Sept. 16, 1930. A. MESSER 1,776,077

COMBINED WATER SEAL AND CHECK VALVE

Filed March 7, 1928

Fig. 1

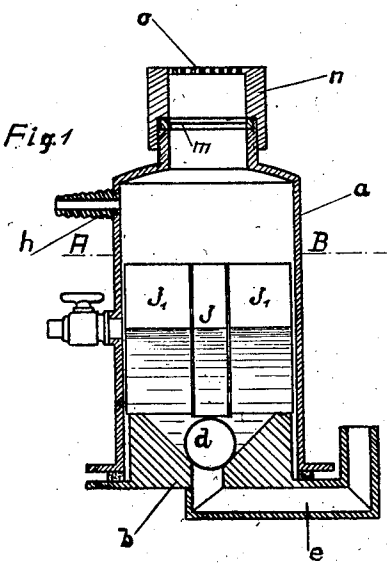
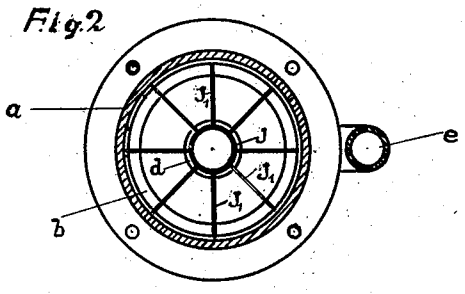


Fig. 2



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COMBINED WATER SEAL AND CHECK VALVE

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This invention is a combined water seal and check valve or shut-off valve, and in its preferred embodiment is specially adapted for use in conduits for conducting explosive gaseous mixtures, such for instance as an acetylene oxygen mixture, used in cutting or welding operations.

The main object of the invention is to provide means which will permit of large volume flow and at the same time give absolute security against backfiring.

Where the check valve is disposed at the lower portion of the water chamber constituting the water seal, the gas forced upwardly past the check valve must bubble through the liquid. Thus the volume of liquid above the check valve is continuously agitated by the gas stream and does not act effectively on the valve to insure instantaneous closure of the valve in case of backfiring to the water chamber.

I have discovered that this difficulty may be overcome by maintaining a quiescent water column directly above the valve and which is out of the path of the upwardly moving stream of gas flowing through the water. By means of such a quiescent water column the valve is subjected at all times to a substantially constant downwardly acting water pressure and is caused to close instantly in case of backfiring.

In its preferred construction I mount a tube directly above the valve and utilize the valve as a means for normally closing the lower end of the tube to prevent passage of gas up through the water in the tube, thus insuring the maintenance of this column of water in a quiescent state.

The water in the tube acts as a piston and as it cannot be compressed when an explosion occurs, it transmits the pressure of the explosion directly to the valve, and thus forces the valve directly to its seat so that further gas supply is shut off.

As a further feature of my invention I subdivide the water chamber into passages by vertically disposed partitions. Thus the upwardly moving gas is subdivided into separate streams, each in a separate water compartment, although all of the compartments communicate at their lower ends.

By reason of this construction there is less liability of explosion being transmitted through the gas stream, a better gas distribution is effected, and unequal lateral pressure on the valve is prevented.

Reference is to be made to the accompanying drawing in which one embodiment of my invention is illustrated by way of example.

In said drawing:

Fig. 1 is a longitudinal section; and

Fig. 2 is a transverse section on the line A—B of Fig. 1.

In the construction illustrated there is provided a chamber *a* adapted to receive the water constituting the water seal. The bottom wall *b* of this chamber is of substantially conical or funnel shape at least upon its upper surface, and provides a seat for the check valve or shut-off valve *d*. This is illustrated in the form of an ordinary ball valve, the gas being delivered to the water chamber and to the valve seat beneath the valve through a conduit *e*.

Above the normal liquid level there is the usual gas outlet *h* which may be in the form of a nipple to which a hose may be connected.

At the top of the water chamber there is provided means for relieving the pressure in case of an explosion. This includes a rupturable diaphragm *m* which may be of tin foil or other analogous material, and above this is a cap or hood *n* provided with a reticulated plate or screen *o*.

In case of explosion in the water chamber and the rupturing of the diaphragm *m* the flame will be subdivided by the perforations in the screen, and will be either extinguished or reduced in size so as to be comparatively short with correspondingly less danger of igniting other objects.

As the important feature of my invention I provide a central tube *j* of somewhat smaller diameter than the valve *d* and extending substantially vertically from a point just above the valve to a point just above the water level. As the gas flows in through the conduit *e* it will lift the ball valve from its seat. If the flow is sufficient it will cause the ball valve to

seat against the lower end of the tube and thus prevent the gas from bubbling up through the water within the tube. The water is thus held as a quiescent column or non-compressible piston directly above and in contact with the ball.

It is necessary to provide some means for holding the tube in position in the chamber. In my improved construction I construct the tube supporting means as ribs or partitions *j'* which extend in radial directions to or adjacent to the peripheral wall of the chamber *a*. As the ball valve is raised by the gas stream and thereby closing the lower end of the tube, the moving of the water level above the bottom plate *b* is prevented, and the gas is subdivided into streams in the separate water compartments. In case of a backfire, either from a cutting or welding burner, or other source, the pressure acting upon the non-compressible water piston in the tube, will instantly force the valve to its seat and prevent further gas admission from the supply conduit *e*.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A combined water seal and check valve, including a water chamber having a gas inlet at the lower end thereof, a check valve for preventing return flow through said inlet, and means for maintaining a column of quiescent water directly above said valve.

2. A combined water seal and check valve, including a water chamber having a gas inlet at the lower end thereof, a check valve for preventing return flow through said inlet, and a substantially vertical tube in said water chamber open at its upper and lower ends and disposed directly above said valve, whereby there is maintained a quiescent water column directly above the valve and gas entering said inlet passes through the water outside of said tube.

3. A water seal including a water chamber having an inlet at the lower part, a ball valve for closing said inlet to prevent return flow, and a vertically disposed tube open at both ends and disposed above said valve, said lower end being closed by said ball valve when the latter is spaced to the maximum distance from said inlet.

4. A water seal including a water chamber having a gas inlet below the water level, a ball valve at said inlet, and means for maintaining a portion of the water in said chamber in the form of a quiescent, non-compressible water piston extending from said valve to the upper surface of the body of water.

5. A water seal including a water chamber having an inlet at the lower part thereof, a valve for controlling said inlet, a tube extending upwardly from said valve and open at its upper end, the lower end of the tube being closed by said valve when the latter is in maximum spaced position from said inlet, and means for subdividing the water chamber outside of said tube into a plurality of compartments communicating at their lower ends.

6. A water seal including a water chamber having an inlet at the lower part thereof, a valve for controlling said inlet, a tube extending upwardly from said valve and open at its upper end, and a plurality of radially disposed partitions extending from said tube to the peripheral wall of the chamber and forming a plurality of water compartments up through which the gas may pass in separate streams from said inlet.

In testimony whereof I affix my signature.

ADOLF MESSER.