W. T. POWERS.

VALVE OPERATING MECHANISM FOR STEAM TRAPS.

APPLICATION FILED AUG. 17, 1907.

967,432. Patented Aug. 16, 1910.

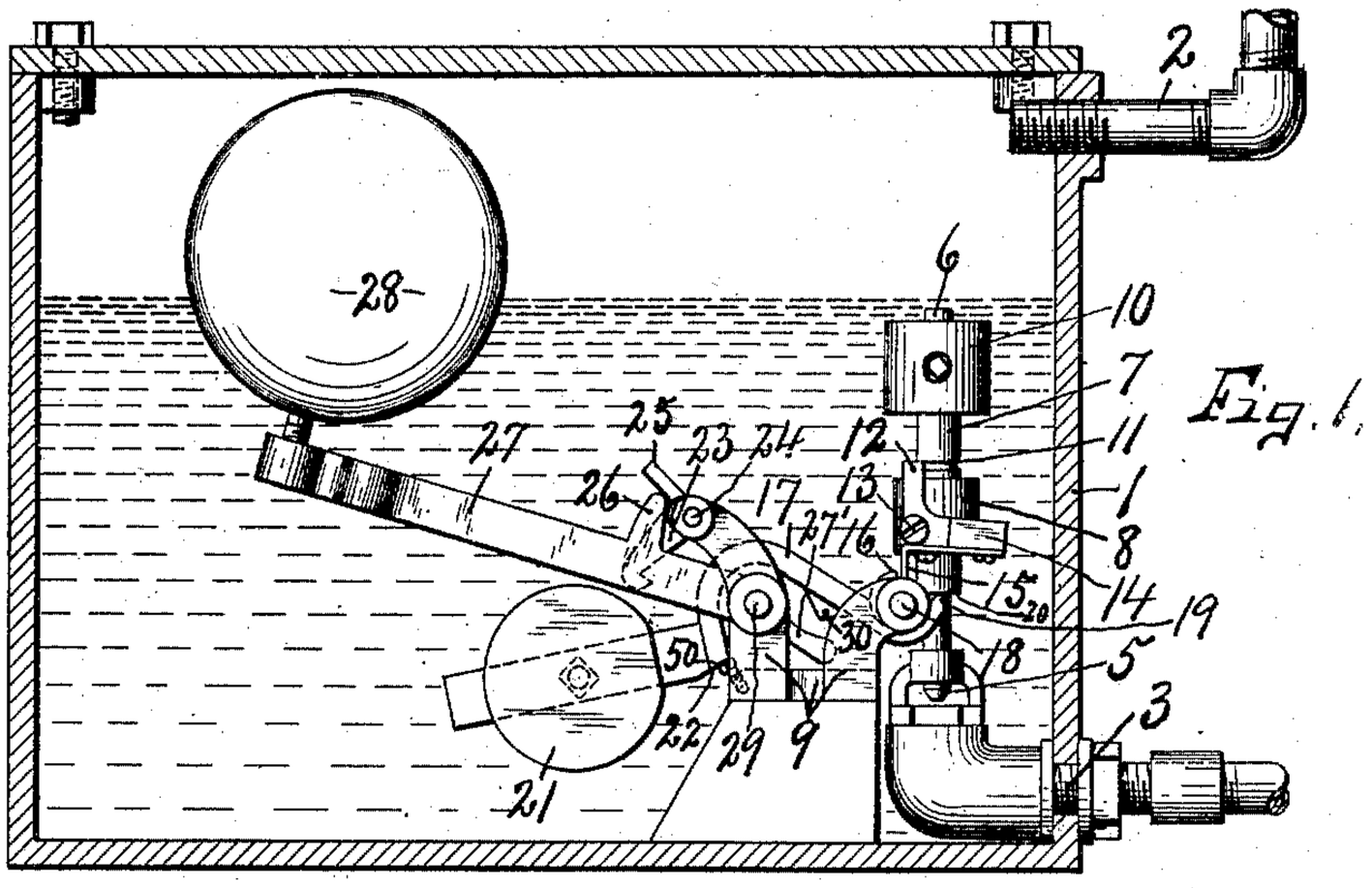

Fig. 1.

