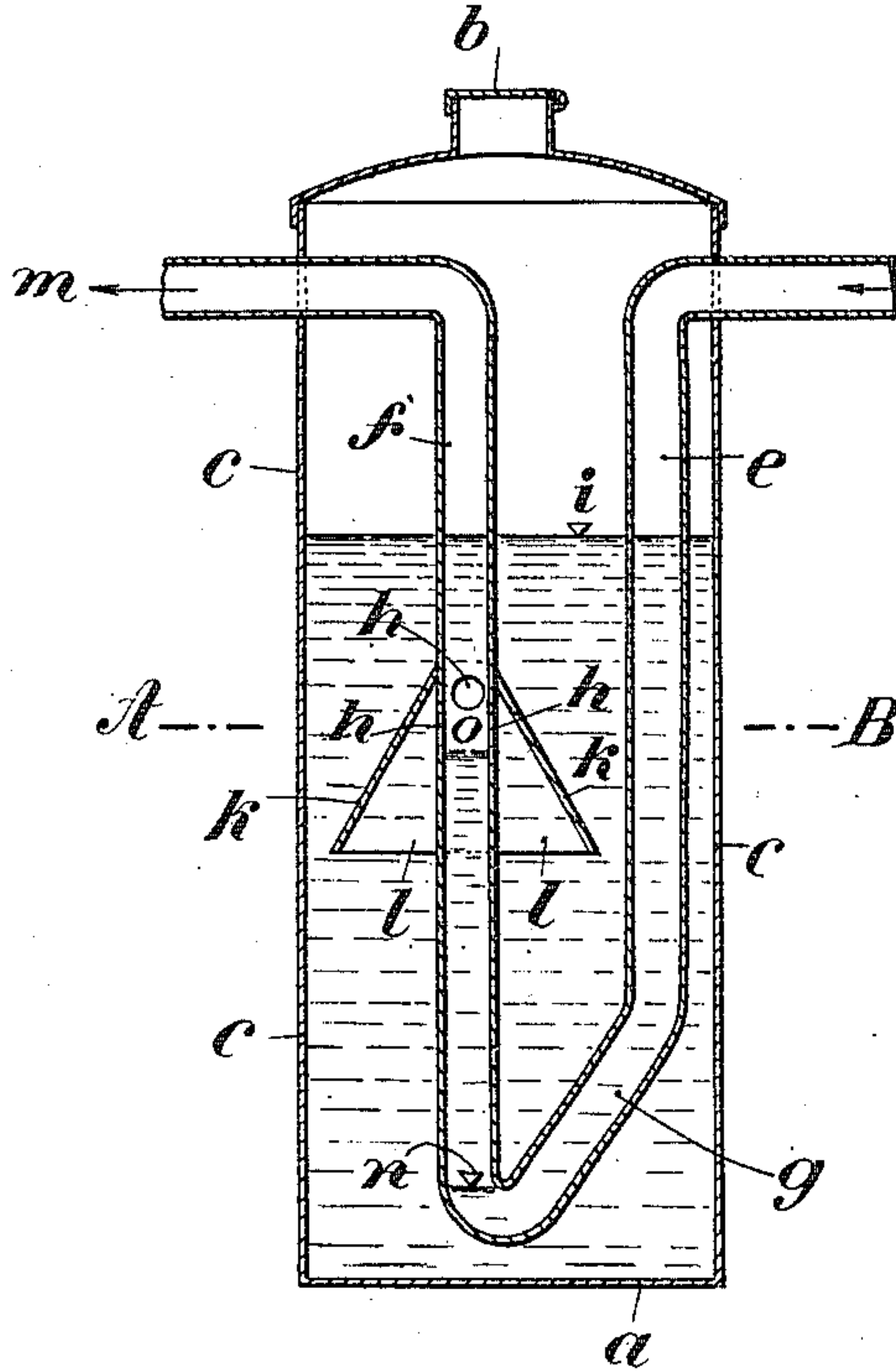


H. KNAPP.  
LIQUID SEAL BACK PRESSURE VALVE.  
