(No Model.) 2 Sheets—Sheet 1.

A. P. HOWES.

AUTOMATIC FLOAT COCK.

No. 453,784. Patented June 9, 1891.

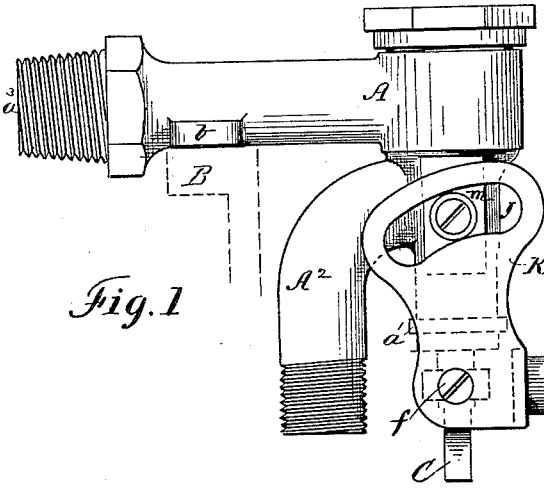

Fig. 1

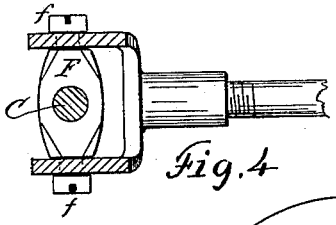

Fig. 4

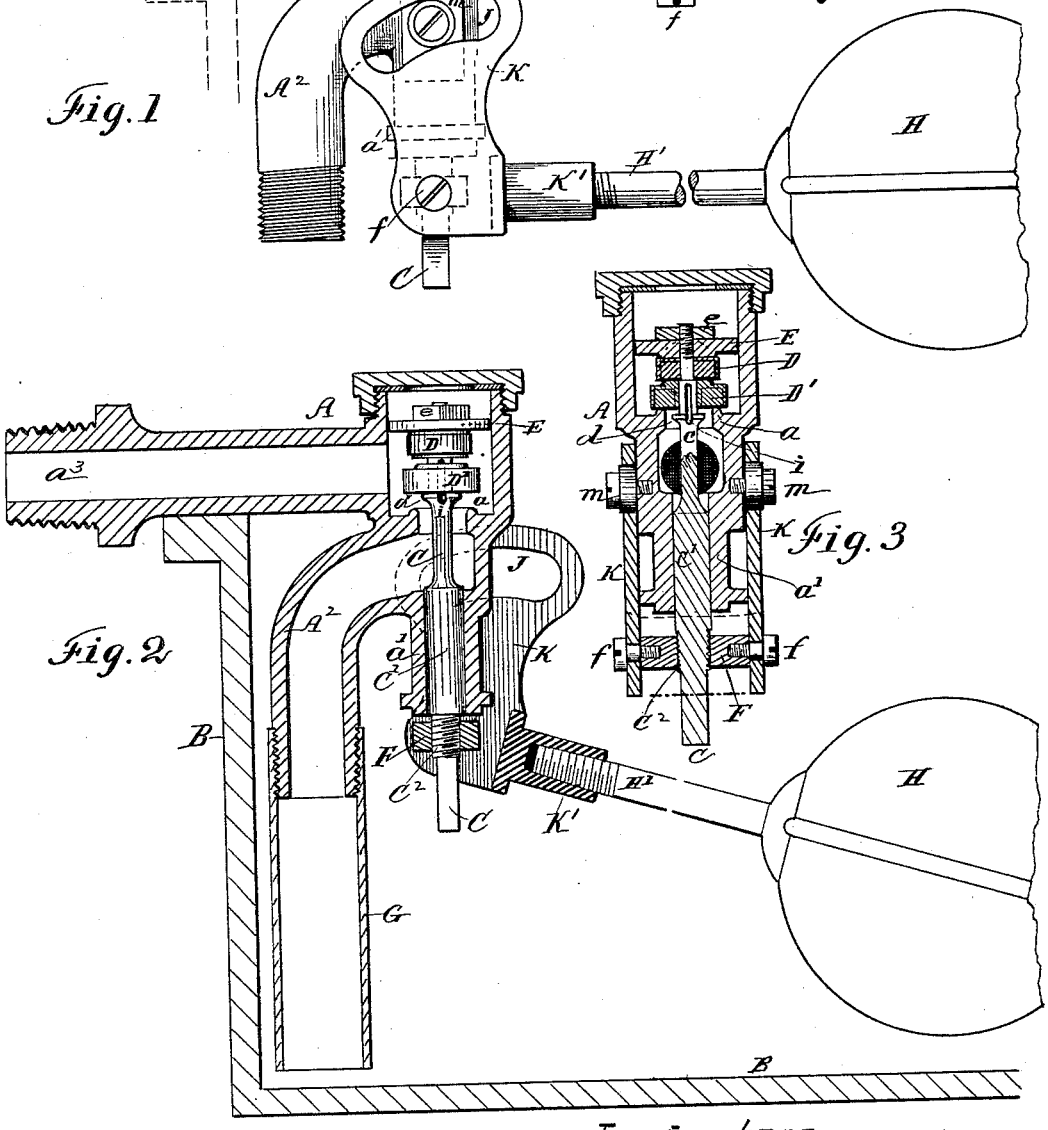

Fig. 2

Fig. 3

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(No Model.) 2 Sheets—Sheet 2.