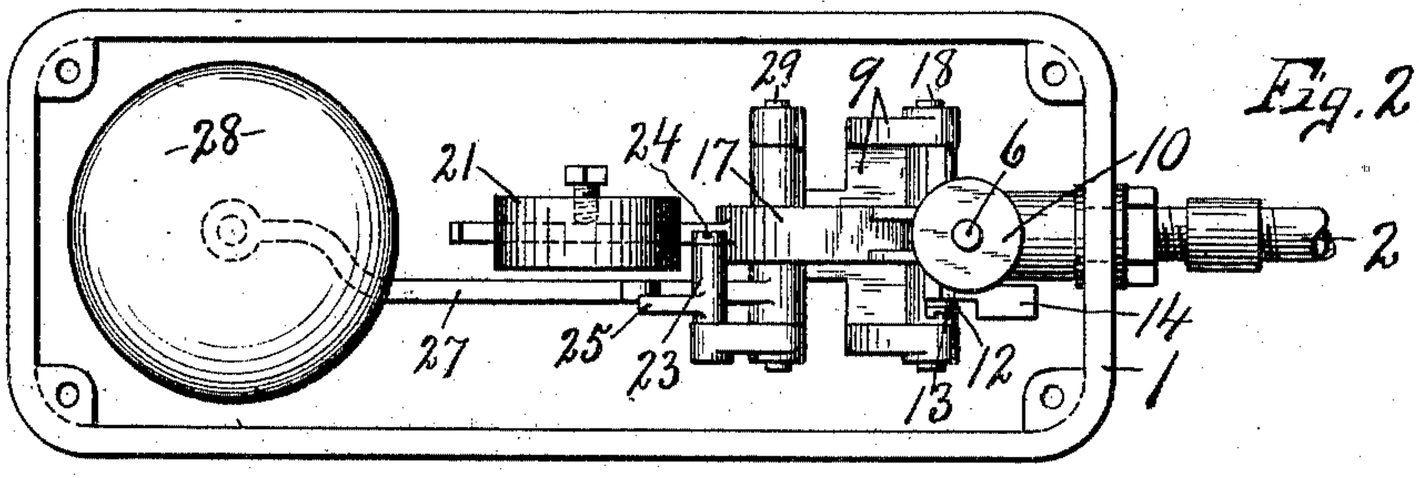

Fig. 2.

