(Model.)

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CISTERN.

No. 245,318. Patented Aug. 9, 1881.

Fig: 1

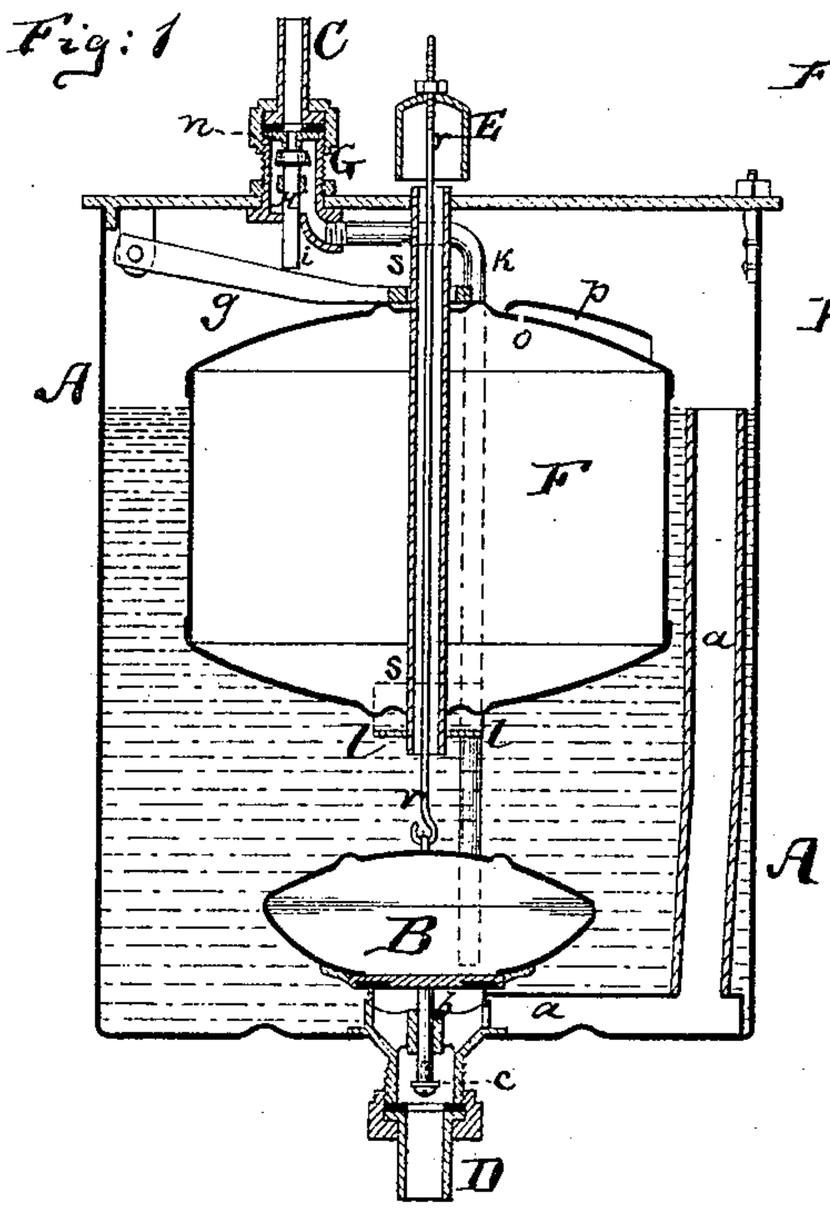


Fig: 3

