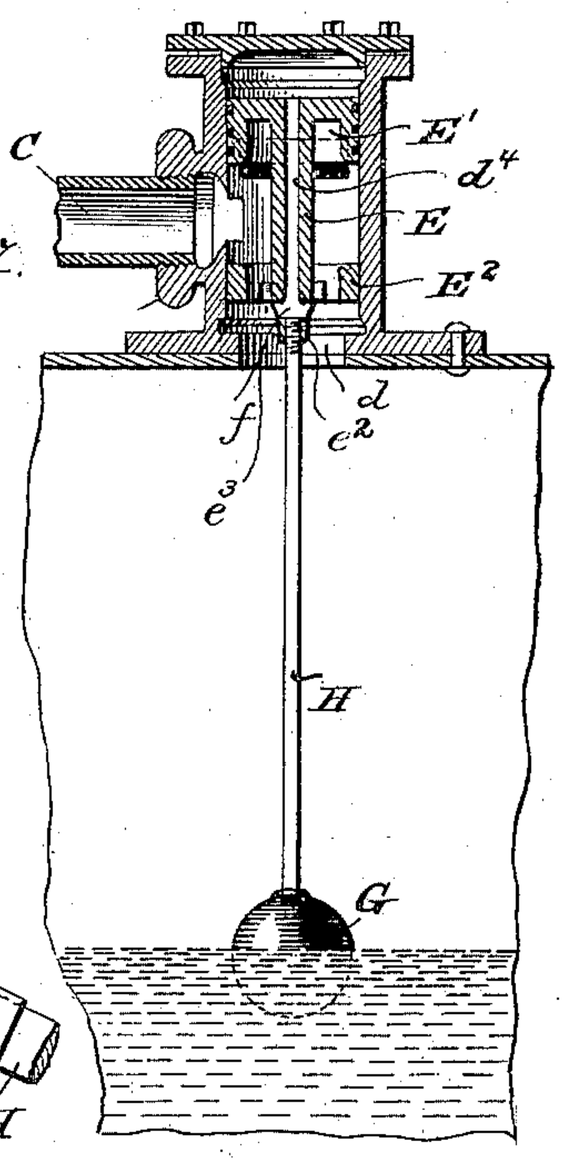


Fig. 7.



WITNESSES:

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C. C. Poole

INVENTOR

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BY

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UNITED STATES PATENT OFFICE.

EUGENE F. OSBORNE, OF ST. PAUL, MINNESOTA.

PUMP-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 298,771, dated May 20, 1884.

Application filed April 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, EUGENE F. OSBORNE, of Saint Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Pump-Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to devices for automatically regulating the action of a pump employed to discharge water from a tank or vessel, and operating with reference to the quantity of water in said vessel, with the view of maintaining said water at a substantially uniform height or level. Such devices are more particularly adapted and intended for use in steam heating apparatus in connection with a tank, to which the water of condensation is delivered preparatory to its return to the boiler or preliminary to its other disposition. The water in the tank being in such constructions usually related intimately to the return system of the apparatus and to its successful operation, the maintenance of a substantially uniform water-level in said tank becomes highly important.

The particular object of this invention is to provide a form and construction of the valve, in connection with the tank and steam-pipe of the pump and with a float located in said tank, whereby the action of the valve will be entirely reliable under all conditions, so that accident to or defective working of the system is not likely to arise from a failure to properly remove the water from the receiving-tank. To this end the steam-supply pipe for a pump, which draws from the tank, is connected into a valve-chamber that is constructed to communicate with the steam-space of the tank, so that there is no necessity for such a tight packing of the valve as will under any circumstances interfere with its free operation by the float. By this means any leakage of steam will be discharged into the tank, and when the tank is constructed to communicate with the supply-pipe of the steam-heating or other apparatus, said steam so leaked by the valve will not be lost, but will be utilized in such apparatus.

