G. HOFFMAN.

FLOAT VALVE.

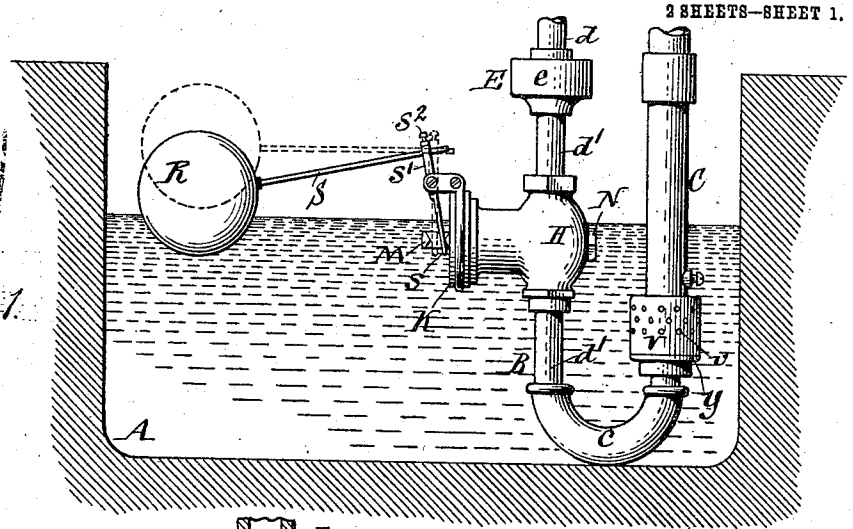
APPLICATION FILED SEPT. 27, 1909.

**966,442.**

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



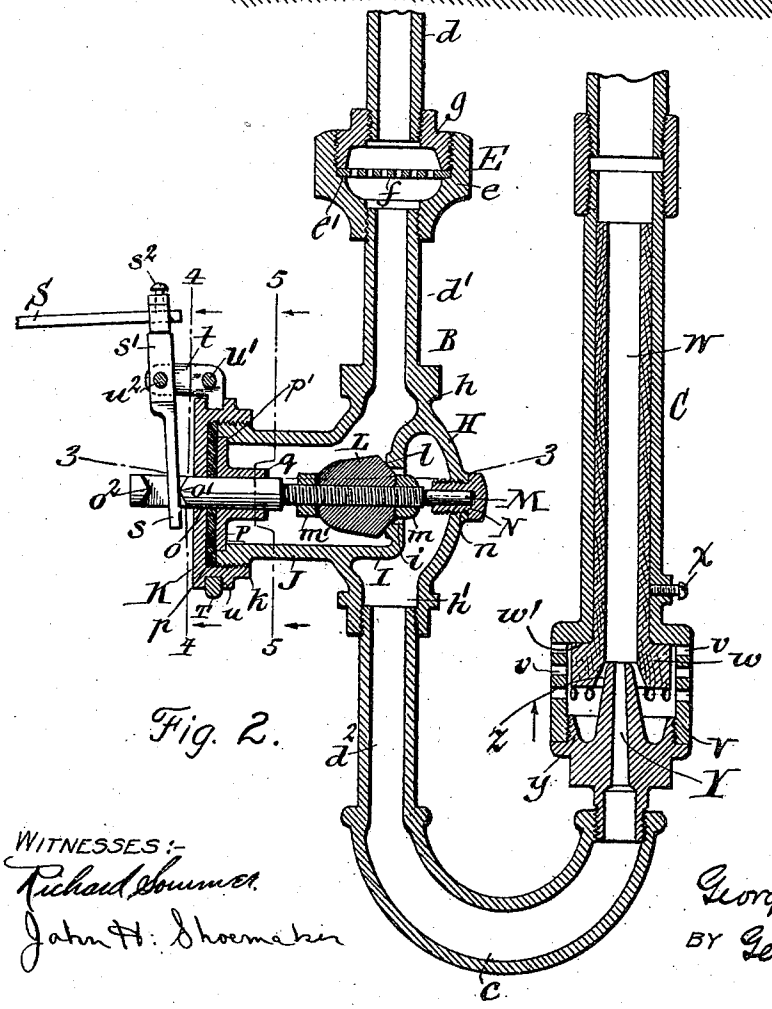




Fig. 2.

WITNESSES:-

Richard Bowmer.

John H. Shoemaker

INVENTOR

George Hoffman

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ATTORNEYS.