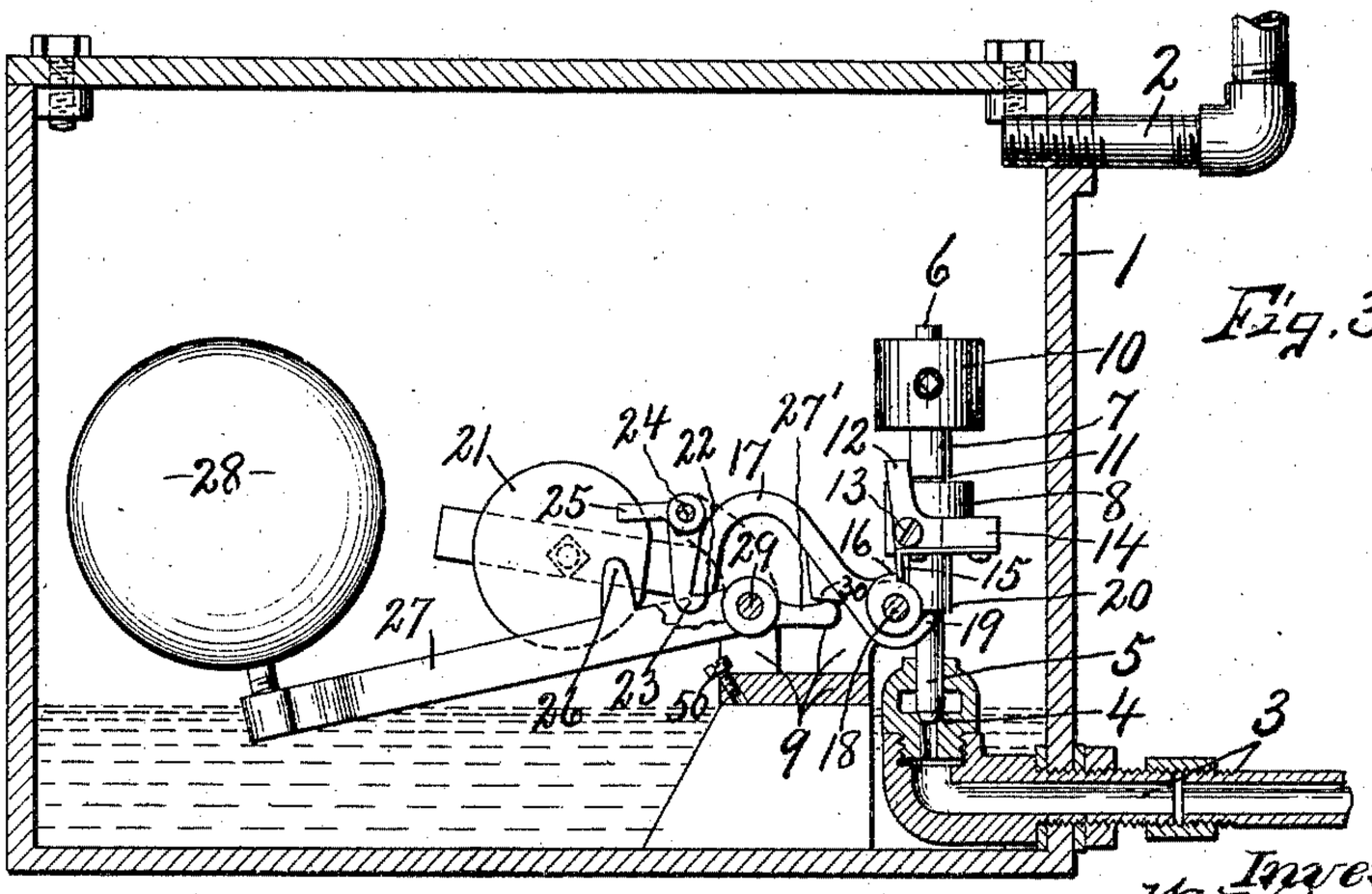

Fig. 3.

Witnesses.
T. C. Thomas
H. E. Chase

Inventor.
W. T. Powers
By Howard P. Denison
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM T. POWERS, OF SYRACUSE, NEW YORK.

VALVE-OPERATING MECHANISM FOR STEAM-TRAPS.

967,432. Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed August 17, 1907. Serial No. 388,996.

To all whom it may concern:

Be it known that I, WILLIAM T. POWERS, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Valve-Operating Mechanisms for Steam-Traps, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in valve operating mechanisms for steam traps, and similar devices in which the valve is controlled primarily by the rise and fall of the water in the trap or tank to regulate the outflow of water from the trap, or it may be used to regulate the inflow or outflow, or both, to and from any reservoir or receptacle where such float-controlled device may be useful.

The essential object of my present invention is to provide means whereby the valve is held full-open, or full-closed during the inflow or exit of the float-actuating liquid, or until such float reaches the extreme limits of its movement so as to prevent cutting of the valve or its seat by fine jets of water and the usual accompanying hissing noise, due to the gradual closing or opening of the valve, as in most of the float-actuated valves now in general use.

Other objects and uses relating to the specific construction and arrangement of the various parts of my invention will be brought out in the following description.

In the drawings—Figures 1 and 2 are respectively a side elevation and a top plan of my improved regulator, as applied to steam traps and similar devices, in which it is desired to intermittently discharge accumulating water, or other liquid, when it reaches a predetermined level, the valve-controlling mechanism being shown in position to hold the valve full-open, while the float is shown in its extreme upper position. Fig. 3 is a side elevation, partly in section, similar to Fig. 1, except that the float is shown in its extreme down-position, and the valve closed.

In the figures I have shown a collecting chamber or tank —1— as provided with an inlet pipe —2— and an outlet-pipe —3—, the inlet pipe serving to supply water of condensation or other liquid to the interior of the tank —1—, while the outlet-pipe —3— is a medium through which water can be discharged from the tank at intervals, as controlled by a float-actuated valve mechanism, hereinafter described. In this particular instance, the inner terminal end of the outlet pipe —3— is provided with a valve-seat —4— co-acting with a valve —5— to control the outlet of the water or other liquid from the tank —1—. The valve —5— is formed upon the lower end of a valve rod —6— having an adjustable sleeve —7— thereon, which is guided in a bearing —8—, forming a part of the main supporting frame —9—. This sleeve is provided at its upper end with a weight —10—, and is also formed with an annular shoulder —11—, the weight —10— serving as a means for automatically closing the valve —5— when released by its controlling mechanism, while the shoulder —11— coöperates with a detent —12— to hold the valve open against the action of the weight —10— until the detent is tripped by the float-actuated mechanism hereinafter described. The object in making the sleeve —7— and its weight —10— adjustable is to permit the shoulder —11— to be properly adjusted relatively to the detent —12— and also to permit the valve and its rod —6— to be properly adjusted relatively to its seat. The detent 12— is made in the form of a bell-crank lever pivoted at 13— and having a laterally projecting arm provided with a weight —14—, whereby the detent 12— is automatically held in position to interlock with the shoulder —11— when the valve —5— is raised or opened against the action of the weight —10—. This detent is provided with a pendent arm or shoulder —15— adapted to be engaged by a shoulder —16— on a weighted rock-arm —17— which rock arm is fulcrumed at —18— upon the main supporting frame —9— and such rock-arm is provided at the rear of its fulcrum with a lifting shoulder —19— adapted to engage a shoulder —20— on the lower end of the sleeve —7— to raise the valve against the action of the weight —10— when the weighted end of the lever —17— descends by its own gravity as will be presently described. This lever —17— extends some distance to one side of the valve rod —6— and fulcrum —18—, and is provided with an adjustable weight —21— and a shoulder —22—. This shoulder is located between the fulcrum —18— and weight —21— and is engaged by a detent —23— to hold the weighted end of the lever —17— in its extreme up-position

