(No Model.)

S. SMITH.

CHECK VALVE.

No. 377,963. Patented Feb. 14, 1888.

Fig. 1.

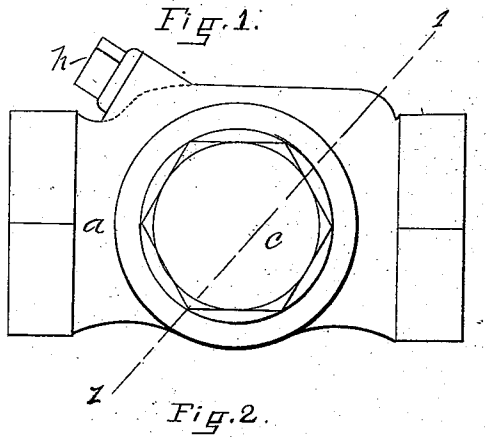


Fig. 2.

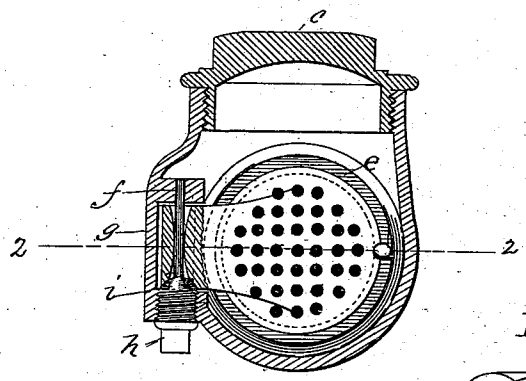


Fig. 3

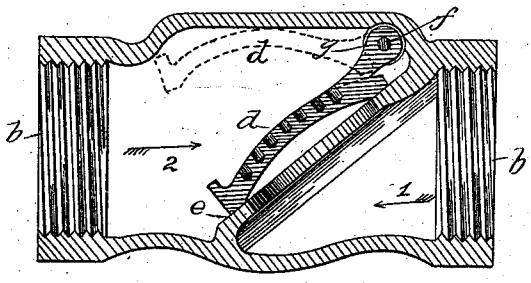
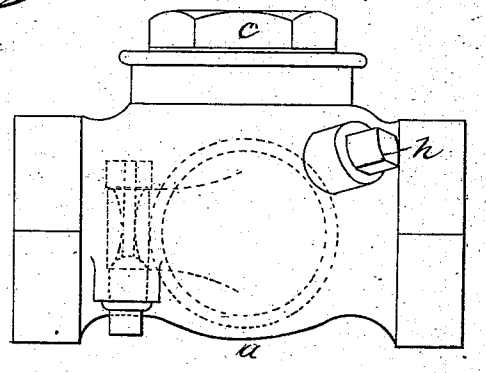


Fig. 4.



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UNITED STATES PATENT OFFICE.

SIDNEY SMITH, OF CAMBRIDGE, MASSACHUSETTS.

CHECK-VALVE.

SPECIFICATION forming part of Letters Patent No. 377,963, dated February 14, 1888.

Application filed April 7, 1887. Serial No. 233,990. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY SMITH, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Check-Valves, of which the following is a specification.

My invention relates to check-valves; and it consists in certain improvements in an article of that class whereby the valve is enabled to rock or tip on a vertical pivot or pintle, and is thereby enabled to be perfectly balanced when in proper position. This balance is measured when the least pressure of whatever is desired to pass through the opening in the valve-seat will cause the valve to open, and the least pressure on the opposite side of the valve will cause it to shut and effectually close the passage through the casing of the valve. The advantages of such a valve are many, the most important of which is that when used in connection with a boiler and radiator as soon as the water from the condensed steam begins to flow from the radiator to the check-valve and from the radiator to the boiler there will be no practical obstruction to the flow of said water, and if from any cause the current is reversed the check-valve will be instantly closed. This feature in a well-constructed heating apparatus prevents the escape and serious loss of water from the boiler, which has often ruined the boiler, with consequent danger and loss arising from fluctuating steam-pressure attendant on the varying degrees of heat from the fire wherever a boiler is used and the water condensed from the steam is designed to be returned to the boiler. Such a check-valve has none of the uncertainties of such contrivances as commonly constructed, and is open to none of the objections usually found thereto by engineers and users of steam for heating purposes.

With this statement of the leading principles of my invention and the objects sought to be accomplished by it, I will now proceed to describe its construction and operation, so that others skilled in the art may be able to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, and the invention being particularly set forth at the end of the explanation of its construction and functions.