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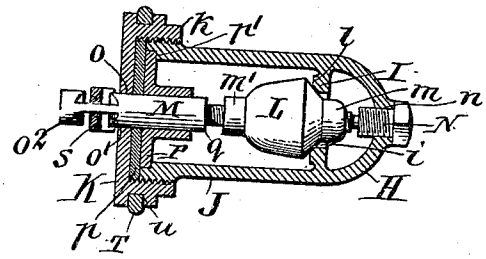


Fig. 3.

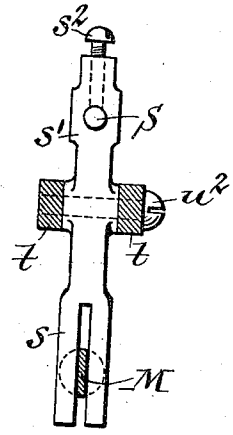


Fig. 4.

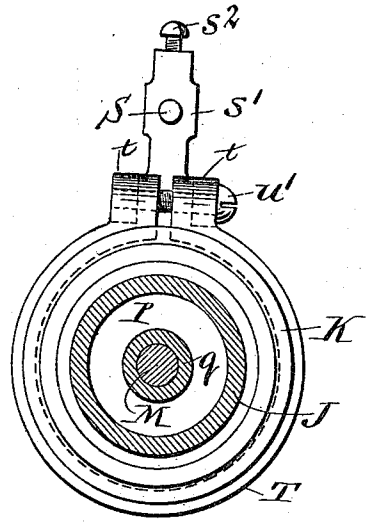


Fig. 5.

WITNESSES:-
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# UNITED STATES PATENT OFFICE.

GEORGE HOFFMAN, OF BUFFALO, NEW YORK.

## FLOAT-VALVE.

966,442. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed September 27, 1909. Serial No. 519,756.

*To all whom it may concern:*

Be it known that I, GEORGE HOFFMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Float-Valves, of which the following is a specification.

This invention relates to a float valve which is more particularly designed for use in automatic drainers which remove accumulated water in a cellar, although the same may also be used for other like purposes.

The object of this invention is the production of a float valve of this character which can be constructed at low cost, which operates to admit or cut off the lifting medium quickly, and which can be readily assembled and adjusted.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a sectional view showing my improved float valve combined with an automatic drainer installed in the well of the cellar or other place to be drained. Fig. 2 is a vertical longitudinal section of the valve and associated parts, on an enlarged scale. Fig. 3 is a horizontal section on line 3—3, Fig. 2. Figs. 4 and 5 are vertical transverse sections, on an enlarged scale, on the correspondingly numbered lines in Fig. 2.

Similar letters of reference indicate corresponding parts throughout the several views.

Although the float valve is applicable to the various uses to which such valves are usually put, the same is shown in the drawings as part of a cellar draining device.

A represents the well, pit or depression which is formed in a cellar or other place and in which the water to be drained accumulates. Within this well is arranged the drainer for removing the water therefrom. In its general organization this drainer comprises an upright pressure conduit or pipe B through which descends the water lifting medium, such as steam or water under pressure, means for controlling the pressure medium arranged in the pressure pipe, an upright discharge pipe or conduit C operatively connected at its lower end with the lower end of the pressure conduit by a return bend *c*, and an ejector arranged in said discharge pipe for removing the water from said well. As shown in Figs. 1 and 2, the pressure pipe or conduit comprises upper, intermediate and lower pipes or sections $d$, $d^1$, $d^2$, respectively. Between the upper and intermediate sections is arranged the straining or screening device E for catching any foreign matter, such as small fishes or sticks contained in the pressure water and preventing the same from reaching the valve mechanism and the water ejecting mechanism. This screening device preferably comprises a casing composed of a lower hollow or tubular body *e* provided in its bore with an upwardly facing annular shoulder $e^1$ and having an internal screw thread at its upper end and a screw threaded opening in its bottom which is secured to the upper end of said intermediate pipe section $d^1$, a screen *f* preferably constructed of perforated sheet metal resting on the shoulder $e^1$, and a plug or cap *g* engaging at its lower end with the upper side of said screen and having an external screw thread which engages with the upper thread of said body and an internally threaded opening at its upper end which receives the lower threaded end of said upper pipe section *d*. The water under pressure from any suitable source passes downwardly through the pressure conduit and the screen and any large foreign particles are intercepted by the latter, so that they will not interfere with the operation of the valve and ejector through which the pressure water passes after passing the screen.