against the action of the weight —21—. When in this position the shoulder —16— engages the shoulder —15— and trips the detent —12— to release the weighted valve rod —6— and permit the valve —5— to close by its own gravity assisted by the weight —10—. This detent —23— is fulcrumed at —24— upon the main supporting frame —9—, and is provided with a rearwardly projecting arm —25— which is adapted to be engaged and elevated by a shoulder —26—, on a float lever —27— the latter having a float —28— secured thereto. The float-lever is fulcrumed at —29— upon the main supporting frame —9— between the fulcrum —18— and detent —23—, and when the water accumulates in the reservoir —1— sufficiently to elevate the float —28—, the float lever —27— is thereby elevated a predetermined distance before tripping the detent —23—. The arm —25— lies in the path of the shoulder —26—, and, as the latter is raised it elevates the arm —25—, thereby rocking the detent —23— out of engagement with the shoulder —22— of the lever —17— and allowing the weight 21— to fall and rock the lever downwardly, thereby bringing the shoulder —19— into contact with the lower end of the sleeve —7— to elevate or open the valve —5— against the action of the weight —10—, and at the same time withdrawing the shoulder —16— from the pendent arm of the detent 12— and allowing the weight —14— to throw said detent into interlocking engagement with the shoulder —11—, as best seen in Fig. 1. The valve —5— being now open, the water will, of course, escape through the outlet —3— and recede in the tank —1— which allows the float —28— to gradually fall by its own gravity until the tank is practically empty, during which time, the weighted lever 17— is elevated by the engagement of an extension —27′— on the lever —27— with a shoulder —30— on the underside of the lever —17—. As the water recedes in the tank thus permitting the float —28— and its supporting lever —27— to drop by gravity, the short arm —27′— engages the shoulder —30— and elevates the weighted lever —17—. When the float operates to the limit of its downward movement, the detent —23— gravitates into holding engagement with the shoulder —22— to hold the lever —17— in its up-position. As the water lever —17— is moved into position to be locked by the detent —23—, the shoulder —16— engages the shoulder —15— and trips the detent —12— out of holding engagement with the sleeve —7— thus permitting the weight —10— to automatically close the lever —5—.

The shoulder —27′— of the lever —27— is located at the side of its fulcrum opposite to that to which the float —28— is secured, and being very much nearer to the fulcrum than the float the weight and leverage of the float end of the lever —27— is sufficient to elevate the weighted end of the lever —17— against the action of the weight —21— as the water recedes in the tank and allows the float to drop. The shoulder —27′— and its co-acting shoulder —30— on the lever —17— are located substantially midway between and nearly in the same horizontal plane as the fulcrums —18— and —29—, and when the lever —17— is thus elevated, the shoulders —22— and co-acting shoulder of the detent —23— are also nearly in the same horizontal plane as said fulcrums, the same being true of the shoulders —19— and —20—, which reduces the friction between these parts of the mechanism, and thereby renders the action easier. A very slight movement of the float by the inflowing water will cause the shoulder —26— to trip the detent —23—, and thereby release the lever —17—, which falls by its own gravity and opens the valve —5— full-open at once, in which position it is held by the detent —12— until the tank is practically empty. The lever 17 is limited in its downward movement by an adjustable stop —50— on the main frame —9— to regulate the degree of elevation of the valve —5— so as to bring the shoulder —11— into proper position to interlock with the detent —12—.