The invention is herein shown in connection with the return-water receiving-tank of the system of steam-heating and power supply illustrated in Letters Patent of the United States Nos. 212,320 and 236,247, heretofore granted to me, wherein the said receiving-tank is located near the generator, and the steam-space of said tank is in communication with the supply-pipe of the local distribution system. In the latter of said patents a device is shown for the automatic regulation of the pump to secure a regulated discharge of the receiving-tank; but said device is defective in its details of construction in a manner calculated to interfere with the reliability of the apparatus. The device herein shown accomplishes the same general result as that set forth in said Letters Patent, the improvement being intended to obviate the objections above mentioned.

In the accompanying drawings, Figure 1 is a central vertical section of a tank and connections constructed in accordance with my invention. Fig. 2 is a central vertical section of the valve-chamber and valve applied to the tank and connected with the float. Fig. 3 is a horizontal axial section of the valve-chamber through *x x* of Fig. 2, and with the valve removed. Fig. 4 is a vertical transverse section through *x x* of Fig. 3. Fig. 5 is a fragmentary section similar to Fig. 1, illustrating another form of devices embodying my invention. Fig. 6 is a central vertical section of the valve-chamber shown in Fig. 5. Fig. 7 is a detail view showing a form of device in which the valve-chamber is located upon the top of the tank with the axis of the valve vertical, as hereinafter more particularly described.

F is a tank for the reception of the water of condensation returned from the heating or other apparatus.

A is the supply-pipe of the steam-distribution, and B is the return-pipe thereof.

A′ is the steam-pipe, leading from the boiler to the tank, for the supply of steam to the distribution system.

A^2 is a reducing-valve in said pipe, whereby a lower pressure than that of the boiler may be carried on the said system.

P is the pump, which takes water from the tank through the pipe *p*.

C C′ is the steam-supply pipe, leading from the boiler to the valve-chest of the pump P.

D is a valve-chamber connected in the pipe

C C′ and fastened to the end of the tank F in open communication with the interior of the latter, as shown plainly in Figs. 2 and 3.

E is a cylindric piston-valve fitted to the interior of the shell D, and G is a float attached to the bent lever H, the short arm *h* of which is pivotally attached to the valve E by a link, I. The valve chest or chamber D is cast with its opposite ends open, one end being provided with the flange *d′*, whereby it may be attached in an axially horizontal position to the end of the tank F, with the opening *d* coincident with the opening *f* in the head of said tank. The opposite or outer end of the chamber D is closed by a head, D′.

d^2 is a boss provided with an opening or port, *c*, leading to the interior of the valve-chamber, and tapped or otherwise fitted to receive the steam-pipe C. Said boss d^2 and its port *c* are preferably located somewhat nearer the inner than the outer end of the cylinder, as shown in Fig. 2. The port *c*, through the boss d^2 at its termination on the interior of the cylinder, is broadened in a direction transverse to the axis of the cylinder, and is preferably rectangular in shape. A similar boss, d^3, having a similar passage or port, *c′*, is located between the port *c* and the outer end of the cylinder D, as shown in Figs. 2 and 3. If desired, two or more of the ports *c′* and bosses d^3 may be provided, to allow the pipe C′ to be connected at either side of the valve-chamber, as may be desired, a disused port being closed by a plug, C^2, as shown. At their openings on the interior surface of the cylinder D the ports *c′* are also oblong in shape, extending transversely to the axis of the said cylinder, as indicated by the heavy black surface *c′* in Fig. 2.

E is a cylindric valve fitted to the interior of the cylinder, being reduced in diameter in its middle portion opposite the inlet-port *c*, so as to form a neck, *e*. Between the two cylindric portions E′ and E^2, at the opposite ends, is thus formed a steam-space always in communication with the port *c*. The part E′ is intended and arranged to open the outlet-port *c′*, leading to the pipe C′, by an outward movement of the valve, and to close said port by an inward movement of the valve, and the cylindric part E^2 is intended simply to close the space within the cylinder D between the inlet steam-passage *c* and the tank F, and also to steady the valve in its axial position. The valve E is provided with a central lug, *e′*, on its inner end, to which is pivoted a link, I, by which pivotal connection is made with the short arm *h* of the float-lever H. The lever H is fulcrumed to a stud, H′, inserted outwardly through the tank-head into the flange *d′* of the valve-chamber, as shown in Fig. 2, said stud being located, as here shown, below the passage *f* through the tank-head. It is obvious that by the vertical vibration of the float-lever H the valve E will be longitudinally reciprocated within the cylinder D, so as to open and close, either proximately or wholly, the outlet steam-passage *c′*, and to thereby regulate the amount of steam delivered to the valve-chest of the pump P. The pump will, therefore, be controlled in its operation by the water-level within said tank, so as to maintain such level at practically a desired point to which the apparatus may be adjusted. A free movement may be safely provided in the valve constructed as shown, and packing thereof omitted, inasmuch as any steam which may pass the head E^2 will escape directly into the tank through the opening *d f*, which is wholly unobjectionable. The necessary balanced pressure on the valve is provided by a passage, d^4, cast in the body of the cylinder or through the piston, as indicated by dotted lines in Fig. 2 and in full lines in Fig. 7.