Between the intermediate and lower pressure pipe sections $d^1$, $d^2$ is arranged the automatic valve mechanism which controls the supply of water to the ejector and which is preferably constructed as follows:—H represents a valve casing having an upper inlet *h* which is connected with the lower end of the intermediate pipe section $d^1$, a lower outlet $h^1$ which is connected with the upper end of the lower pipe section $d^2$, a partition I arranged between the inlet and outlet of the casing and provided with a port or passage *i*, and a tubular neck J projecting forwardly from the front side of the casing in line with said port. The outer end of the neck is closed by a detachable cap K which is secured to the neck by an internal screw thread on the flange *k* of the cap engaging with an external screw thread on the neck. L represents the stopper of the valve which is preferably constructed of rubber in the form of a sleeve and is movable toward and from a seat *l* on the front side of the partition I around the port thereof. This stopper is mounted on the central

threaded part of a horizontal valve stem M and adjustably held in place thereon by means of inner and outer screw nuts $m$, $m^1$ arranged on said threaded part of the valve stem and engaging with the inner and outer ends of the stopper, as shown in Fig. 2. At its inner unthreaded end the valve stem is guided in a cup-shaped plug N which is provided with an external screw thread whereby the same is secured in an internally threaded opening $n$ in the rear wall of the valve casing, thereby guiding the valve stem and retaining the stopper in the proper position relative to its seat on the partition. The outer unthreaded end of the valve stem passes through a central opening $o$ in the cap K and is provided on the outside of said cap with notches on opposite sides forming inner and outer shoulders $o^1$, $o^2$ thereon. A tight joint is formed between the cap and body of the valve casing by means of a perforated packing washer $p$ of rubber, leather or other suitable material which surrounds the outer part of the valve stem and is clamped at its periphery between the inner side of said cap and the outer end of said neck, and an inner metal supporting disk P engaging at its outer side with the inner side of the packing disk and engaging the inner side of its margin with an outwardly facing shoulder $p^1$ on the outer end of said neck and provided centrally with an opening which receives the outer part of said valve stem. Centrally on its inner side the supporting disk P is provided with a sleeve $q$ which receives the outer part of the valve stem and serves as a guide for the same. This sleeve projects inwardly a sufficient extent, so that it is engaged by the outer nut $m^1$ of the valve stem upon opening the stopper and forms a stop for preventing the inner end of the valve stem from being disengaged from the guide plug N. The opening and closing of the stopper is effected by means of a float R which is adapted to be raised and lowered by the variation of the level of water in the well. This float is operatively connected with the valve stem by means of an upright shifting rock lever having its lower arm $s$ constructed in the form of a fork which straddles the valve stem between its inner and outer shoulders $o^1$, $o^2$ while its upper arm $s^1$ has secured thereto the inner end of an extension rod S which latter carries the float at its outer end. The connection between the rod S and the upper arm of the rock lever is preferably made adjustable by slidingly engaging said rod with an opening in said arm and holding the same in place by means of a set screw $s^2$, as shown in the drawings. When the level of the water in the well is below normal, the float drops into its lowermost position, as shown in Fig. 1, whereby the rock lever is turned so that its lower arm engages the inner shoulders of the valve stem and the latter is moved inwardly so that the stopper engages its seat and closes the valve, thereby shutting off the supply of water or other pressure medium. When the water rises above the normal in the well, the float turns the rock lever so that its lower arm engages the outer shoulders of the valve stem, the latter will be moved outwardly and the stopper will be opened, thereby permitting water under pressure to pass through the valve to the ejecting device. The distance between the outer and inner shoulders $o^1$, $o^2$ of the valve stem is greater than the thickness of the lower arm of the lever, so that there is slack or play between this lever and the valve stem which causes the lever to move idly or dead in passing back and forth between these shoulders and during this idle movement the stem and stopper of the valve are not affected.

Let it be assumed that the level of the water in the well is below the normal, and that the stopper is closed and the lower arm of the shifting lever engages with the inner shoulders $o^1$ of the valve stem. In this position of the parts the stopper will be held in its closed position by the pressure of the water against the outer side of the same and until this pressure is overcome by the lifting effect of the float. As the water in the well begins to rise above the normal and the float effects the initial part of its upward movement the rock lever travels idly from the inner shoulders $o^1$ of the valve stem to the outer shoulders $o^2$ thereof. After this lever engages the last mentioned shoulders, the continued upward movement of the float due to continued rising of the water in the same will not immediately cause the lever to withdraw the valve stem and open the stopper, this being prevented by the pressure of the water against the outer side of the stopper. The continued upward movement of the float after the lever thus engages the outer shoulders $o^2$ of the valve stem therefore causes the extension rod S to be strained or sprung upwardly. When this strain exceeds the pressure of the water against the outer side of the stopper, the latter is opened quickly its full extent and the full pressure of the water is immediately allowed to pass through the valve to the ejecting device for effecting the discharge of the water from the well. The stopper and valve stem are held in this open position by the pressure of the water against the inner side of the stopper until the float, during the subsequent discharge of the water from the well, descends sufficiently to shift the rock lever from the outer to the inner shoulders of the valve stem and the latter and the stopper have been moved inward sufficiently to again engage the stopper with its seat, when the flow of the pressure medium will be