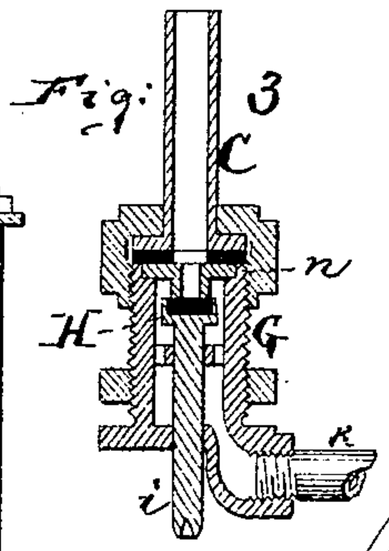


Fig: 2

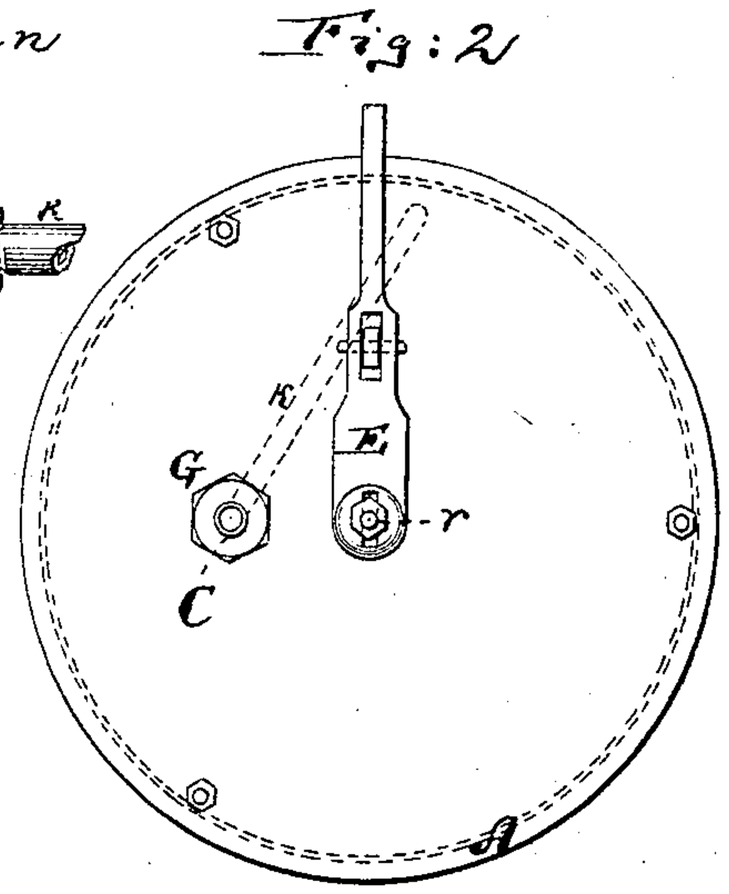


Fig: 4

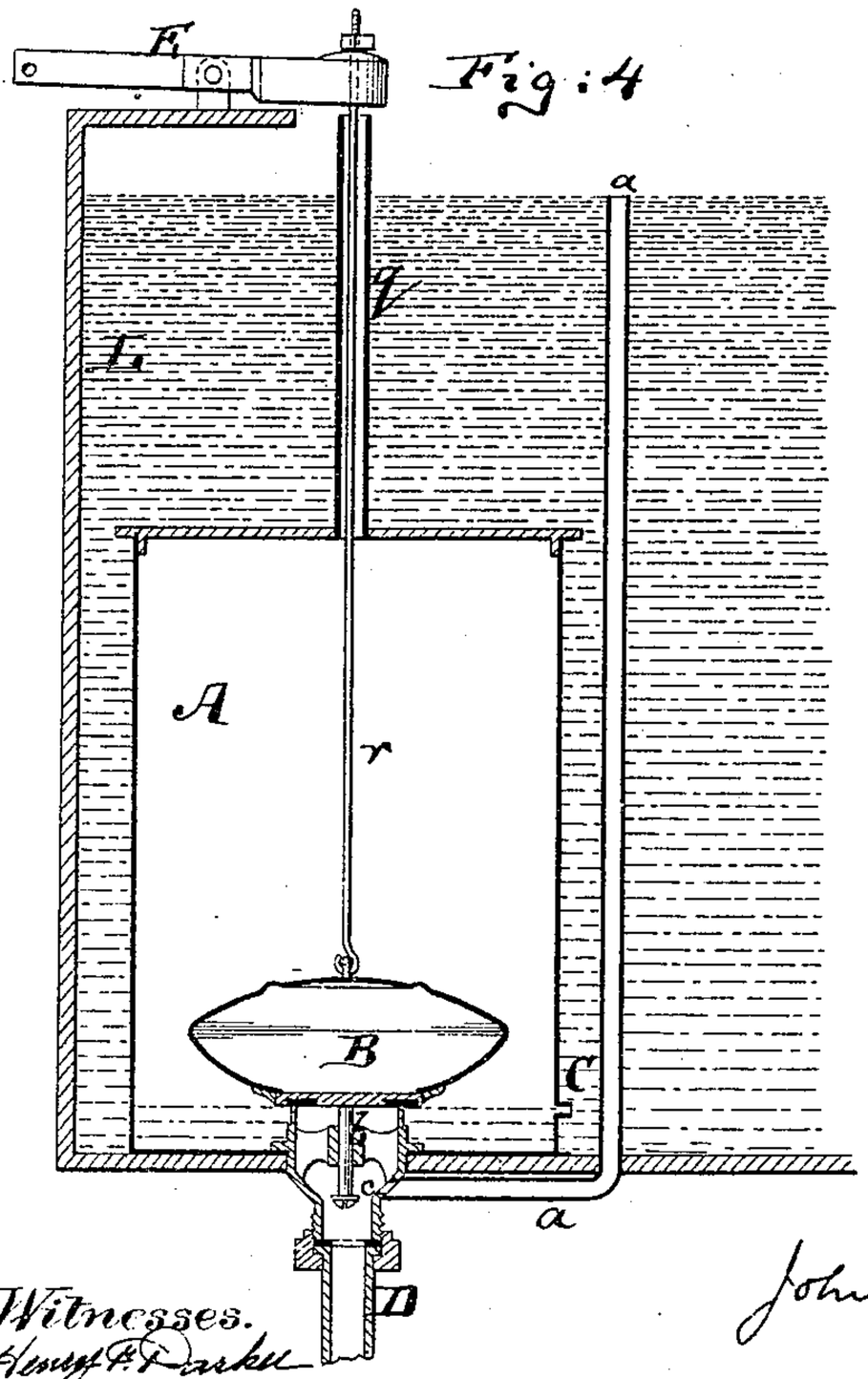