The valve —5— and levers 17— and —27— are self-acting in one direction; as for instance, downwardly, the valve —5— being depressed by its own gravity assisted by the weight —10—, and the lever 17— is also depressed by its own gravity assisted by the weight —21—, while the lever —27— is depressed by its own gravity, assisted by the additional weight of the float —28—.

The extension —27′— may be termed, the "heel" of the lever —27— and operates on the under side of the lever —17— between the fulcrums —18— and —29— to elevate the lever —17 as the lever —27— is depressed. It is evident that the lever —17— may be moved upwardly without imparting any movement to the valve —5— and that the lever —27— may also be actuated upwardly by the float and entering liquid without operating the lever —17—, although in the upward movement of both levers, the detents —12— and —23— are tripped.

What I claim is:

1. In combination with a liquid receptacle having inlet and outlet passages, a self-closing valve for one of said passages, a weighted lever operated by its own gravity to open the valve, a detent for holding the valve in its open-position, a float lever fulcrumed at one side of the fulcrum of the weighted lever and operated by its own gravity to elevate the weighted lever independently of the valve, said levers engaging each other

between their fulcrums, means actuated by the elevation of the weighted lever for tripping the detent and allowing the valve to close, a second detent for holding the weighted lever in its elevated position, a float actuated by the inflow of liquid into the receptacle for elevating the float lever independently of the weighted lever, and means brought into action by the elevation of the float lever for tripping the second detent whereby the weighted lever is allowed to fall by gravity for opening the valve.

2. In combination with a receptacle having inlet and outlet passages, a self-closing valve for the outlet, a weighted lever acting by its own gravity to open the valve against its own weight, a detent for holding the valve in its open-position, a second lever acting by its own weight to elevate the weighted lever, said levers being fulcrumed side by side to swing on different axes and engaging each other between their fulcrums, means brought into action by the elevation of the weighted lever for tripping the detent, and a float actuated by the inflowing liquid for elevating said weighted lever.

3. In combination with a liquid receptacle having inlet and outlet passages, a valve for one of said passages operated automatically to one position, a weighted lever operated by its own gravity to move the valve to another position, a detent for holding the valve in the last named position, a float lever for elevating the weighted lever, said levers being fulcrumed side by side to swing on different axes and engaging each other between said axes, and means brought into action by the elevation of the weighted lever for tripping the detent and allow the valve to move to the first named position.

4. In combination with a liquid receptacle having inlet and outlet passages, a valve for one of said passages operated automatically to one position, a weighted lever operated by its own gravity to move the valve to another position, a detent for holding the valve in the last named position, a float lever operated by its own gravity to elevate the weighted lever, said levers being fulcrumed side by side to swing on different axes and engaging each other between said axes, means brought into action by the elevation of the weighted lever for tripping the detent and allowing the valve to take its first named position, a second detent for holding the weighted lever in its elevated position, a float actuated by the inflowing liquid for elevating the float lever, and means brought into action by the elevation of the float lever for tripping the second detent and allowing the weighted lever to descend for moving the valve to its second position.

5. In combination with a liquid receptacle having an inlet passage and an outlet passage, a self-closing valve for one of the passages, a weighted lever operating by its own gravity to open the valve, a detent for holding the valve in its open position, and means including a float lever controlled by the outflow of the liquid in the receptacle for elevating the weighted lever, said levers being fulcrumed side by side to swing on different axes and engaging each other between their fulcrums, and additional means brought into action by the elevation of the lever for tripping said detent.

6. In combination with a liquid receptacle having an inlet and an outlet passage, a self-closing valve for one of the passages, a weighted lever operating by its own gravity to open the valve, a detent for holding the valve in its open position, a float lever operating by its own gravity to elevate the weighted lever, said levers being fulcrumed side by side and engaging each other between their fulcrums, means brought into action by the weighted lever for tripping the detent, a second detent for holding the weighted lever in its elevated position, and a float actuated by the inflowing liquid for elevating the float lever, and means brought into action by the elevation of the float lever for tripping the second detent.

7. In a valve operating mechanism for steam traps, a discharge valve having an upright stem a shoulder on the stem, a weighted lever engaging said shoulder to open the valve when the weighted lever falls, a detent for engaging and holding the valve stem in its up-position independently of the weighted lever, a float and means controlled thereby for elevating the weighted lever against the action of its weight, and actuated by the weighted lever for tripping said detent and allowing the valve to close.

In witness whereof I have hereunto set my hand this seventh day of August 1907.

WILLIAM T. POWERS.

Witnesses:
H. E. CHASE,
M. M. NOTT.