In the construction herein shown the steam-space of the tank F is in direct communication with the supply-pipe of the steam-distributing system on the principle and for the purpose set forth in my first above-mentioned Letters Patent, whereby an equalized pressure is obtained throughout said distribution system. In this mode of connecting the tank F the admission of steam by leakage of the valve E is still less objectionable, for the reason that such steam is utilized by its incorporation with that which passes through the tank into the circulation.

The pipe C is here shown as being taken from the supply-pipe A′, leading from the boiler between the reducing-valve A^2 of the cut-off valves *a* and said boiler, said pipe C being provided with a suitable valve, *c″*, as indicated. In this arrangement and construction of the steam-supply pipe C C′ the pump P may continue in operation after steam is shut off from the distributing apparatus. Under some circumstances, however, the steam for driving the pump may be taken directly from the tank F, which, as herein illustrated, is always under pressure when the heating or distributing system with which it is connected is in operation. When this construction is used, the pipe C may be dispensed with, and the head E^3 of the valve E may also be absent or constructed with apertures, giving free passage through the said head for the steam, and operating in that case merely to steady the valve in its axial position. This construction is clearly illustrated in Figs. 5 and 6, other parts of the apparatus being therein shown as constructed in the manner hereinbefore described.

Instead of locating the valve and chamber at the end of the tank and with their axes horizontal, as shown in the figures hereinbefore described, said valve and chamber, as illustrated in Fig. 7, may be located on top of the tank with their axes vertical. In this case the stud H′ may be dispensed with, and a straight float-lever, H, rigidly connected with the valve E may be used, as clearly shown in said figure. As shown in the figure last mentioned, also, the aperture d^4, for the admission of steam to the upper end of the valve-cham-

ber, is formed axially through the valve, the said aperture operating also to discharge the condensed water from the said valve.

As shown in Fig. 7, a hub, e^2, is formed upon the lower end of the valve, in which the rod H is secured, said hub being provided with a transverse aperture, e^3, in communication with the aperture d^4, so as to permit the escape of water therefrom. Advantages of the location and arrangement of the valve last mentioned will be found in the lessened friction and wear of the parts gained by dispensing with the pivotal connection of the rod H with the valve.

A separate steam-connection, C, is preferably provided in the apparatus herein illustrated, by which the pump may be run independently of the valve E, if desired.

I claim as my invention—

1. In combination with the pump, the tank and the steam-pipe of the pump, a valve-chamber provided with ports, and constructed in open communication with the tank-interior, a freely-movable valve in said chamber, and a float connected with the valve, substantially as described.

2. In combination with the pump, tank, and float-lever, a valve-chamber, D, in free communication at both ends with the tank-interior, and provided with ports c and c', arranged as shown, and the freely-fitted valve E, centrally reduced opposite the port c, and a pivotal connection uniting the valve and float lever, substantially as described.

3. The combination, in a steam-distributing system, of a tank connected to receive the water of condensation, the steam-supply pipe of the system communicating with the steam-space of the tank, a pump connected with the water-space of the tank, a steam-supply pipe for the pump, a valve-chamber in open communication with the tank interior, a freely-moving valve therein, a float riding within the tank, and connections uniting the valve and float, constructed to reciprocate the valve by the rise and fall of the float, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

EUGENE F. OSBORNE.

Witnesses:

JESSE COX, Jr.,

G. F. LANAGHEN.