No. 649,670. Patented May 15, 1900.

E. J. McCULLOCH.

FLUSHING APPARATUS.

(Application filed June 25, 1898.)

(No Model.)

Fig. 1,

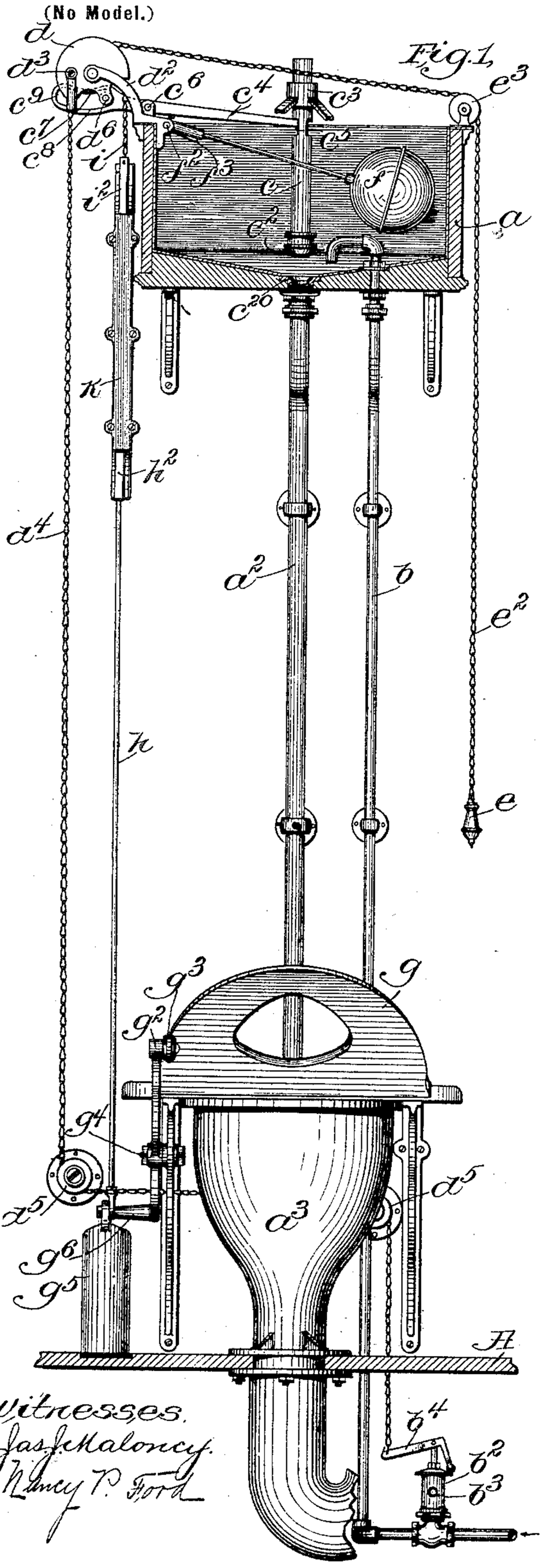

Fig. 2,

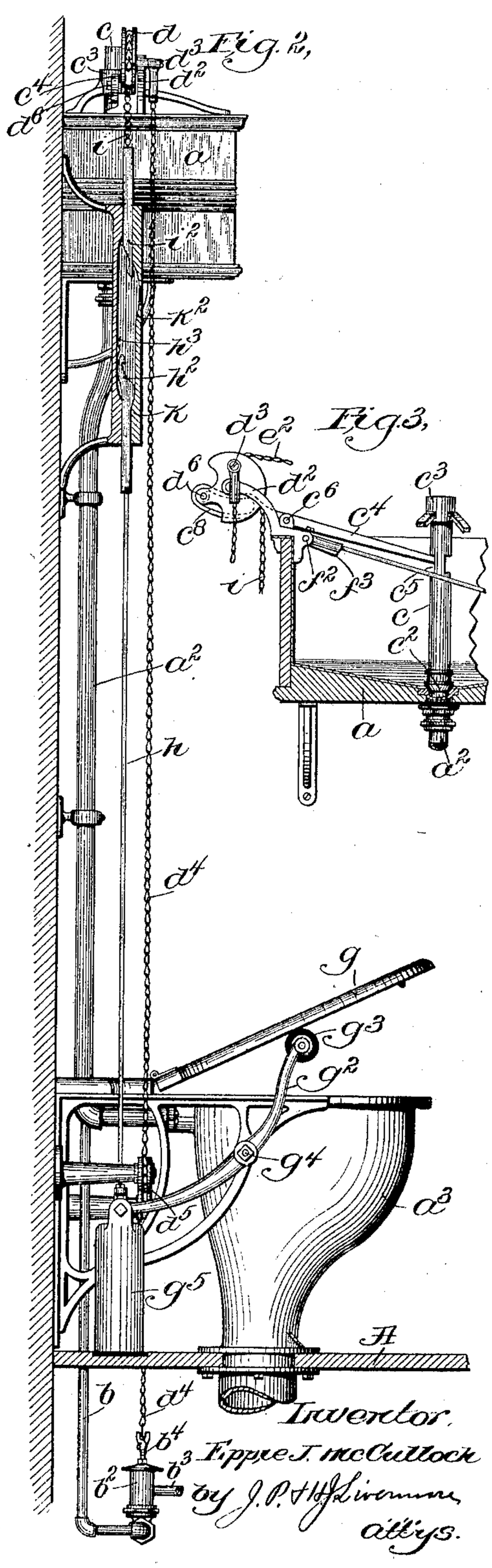

Fig. 3,

Witnesses.
Jas. F. Maloney.
Nancy P. Ford

Inventor.
Fippre T. McCulloch
by J. P. & H. J. Livermore
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EPPIE J. McCULLOCH, OF MANCHESTER, NEW HAMPSHIRE.

FLUSHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,670, dated May 15, 1900.

Application filed June 25, 1898. Serial No. 684,469. (No model.)

To all whom it may concern:

Be it known that I, EPPIE J. McCULLOCH, of Manchester, county of Hillsborough, and State of New Hampshire, have invented an Improvement in Flushing Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a flushing apparatus, and is mainly intended for use in places where the flushing-tank, supply-pipe, &c., are liable to be exposed to extreme cold, the object of the invention being to obviate the trouble and damage due to freezing.

In the apparatus embodying the invention the tank is arranged to be normally empty and is filled and discharged at each flushing operation, the supply-pipe being controlled by a valve below the surface of the floor or ground or at any other place where the water is not liable to freeze. The said valve is arranged with a by-pass or drain-opening, so that when the valve is closed the water in the supply-pipe will drain out and leave the said pipe empty, the service-pipe also being arranged so that all the water is drained out of the tank in the flushing operation, and the tank and all the pipes leading therefrom are therefore normally empty.

The invention further consists in novel operating mechanism for controlling the flushing operation, the said mechanism being so arranged that a manual or automatic operation, as the case may be, opens the supply-valve, causing the tank to fill, the flushing-valve, however, being closed as the supply-valve is opened and remaining closed until the tank is filled to the desired level for the flushing operation. The opening of the flushing-valve is automatically controlled by a device adapted to operate in response to the rise of water in the tank—such, for example, as a float—and the action of the said automatic device is such as to open the flushing-valve and close the supply-valve at the same operation. The water then passes through the service-pipe and also drains out through the supply-pipe, the latter, however, being of relatively-small capacity, so that it does not materially interfere with the flushing operation, although it empties itself during or after such flushing operation.