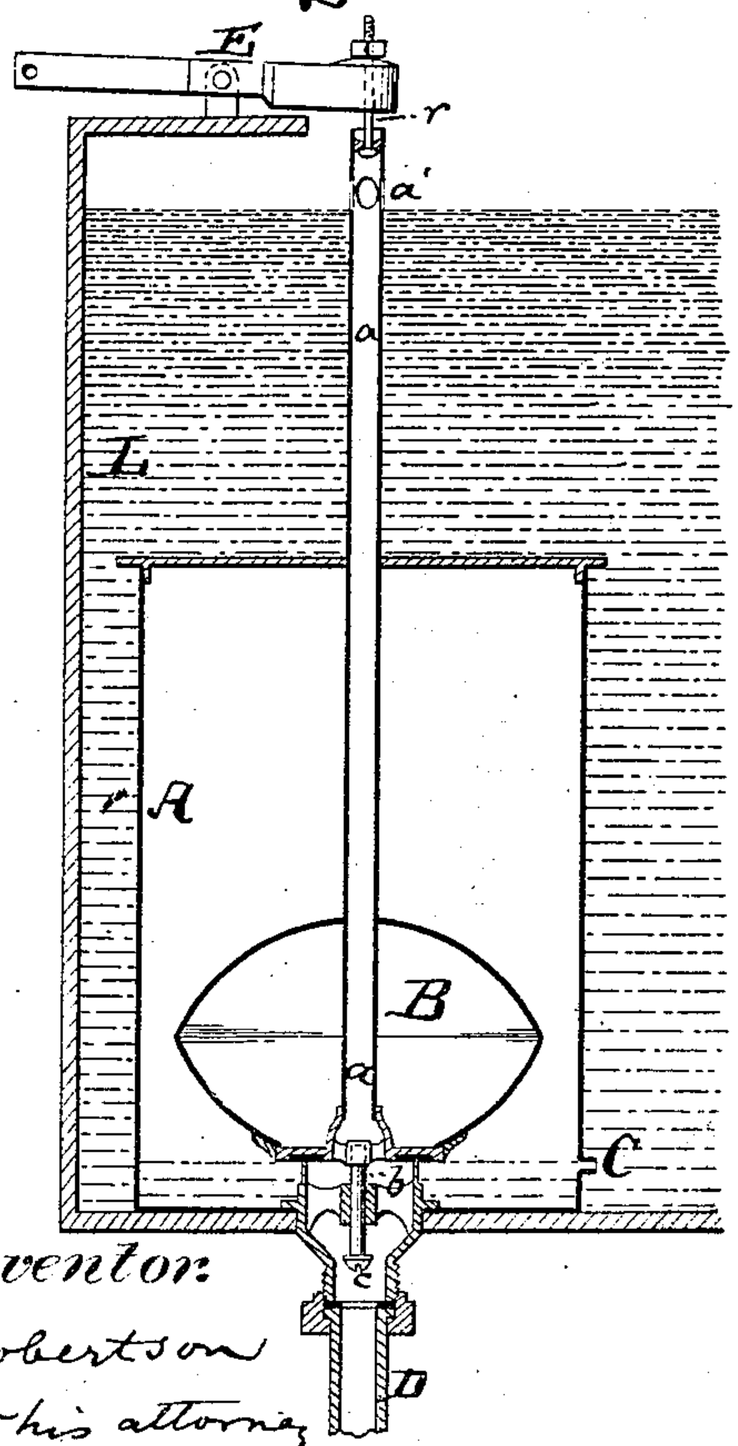


Fig: 5



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SPECIFICATION forming part of Letters Patent No. 245,318, dated August 9, 1881.