A. P. HOWES.

AUTOMATIC FLOAT COCK.

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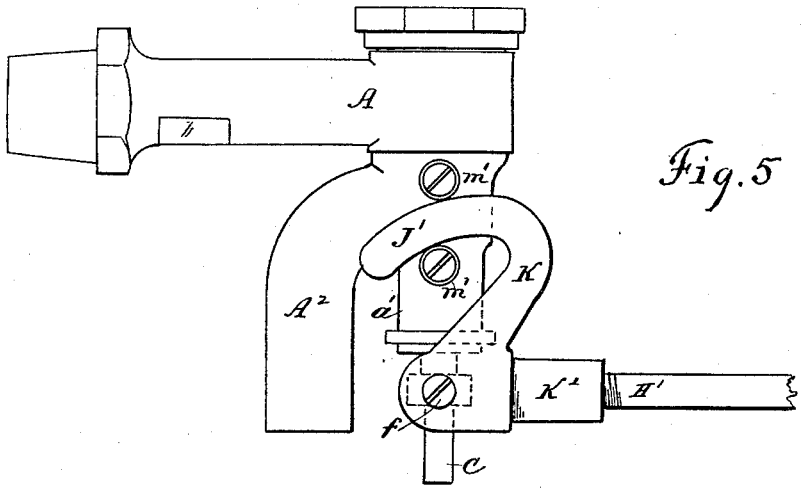

Fig. 5

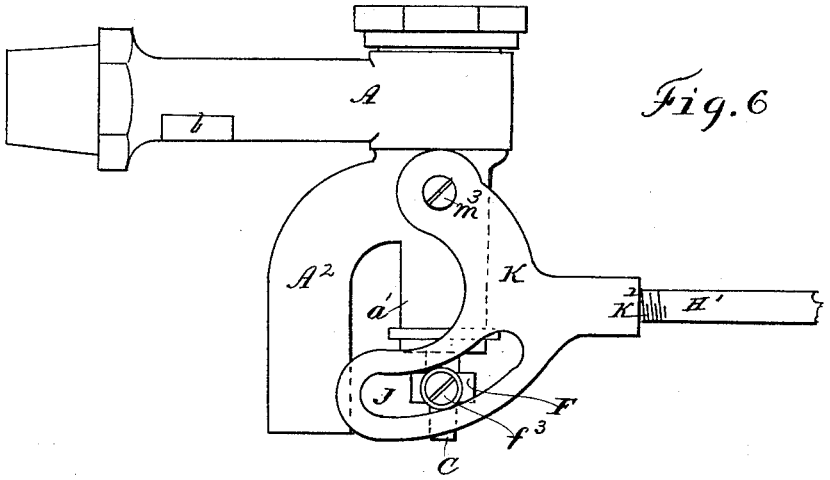

Fig. 6

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UNITED STATES PATENT OFFICE.