Of the drawings, Figure 1 represents a top view of the valve-casing provided with my invention. Fig. 2 is a sectional view on the line 1 1 of Fig. 1. Fig. 3 is a sectional view on the line 2 2 of Fig. 2. Fig. 4 is a side view of the invention.

The same letters of reference indicate the same parts in all of the views.

a represents the valve-casing, of usual form, screw-threaded, as at *b*, at each end, or otherwise constructed for connecting it to pipes with which it is to operate.

c represents a cap, of common construction, for the purpose of closing or covering the opening through which the valve *d* is inserted.

e represents the valve-seat, which is in a substantially-vertical plane and extends diagonally across the water-way through the casing.

As shown, the valve *d* is convex in form on one side and concave on the other, and is hinged to the valve-casing by a pin or pintle, *f*, passing through a hole in the hinge part or member *g* of the valve. Said hole through which the pin *f* passes is barely large enough in the middle to admit the pin therethrough, and is enlarged toward either end to allow the valve to swing on the pin with a rocking motion, in a way that will be readily understood.

The part of the hinge member of the valve bearing the weight of the latter turns on a ball-and-socket joint, formed by inserting a screw-threaded pin, *h*, into the casing at the point mentioned, the inner end of which is rounded, as represented at *i*, which rounded end of the pin fits a concaved or rounded depression on the lower part of the hinge member *g*. The pin *f* is closely fitted at one end into the rounded end of the removable screw-threaded pin *h*, and at the other end into the valve-casing.

The ball-and-socket joint thus formed, together with the pin *f* and peculiar hole through the hinge member *g* of the valve, enables the valve to have a slight rocking motion on the pin or pintle *f*. I have found by practical experience that this rocking motion permits the valve to accurately fit its seat, and also to open and close with perfect freedom under the highest and lowest temperatures of the liquid flowing through the valve.

In the use of check-valves with steam apparatus there is considerable expansion and

contraction of parts under change of temperature, as the valve must be exposed to the action of water cooled down nearly to freezing, and again within a short space of time to water heated to nearly 300°. This change of temperature may distort one part of the device and not the other, and therefore the closing-valve *d* is given the described freedom of rocking movement, so that it can find a perfect seat on the ring *e* under all conditions of use.

As stated, the valve *d* is in form approximately a section of a hollow sphere and is honeycombed or provided with numerous cavities or pockets on its convex side to make it as light as possible. The spherical form and honeycombing of the valve afford the greatest possible strength with the least amount of material.

The central part of the valve *d*, when the valve is open, will rest against the casing, or a projection will be placed on the valve *d*, for the same purpose, so that the valve *d*, when open, will not come to a tight bearing against the casing, but will project into the water-way of the casing to some extent, (the passage being large enough to permit this without throttling.) Normally the direction of movement of the water will be to keep the valve *d* open; but when there is a reversal of the current the water in pressing back enters between the swing-piece *d* and the casing and swings the valve close.

I claim—

1. In a check-valve, the combination of the casing having a valve-seat arranged in a substantially-vertical plane diagonally across the way or passage through the casing, a fixed substantially-vertical pintle or pivot at one side of said seat, and a valve formed to cover said seat, and having a hinge member loosely surrounding said pintle, so as to swing around the same and to rock or tip slightly thereon, substantially as described.

2. The casing provided with the valve-seat *e*, extending in a practically-vertical plane diagonally across the water-way, and having a substantially-vertical pintle, *f*, in combination with the valve having the hinge member perforated with a hole centrally contracted to closely fit the pintle and enlarged at its ends, whereby the valve is enabled to rock slightly on the vertical pintle, as set forth.

3. The casing provided with the valve-seat *e*, in combination with the valve having the hinge member perforated with a hole centrally contracted and enlarged at its ends, the fixed substantially-vertical pintle in said hole, and formed to closely fit the contracted portion thereof, and the rounded boss or screw end on which the hinge member rests, as set forth.

4. The combination of the valve-casing, the valve-seat arranged in a substantially-vertical plane and extending diagonally across the way or passage through the casing, a vertical pintle at one side of said valve-seat, a valve pivoted on said pintle and having its hinge loosely surrounding the same, so as to permit of a slight rocking movement as well as the swinging movement thereon, and a projection on said valve in position to prevent the valve from swinging against the inner surface of the casing, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of July, 1886.

SIDNEY SMITH.

Witnesses:
A. D. HARRISON,
H. BROWN.