Application filed April 6, 1881. (Model.)

To all whom it may concern:

Be it known that I, JOHN ROBERTSON, of Montreal, in the Dominion of Canada, have invented an Improvement in Cisterns or Supply-Tanks for Water-Closets and the like, of which the following is a specification.

Figure 1 is a vertical central section of my improved cistern. Fig. 2 is a plan or top view of the same. Fig. 3 is a detail vertical section on an enlarged scale, showing the construction of the valve for regulating the inflow of water. Figs. 4 and 5 are vertical sections of modifications of the same.

This invention relates to a new arrangement of parts for regulating the discharge of a given quantity of water from a cistern or tank, and at the same time the flow of water into such cistern or tank.

The invention is applicable to cisterns or tanks used above water-closets, or wherever a certain quantity of water is wanted, and no more.

The invention consists, first, in combining with the supply-tank or cistern a balanced float-valve, which is so constructed that when it is on its seat it will not float, but as soon as it is raised off its seat a certain distance the area of the valve-seat is added to its floating power, and it will remain floating till the water gets down low enough to uncover an equal area of the valve-seat on top of float, when it will descend on its seat and remain there till raised by the action of the closet-handle and trip. The object of the trip in connection with the tank is that as soon as the floating valve is tripped up the ball is left free to drop as soon as enough water is run out to uncover the floating valve. The amount of water is regulated by the capacity of the tank and the pressure of the inlet-valve.

The invention also consists in combining with said balanced float-valve another upper float, which by its own movements controls the inflow of water into the tank or cistern, and in further details of improvement which are hereinafter more fully described.

In the accompanying drawings, with special reference to Figs. 1, 2, and 3, the letter A represents the supply-tank, which may be of any suitable form, although the cylindrical form is preferred. It is made of metal or other material, and connects at its upper end with the water-supply pipe C, and at its lower end with the water-discharge pipe D. The water-supply pipe C enters a valve-chamber, G, into which is placed a tubular valve-seat, *n*, that bears from below against a leather ring or other packing, which is in contact with the lower end of the pipe C, as is more fully shown in Fig. 3. The inlet-valve H enters the valve-chamber G from below, and presses against the tubular valve-seat *n*, the face of the valve being provided with suitable packing to insure a tight joint. The stem *i* of the valve H extends downward below the valve-chamber G into the body of the tank A, and rests on a lever, *g*, which is pivoted within said tank, as is more clearly shown in Fig. 1. If a greater or less stream of water is desired, the valve-seat piece *n* is taken out, which is easily done by unscrewing the cap-nut at the top of the chamber G, and is then replaced by another valve-seat piece having an aperture of the requisite diameter. From the valve-chamber G the water flows into the lower part of the tank A through a pipe, *k*, whose open lower end is but a short distance above the bottom of the tank A.

The lever G, upon which rests the stem *i* of the valve H, rests its free end on a float, F, which float, when the tank A has the requisite normal quantity of water, is raised sufficiently high to cause the valve H to close, as indicated in Fig. 1; but when the supply of water in the tank A is below a given point the float F drops upon a suitable cross-bar, *l*, or support, and allows the lever *g* to follow it, causing the valve H to be opened and the water-supply to be started.

The upper end of the outlet-pipe D, which is raised slightly above the bottom of the tank A, is normally closed by means of a balanced float-valve, B, which float-valve B is connected by a rod, *r*, with the operating-lever E of the tilting mechanism. The float-valve B is of such construction that when the tank A has its requisite supply of water, as shown in Fig. 1, the floating valve B, having lost its floating power by being on its seat D, the weight of the water and its own weight will keep the float-valve B on the pipe D, preventing the discharge of

liquid from the tank; but when by means of the lever E the float-valve B is raised into the body of water it will, when so raised to a sufficient height, permit the water which then is below it to keep it afloat, and it will not then again descend upon the pipe D until the contents of the tank have been lowered to an extent sufficient to uncover enough of the float-valve as will make it lose its floating power. The float-valve will then by its own gravity again reach the pipe D and close the outlet. The rod *r*, by preference, passes through a tubular central guide, *s*, which is formed within and part of the float F, as shown. The float F, in order to prevent it from collapsing, should have at its upper part a small outlet-opening, *o*, covered by a cap-piece, *p*, as indicated in Fig. 1; or the opening *o* can be made in the guide *s* in the inside of the float F at its highest point.

a is the overflow-pipe, reaching from the normal level of the water in the tank to the lower part of the tank, and joining the pipe D below the seat for the float-valve B, as is clearly shown in Fig. 1.