ALBERT P. HOWES, OF WORCESTER, MASSACHUSETTS.

AUTOMATIC FLOAT-COCK.

SPECIFICATION forming part of Letters Patent No. 453,784, dated June 9, 1891.

Application filed August 11, 1890. Serial No. 361,631. (No model.)

To all whom it may concern:

Be it known that I, ALBERT P. HOWES, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Automatic Float Tank-Cock, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

One object of my present invention is to obviate the rebounding of the valve in a tank-cock having a puppet-valve operated by a float when closing by reason of the pressure on the valve forcing the float above its normal level and its consequent recoil.

Another object is to provide a tank-cock the valve of which will not chatter when nearly closed and under heavy pressure.

Another object is to provide a tank-cock fitted for the attachment of a hush-pipe thereto, and adapted to serve as an anti-vacuum valve to prevent siphoning the water from the tank when the head is shut off.

These objects I attain by the mechanism illustrated and described, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a side view of my improved tank-cock. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a transverse vertical section through the head and valve. Fig. 4 is a horizontal section showing the connection of the ball-lever with the valve-spindle. Figs. 5 and 6 illustrate modifications of the structure of the valve-actuating cam.

Referring to parts, A denotes the body or shell, which is best formed, as shown, with the cylindrical head portion containing the upright valve-chamber, having the valve-seat a at the bottom thereof, the dependent spindle-guiding bearing a' beneath the same, and the backwardly and downwardly curved delivery-spout A^2 branching rearward from below the valve-seat, and the usual neck and coupling-boss through which the inlet or supply passage a^3 leads into the valve-chamber. Ears b are preferably formed on the sides of the neck for attaching the cock to the edge of a tank B.

C indicates the valve-spindle, its upper end carrying the two valves D and D', and also a guiding disk or plate E, retained by a nut e on the threaded end of the spindle, which maintains the valve central at its top end, while its lower part is made with a cylindrical portion C', that fits within the bearing or guiding sleeve a', a screw-thread C^2 to receive the coupling-yoke F, whereby the ball-lever or arm is connected thereto, and with a squared or other shaped end suitable to receive a wrench or key by which the spindle can be rotated for adjusting its screw in the yoke. The spindle is provided with small vents or water-ways at i, and the lower valve D' is arranged to have a limited sliding action longitudinally of the spindle between the valve D and a supporting lug or flange d, that is formed on said spindle below the valve. The upper side of the valve D' is fitted to serve as a seat for the valve D. The employment of a double valve in a cock has been described in prior Letters Patent; but in connection with a different style of spindle and combined with an essentially different class of operating mechanism. The water passes out from the valves through the spout A^2, which, being offset backward, allows ample space for the valve-operating mechanism. The end of the spout A^2 is threaded to receive an extension or hush pipe G, that extends to near the bottom of the tank B and prevents noise by the falling water when the level in the tank is low.

H indicates the float or hollow ball of well-known construction, which is made to serve both as a float and a weight for operating the valve mechanism.

K K indicate cams or swing-arms attached to a hub or part K', fitted to connect with the screw-threaded end of the ball rod or lever H', the said arms being rigidly fixed to the hub and disposed in upright positions to swing back and forth at the opposite sides of the body, as illustrated. The cams K are preferably pivoted to the ends of the yoke F by studs or screws f, and each provided with an eccentric or inclined slot J, that engages the roll m, which latter is mounted at fixed position on the side of the body. (See Figs. 1 to 4.) The lower part C^2 of the valve-spindle fills the opening in the bearing sufficiently close to prevent the flow of water therethrough to any extent, but not so close as to be absolutely tight. Hence the spindle can play freely up and down and air can be sucked in around

the spindle and through the valve to relieve any tendency toward a vacuum and to accommodate the backward flow in the supply-pipes when the head is shut off, and thus avoid siphoning the water from the tank B through the hush-pipe.