The valve-operating mechanism, which may be controlled, as stated, either by a manual actuating device or an automatic actuating device, comprises a pivotally-supported or rotatable member connected at a point radial to its pivotal support or axis with the supply-valve, so that when it is moved upon said pivotal support it will open the said valve, at the same time bringing the line of connection between it and the valve across its own axis or center, so that the said valve will remain open until the said point of connection is moved back far enough to throw the line of connection across or out of line with said center. The said operating device is provided with a projection arranged to coöperate with a cam-surface formed on a lever which controls the flushing-valve, whereby the same movement which opens the supply-valve will close the said flushing-valve. To open the flushing-valve and close the supply-valve, said flushing-valve lever is arranged to be acted upon by a device which is adapted to operate in response to the rise of water in the tank, the said device lifting the said lever, and thereby acting upon the projection from the operating member and moving the same upon its axis far enough to carry the line of connection between it and the supply-valve across its axis, said supply-valve being arranged to close automatically, as by a spring, as soon as it is free to do so.

The invention further relates to an automatic seat-actuating device of novel construction and arrangement.

Figure 1 is a front elevation, partly in section, of a flushing apparatus embodying the invention. Fig. 2 is a side elevation of the same, also partly in section; and Fig. 3 is a detail showing the operating member set.

In Fig. 1 of the drawings a manual actuating device is shown in addition to the novel automatic actuating device which forms a feature of the invention, it being understood, however, that in practice but one of these devices would be used and the other dispensed with.

The tank *a* communicates through the serv-

ice-pipe a^2 with the bowl a^3, the floor or inner surface of the tank being inclined from the sides toward the point where the service-pipe communicates therewith, so that at each flushing operation the water will be completely drained from the tank. The said tank a is arranged to be supplied with water through the supply-pipe b, which is controlled by a valve b^2, situated, as shown, below the floor A or below the ground-level, if the closet is situated in a cellar, or at any other point where there is practically no liability of encountering temperature below the freezing-point. The said valve b^2 is provided with a by-pass or drain-opening b^3, arranged to let the water out of the pipe b when the said valve b^2 is closed, it being understood that any suitable or usual by-pass valve may be employed—such, for example, as that shown and described in Patent No. 502,563, to J. W. Hill, dated August 1, 1893. The construction of said valve is not herein shown, since it forms no part of the present invention, it being, in fact, immaterial what specific form of valve is used. The said valve b^2 is normally closed and the flushing-valve c, which controls the flow of water from the tank to the service-pipe a^2, is normally open, so that the tank and all the pipes above the floor or ground are normally empty. The drain opening or pipe b^3 may be arranged to communicate with the main drain-pipe or the closet-trap, the connection not being herein shown, since it is immaterial to the invention. To produce the flushing operation, therefore, it is necessary to open the valve b^2 and at the same time to close the valve c in order that the tank may fill until there is a sufficient supply of water therein to properly flush the bowl. To this end the said valves are provided with a common operating device d, the initial operation of which is under the control of a suitable actuating device, such as the handle e, connected therewith by a chain e^2, passing over a pulley e^3, or by an automatic seat-actuating device of novel construction, which will be hereinafter described. The said operating member d is pivotally supported upon a suitable bracket d^2 and is shown as in the form of a disk capable of oscillating or rotating on said pivotal support, the chain e^2 being connected to said disk at or near the periphery thereof, so that pulling the chain causes the oscillation of the disk. As shown in Fig. 2, the said chain lies in a groove along the periphery of the member d and is fastened at a point some distance beyond the point where it normally leaves the periphery of said member, so that a pull on the chain will rotate or rock the member sufficiently far to cause the proper operative movement of the parts connected with and operated by said member. To open the valve b^2, therefore, the said member d is connected at d^3 with a chain d^4, passing over pulleys d^5 and connected with a lever or other actuating member b^4, arranged to open the valve b^2. The member d being pivotally supported or arranged to oscillate around a fixed axis, it is obvious that the point d^3 will travel on the arc of a circle from the position shown in Fig. 1 to that shown in Fig. 3, and in so doing will move upward, and thereby act upon the lever c^4. As soon as the point d^3 reaches such a position that the chain d^4 has crossed the axis of the disk Fig. 3 the valve b^2 (which is arranged to close automatically when not held open) will be prevented from so closing if the further movement of the disk is prevented after the chain d^4 has crossed the center. Such movement being prevented, as will be hereinafter described, the supply-valve will remain open and the water will begin to flow into the tank. In order, however, that the tank may become charged with water prior to the actual flushing of the bowl, it is necessary to close the valve c, the said valve being herein shown as a tubular plug having an annular valve-seat c^2 arranged to coöperate with a corresponding valve-seat c^{20} in the bottom of the tank, the said valve-seat being wholly below the sloping bottom of said tank, so that perfect drainage is secured when the said valve is open. The said valve c is longitudinally movable in a tubular guide c^3 and is arranged to be controlled by the action of the lever c^4, which extends into an opening c^5, which opening may also serve as an overflow in case the valve c should accidentally remain closed after the tank is filled to the proper level. The said lever c^4 is also under the control of the operating device d, which has a projection d^6 arranged to coöperate with the lever c^4, which is shown as pivoted at c^6 in suitable lugs supported by the tank a. The projection d^6 will obviously travel on the arc of a circle around the axis or pivotal support of the member d, and in so traveling is arranged to engage a cam-surface c^7 of the lever c^4, so that it will cause the said lever to rock on its pivot and either positively lower the valve c or permit the same to drop of its own weight, the latter method being preferable and such method being indicated, as the lever is shown as loosely inserted into the opening c^5 to positively lift, but not necessarily to positively lower, the said valve.