stopped and the discharge of water from the well arrested. By this means of operating the stopper of the valve the same is held in its closed position and also in its open position by the pressure of the water, whereby this stopper is caused to move positively and certainly in both directions, thereby avoiding the noise due to vibration or chattering of the stopper which occurred in valves for this purpose as heretofore constructed.

The shifting lever may be pivotally supported in various ways but preferably by the improved means which are shown in the drawings and which are constructed as follows:—T represents a split supporting ring which engages with a circumferential groove $u$ formed on the periphery of the cap K and which is provided on opposite sides of its split or division with outwardly projecting arms $t$, $t$. The supporting ring is held in position on the cap K by a clamping screw $u^1$ which connects the ends or parts of the supporting ring on opposite sides of its split and draws the same firmly against the cap K. The rock lever is arranged between the outer ends of the arms $t$ of the supporting ring and is pivotally supported on a transverse screw $u^2$ which connects the outer ends of said arms. In assembling the parts, the screw cap K is turned on the neck of the valve casing until the same is perfectly tight. The supporting ring T is turned on the cap K until its arms $t$ are uppermost and then the same is clamped tightly on the cap by the screw $u^1$. By this means the tightening of the cap K may be effected independently of the float lever and enables the latter to be always brought into its proper upright position regardless of the position of the cap K of the valve casing.

The ejecting device which operates by the action of the pressure medium for discharging the water from said well is constructed as follows:—V represents a cylindrical enlargement or chamber arranged on the lower part of the discharge pipe C and provided with a plurality of openings $v$ in its wall, thereby forming a screen or strainer which permits the water in the well to enter said chamber but excludes any large particles. W represents the tubular body of a lining or bushing arranged within the discharge pipe above the straining chamber V and provided at its lower end with an enlargement or head $w$ which is arranged in said straining chamber and forms an upwardly facing shoulder $w^1$ which bears against the top of said straining chamber. This bushing is preferably held in place by a set screw $x$ engaging with the same and arranged in the discharge pipe. Y represents an upwardly tapering ejector nozzle which is arranged centrally in the straining chamber and provided with an external annular flange $y$ which is secured by a screw joint to the lower end of said straining chamber. The upper end of the ejector nozzle projects into the downwardly flaring lower part $z$ of the bore of the bushing and its lower end is secured by a screw joint with the adjacent upwardly turned end of the return bend $c$. When the controlling valve is opened, the pressure water or other pressure medium passes upwardly through the ejector nozzle into the bushing in the form of a jet, thereby creating a suction whereby the water is drawn from the well through the perforated straining chamber and ejected upwardly through the bushing and from the upper end of the discharge pipe to a sewer or other place. The body and head of the bushing are constructed of wood so as to prevent scale, lime or dirt from solidifying therein and clogging the same.

I claim as my invention:

1. A float valve comprising a valve case having a port, a stopper arranged on the outer side of said port and movable toward and from a valve seat around the port, a valve stem on which said stopper is mounted, a guide for the inner end of said stem secured in a side wall of the casing and accessible from the exterior of the latter, and a float operatively connected with said stem.

2. A float valve comprising a valve casing having a neck, a port and a seat around said port, a cap secured to said neck, a packing washer arranged on the inner side of said cap, a supporting disk arranged between said packing washer and said neck, a stem supporting said stopper and extending through said cap, washer and disk, a sleeve which projects inwardly from said disk and surrounds said stem and which forms a stop to limit the outward movement of said stem and stopper, and a float operatively connected with said stem.

3. A float valve comprising a valve casing having a port and a neck, a cap connected by a screw joint with said neck and having a circumferential groove, a stopper for opening and closing said port, a stem carrying said stopper and extending through said cap, a split ring arranged in the groove of said cap and provided on opposite sides of its split with arms, a clamping screw connecting the parts of said ring on opposite sides of its split, a lever arranged between said arms and pivoted thereto and connected with said stem, and a float connected with said lever.

Witness my hand this 24th day of September, 1909.

GEORGE HOFFMAN.

Witnesses:
THEO. L. POPP,
ANNA HEIGIS.