In the operation a depression of the water-level in the tank allows the float to descend and its rod swings the arms K forward. (See Fig. 2.) The slot J being eccentric to the circle of its motion, and the roll m being mounted at a fixed position causes the entire head, together with the yoke F and valve-spindle, to be drawn or moved upward in relation to the body, thereby lifting the valves from their seats and opening the passage so that the water can flow out through the discharge a^3. The first part of this lifting action raises the valve D from the valve D′ and permits the flow through the small water-ways i, thus giving a small flow and relieving the source of the pressure so that the larger valve can be readily lifted by the further movement of the float. When the tank fills, the direction of movement is reversed and the cams by positive and gradual action draw down the valve-spindle, at the same time sustaining it positively against the head-pressure tending to force the valve to its seat. When the tank is nearly filled, the main valve D′ closes upon its seat a, but for some time thereafter the flow continues through the small water-ways i, thereby closing off the flow by a gradual termination and causing the float to approach its final level by an easy and very gradual movement, obviating any liability of rebounding action or lifting of the float by reason of quick pressure when the valve is nearly onto its seat, and preventing any tendency toward the chattering of the valves when nearly closed, as frequently occurs with valves or cocks when employed under very heavy pressures.

It will be noticed that the pivoting-studs f and rolls m are disposed substantially in the same plane with the longitudinal axis of the valve-stem or substantially so. Hence the direction of strain on the cam from the axis of the stud f to the axis of the roll m is in a direct line with the pressure or movement of the valve-stem, thus avoiding any tendency toward lifting or depressing the float by sidewise leverage in the connection; but on the contrary giving a straight, direct, and rigid sustension of the pressure and giving an equally efficient action under heavy or light pressures.

In Fig. 5 I have shown a modification in the form of the actuating mechanism, wherein a curved tongue j' is used with two studs or rolls m' in lieu of a slot J and single roll m. The tongue passes between the rolls and the swing of the arms K as the ball rises and falls effects movement of the valve-spindle in the same or equivalent manner as does the slotted cams shown in Fig. 1.

In Fig. 6 I show a modification wherein the position of the arms or cams K is inverted, the pivot or fulcrum being located at m^3 on the side of the body A and the slot J disposed so as to engage rolls f^3 on the yoke F. As will be understood from an inspection of the drawings, the falling and rising of the float effects movement of the valve in a manner equivalent to that above described.

I claim as my invention to be herein secured by Letters Patent—

1. In a tank-cock, the combination, with the body and reciprocating puppet-valve, of a swinging cam having a hub for attachment to the float-lever, a pivot-stud for the cam, and an engaging stud or roll against which the cam acts for moving the valve-spindle, said pivot-stud and engaging stud being respectively arranged in connection with the valve-stem and the body-shell and both disposed in a plane substantially coincident with the axis of the valve-spindle, as described, whereby the line of resistance and the line of pressure are relatively in the same direction with the valve movement, substantially as set forth.

2. The combination, with the body and the valve disposed within the chamber in the body and having the depending spindle, of the operating-arms fulcrumed upon or in connection with the lower end of the valve-spindle and having cam-surfaces that work in connection with studs or rolls arranged on the sides of the body, the float and float-lever connected with said arms for imparting movement thereto by the rise and fall of the float, substantially as set forth.

3. In a tank-cock, the combination of the body having the valve-seat a, the depending spindle-bearing guide a', the valve-spindle C, having water-ways i, the upper valve D, fixed on said spindle, the valve D′, movable on said spindle, the valve-supporting flange, the guide-bearing a' and threaded portion C^2 on said spindle, the connecting-yoke F adjustable on said spindle, the swinging arms H, pivoted to said yoke and fitted with cam-surfaces that engage with lugs or rolls on the body, the float-lever, and float.

4. In a tank-cock, the combination of the body having the depending spindle-bearing guide a' and the offset delivering-spout with the hush-pipe attached thereto, of the valve-spindle provided with the inwardly-opening valve (or valves) and having the cylindrical part C′ arranged through said guide in a manner to afford inward air-vent about said valve-spindle to prevent siphoning through said hush-pipe by retroactive pressures, and the operating connections and float for actuating said valve-spindle and valve, substantially as set forth.

Witness my hand this 6th day of August, A. D. 1890.

ALBERT P. HOWES.

Witnesses:
CHAS. H. BURLEIGH,
ELLA P. BLENUS.