The cam-surface c^7 is preferably formed by making a slot in the end of the lever c^4, the opposite surface of said slot also forming a cam c^8 to be acted upon by a movement of the member d in the opposite direction, which will therefore result in the lifting of the valve c. Furthermore, at the end of the said slot the surface c^9 may be utilized as constituting a stop for the member d to prevent the same from turning beyond a certain point in response to the action of the valve b^2.

As will be seen from the foregoing description, the movement of the member d in response to a pull upon the chain e^2 will open the valve b^2 and cause the projection d^6 to travel along the slot in the lever c^4 until it brings up against the surface c^9, at which time

the chain d^4 has crossed the axis of the member d, so that the tendency of the valve b^2 to close will act to retain the parts in said position. The water then begins to flow into the tank, being retained therein as the tank fills owing to the closure of the valve c. In other words, the initial movement of the actuator "sets" the operating device, so to speak, the said operating device being provided with automatic restoring means of any suitable kind, the self-closing valve b^2 being shown as utilized for this purpose, and as soon as the operating device d is thus set the tank begins to fill. To obtain the actual flushing of the bowl, therefore, it is essential to open the valve c at the proper time, this being accomplished automatically by tripping or releasing the operating device d and permitting the same to return to its normal position. To this end the lever c^4 is arranged to be acted upon by a device which operates in response to the rise of water in the tank, such device being herein shown as a float f, mounted on an arm pivotally supported at f^2, the said arm being arranged to engage the lever c^4 as the float rises. For this purpose the said arm is shown as provided with a projection f^3, arranged to engage the under side of the lever c^4 and rock the same on its pivot, thus depressing the end of the lever which coöperates with the operating device d. In this operation the projection d^6 is acted upon by the surface c^7, thus causing the member d to move on its axis, a slight movement being sufficient to throw the point d^3 and chain d^4 out of line with the axis of the member d, so that the pull upon the chain d^4 caused by the action of the self-closing valve b^2 or otherwise will continue the movement of the member d until the parts are restored to their normal position. Such movement of the member d acts, through the agency of the projection d^6, upon the lever c^4, thus lifting the valve c, the parts then being held in their normal positions, as shown.

It will be seen from the foregoing description that the tank and pipes are normally empty and that the tank fills and discharges in response to the actuating device, thus securing uniformity in the flushing operations and insuring an ample supply of water each time.

As has already been stated, the device is capable of being automatically operated through the action of the seat when such action is preferred to the ordinary pull-chain e^2, which has been hereinbefore described.

As herein shown, the seat g is arranged to coöperate with a rod h, which acts upon a chain i, which may be connected with the member d, near the periphery thereof, so that a pull upon the said chain will produce the same operation as that already described in conjunction with the chain e^2.