The float-valve B may have a suitable downwardly-extending stem, *b*, which is guided in a proper socket formed within the pipe D, as shown, and which at its lower end has an adjustable cap or nut, *c*, that regulates the extent to which the float-valve B can be raised by means of the lever E.

It will be observed that the diameter of the outlet-pipe D is much greater than that of the supply-pipe C, which is an important factor in the operation of my apparatus.

The apparatus thus far described operates substantially as follows: Supposing the tank to be filled with water to the upper end of the pipe *a*, the float-valve B to be held to its seat on the pipe D by the loss of its floating power and weight of water on top of it, the inlet-valve H to be also closed by the buoyancy of the float F, if the water is now to be discharged, the lever E is moved on its pivot and the float-valve B raised, thereby allowing the water to rush down into the pipe D. Being once raised, the float-valve B remains in the elevated position, it being so balanced that the water which is beneath it in the elevated position will have the power of buoying it or holding it raised. As the water escapes through the pipe D the float F gradually descends until it rests on the cross-bar *l*, dropping the lever *g* and causing the valve H to open and the inlet-pipe to admit water to the tank; but the stream of water which thus enters the tank at the same time that the tank is discharging through the pipe D is smaller than the stream of water which leaves the tank, so that there is no possible danger of the tank becoming refilled while the pipe D is open; but, on the contrary, by my arrangement I am enabled, while the float-valve B is raised, to draw not only the actual contents of the tank, but also a suitable proportion of fresh water from the pipe C. As the level of the water in the tank A finally recedes from below the center of the float-valve B, the latter drops by its own weight back upon the pipe D, and the discharge of water from the tank now ceases, whereas the supply of fresh water to the tank continues, and the more water there is being added to the tank the more securely will the float-valve B be pressed down upon its seat. As soon as the water reaches to the level of the overflow-pipe the float F rises to its normal position, and, lifting the lever *g*, raises the valve H to its seat and stops further inflow of water.

In the modifications shown in Figs. 4 and 5 the upper float, F, is dispensed with, but the balanced float-valve B and its connection with the lever E retained. These modifications have reference only to the use of my invention in large cisterns which are to supply the tanks A that are placed into them. Thus in Fig. 4 the cistern L contains a comparatively small tank, A, which has the pipe D closed by the float-valve B exactly as the tank A, which is shown in Fig. 1; but the inflow of water into the tank A from the cistern L is through the pipe C, that enters the tank A near its bottom.

The device shown in Fig. 4 operates as follows: The tank A being full of water, the float-valve B can be raised by means of the lever E, and the water discharged from the tank A through the pipe D, which is larger than the inlet-opening C. When the contents of the tank A have been sufficiently withdrawn the balanced float-valve B drops by its own weight back to its seat, and the tank A is then refilled through the inlet C.

The rod *r*, which is shown in Fig. 4, reaches the lever E through a tubular extension, *q*, of the tank A.

a is the overflow and air pipe for the cistern L, and reaches from the upper part of said cistern to the pipe D, below the valve-seat of the latter, as shown.

The modification which is shown in Fig. 5 consists simply in making the overflow and air pipe *a* serve the purpose of a stem for the float-valve B. In this case the pipe *a* has apertures *a'* at its upper part, as indicated, so that the excess of water may pass down through the pipe *a* from the body of the cistern L.

I claim—

1. The combination of the tank A, having outlet-pipe D and inlet-pipe C, the inlet-pipe being of less diameter than the outlet-pipe, with the balanced float-valve B, rod *r*, and lever E, all arranged so that the float-valve B will be held to its seat by the weight of water above, and, when raised into a full supply of water, held off its seat by the water below it, substantially as described.

2. The combination of the tank A, having outlet-pipe D and inlet-pipe C, of smaller diameter, with the float-valve B, rod *r*, and lever E, and with the overflow-pipe *a*, which reaches from the upper part of the tank A to the pipe D below the seat of the float-valve, substantially as specified.

3. The combination of the tank A, having outlet-pipe D at the lower part, with the balanced float-valve B, and with mechanism *r* E for lifting the same, substantially as specified.

4. The combination, in a tank, A, having float-valve B for closing the outlet-opening, of the float F, and rest *l* for the same, with the valve H and supply-pipe C, all arranged for operation substantially as described.

5. The combination of the supply-pipe C with the valve-chamber G, downwardly-opening valve H, and detachable valve-seat piece *n*, substantially as specified.

6. The combination of the tank A and its outlet-pipe D, having valve-seat, with the balanced float-valve B, mechanism *r* E for lifting the same, and with the guide *b* and stop *c* on said float-valve, substantially as herein shown and described.

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