It is necessary that the flushing operation should take place in response to the release of the seat after it has been depressed, and consequently the said seat is so arranged that the depression thereof merely sets the parts in condition to operate, the seat being shown as operating upon a lever-arm g^2, provided with a roll g^3, the said lever-arm being pivoted at g^4 and provided with a weight g^5, which normally holds the parts in the position shown. The said lever-arm is shown as provided with a projection g^6, which is connected with the rod h, so that when the seat is depressed the said rod h is lifted and becomes connected with the chain i, so that when the weight g^5 drops the chain will be pulled and the operating member d moved to start the flushing operation.

To connect the rod h with the chain i, the said rod is shown as provided at its upper end with a hook member h^2, arranged to coöperate with a corresponding hook member i^2, which is connected with the chain i, (see Fig. 2,) the said hook members being supported in a guide k and arranged to latch together upon the lifting of the rod h. To cause the hook h^2 to come into proper engagement with the hook i^2, the former is shown as provided with a spring h^3, which acts against the wall of the guide k, tending to move said hook h^2 toward the hook i^2, so that it will engage the same as soon as it has passed by. The two hook members being thus in engagement, it is obvious that when the weight falls the member i^2 and chain i will be pulled down, thus causing the supply-valve to open and the flushing-valve to close, as hereinbefore described. It is essential, however, in order to complete the operation that the chain i should not be prevented from moving back to its normal position when the operating member d is acted upon by the rise of the float f. For this purpose the hook members h^2 and i^2 are arranged to become automatically disengaged from each other as the rod h moves downward, the disengagement taking place as soon as the member d has become "set," so to speak, to start the filling operation.

As herein shown, the hook member h^2 is arranged to coöperate with the cam-surface k^2 in one wall of the guide k, the action being such that the said member h^2 is moved out of engagement with the member i^2, as illustrated in Fig. 2.

It will be seen from the foregoing description that the flushing apparatus embodying the invention cannot be rendered inoperative by freezing when the temperature in the room in which it is situated falls below the freezing-point. After each flushing operation the tank and pipes are fully drained, and it will be noted, moreover, that the guide for the flushing-valve is wholly above the normal level of the water in the tank, so that no water can remain between it and the valve (as might be the case if it were submerged) to freeze and prevent the proper operation of the valve.

It is not intended to limit the invention to the specific construction and arrangement

herein shown and described, since obvious modifications may be made without departing from the invention.

I claim—

1. In a flushing apparatus, the combination with the tank, of a supply-pipe for said tank, a valve controlling said supply-pipe arranged to close automatically, a pivotally-supported operating device arranged to open the said valve, a stop to limit the movement of said operating device, a connecting member connecting said operating device with the movable member of said valve and arranged to be moved across the axis or pivotal support of said operating device while the operating device is being moved to open the valve and to engage said stop, said connecting device and stop thus coöperating to maintain the said valve open, and means for moving said operating device in the other direction away from said stop in response to the rise of water in the tank to thereby move said connecting member out of line with the axis of the operating device to permit the automatic closure of the valve, substantially as described.

2. In a flushing apparatus, the combination with the tank a, of the supply-pipe b provided with a self-closing valve b^2, the operating member d arranged to open the said valve b^2 and retain the same open, and provided with the projection d^6, the flushing-valve c adapted to be closed by the movement of said operating member, the lever c^4 arranged to coöperate with the said projection d^6 to move said operating member and permit the closure of the valve b^2, and the float f coacting with said lever c^4, substantially as and for the purpose described.

3. In a flushing apparatus, the combination with a supply-valve, of a pivotally-supported operating device for said supply-valve, a projection from said operating device, a lever provided with a slot embracing said projection, the walls of said slot being engaged by said projection whereby the lever is rocked in the movement thereof, a flushing-valve controlled by said lever, and independent means for rocking said lever at a predetermined time, whereby the same is caused to coöperate with said projection to produce a movement of said operating device, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EPPIE J. McCULLOCH.

Witnesses:
GEORGE H. ALLEN,
WM. A. TRUESDALE.