APPLICATION FILED MAY 23, 1910.

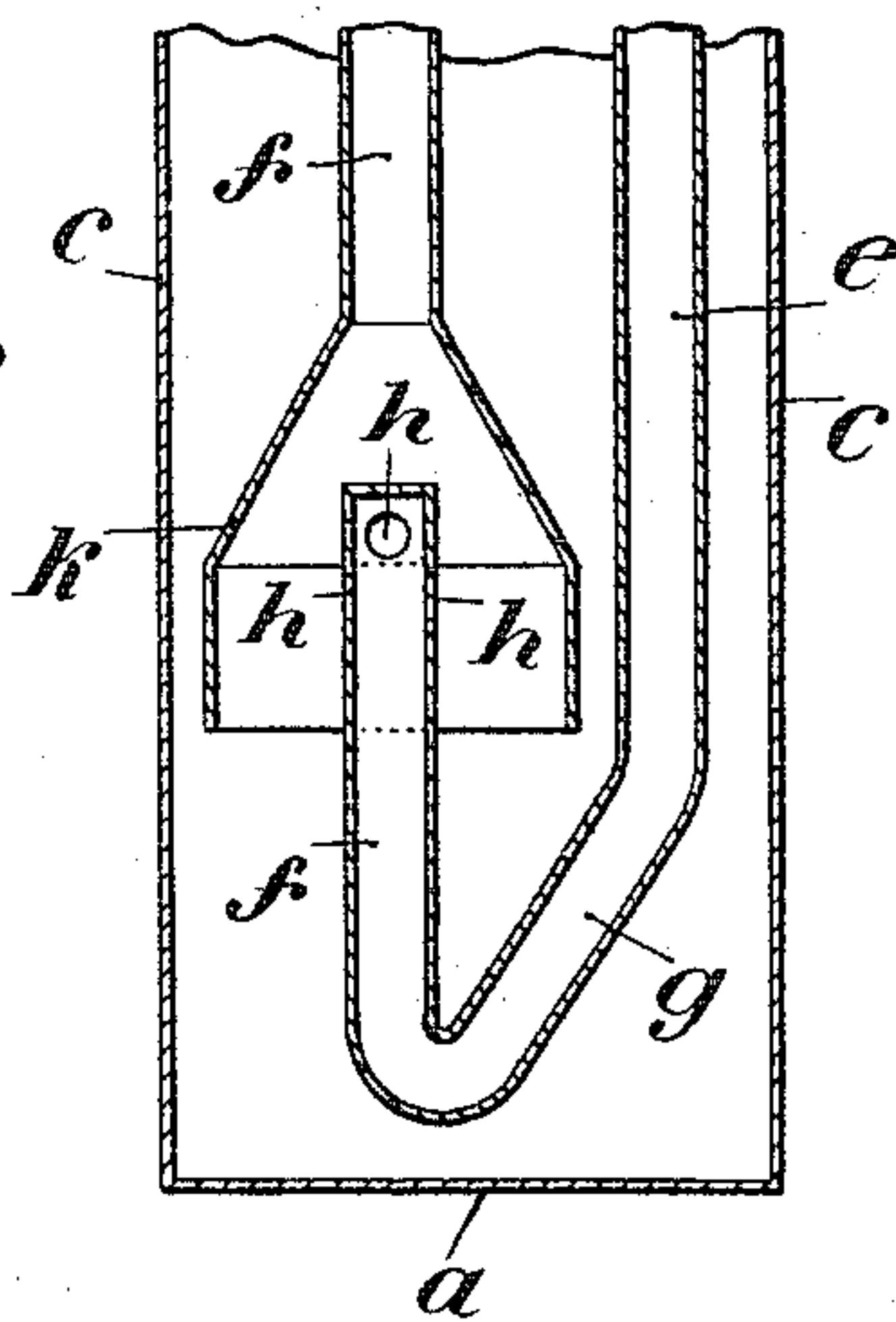
994,645.

Patented June 6, 1911.

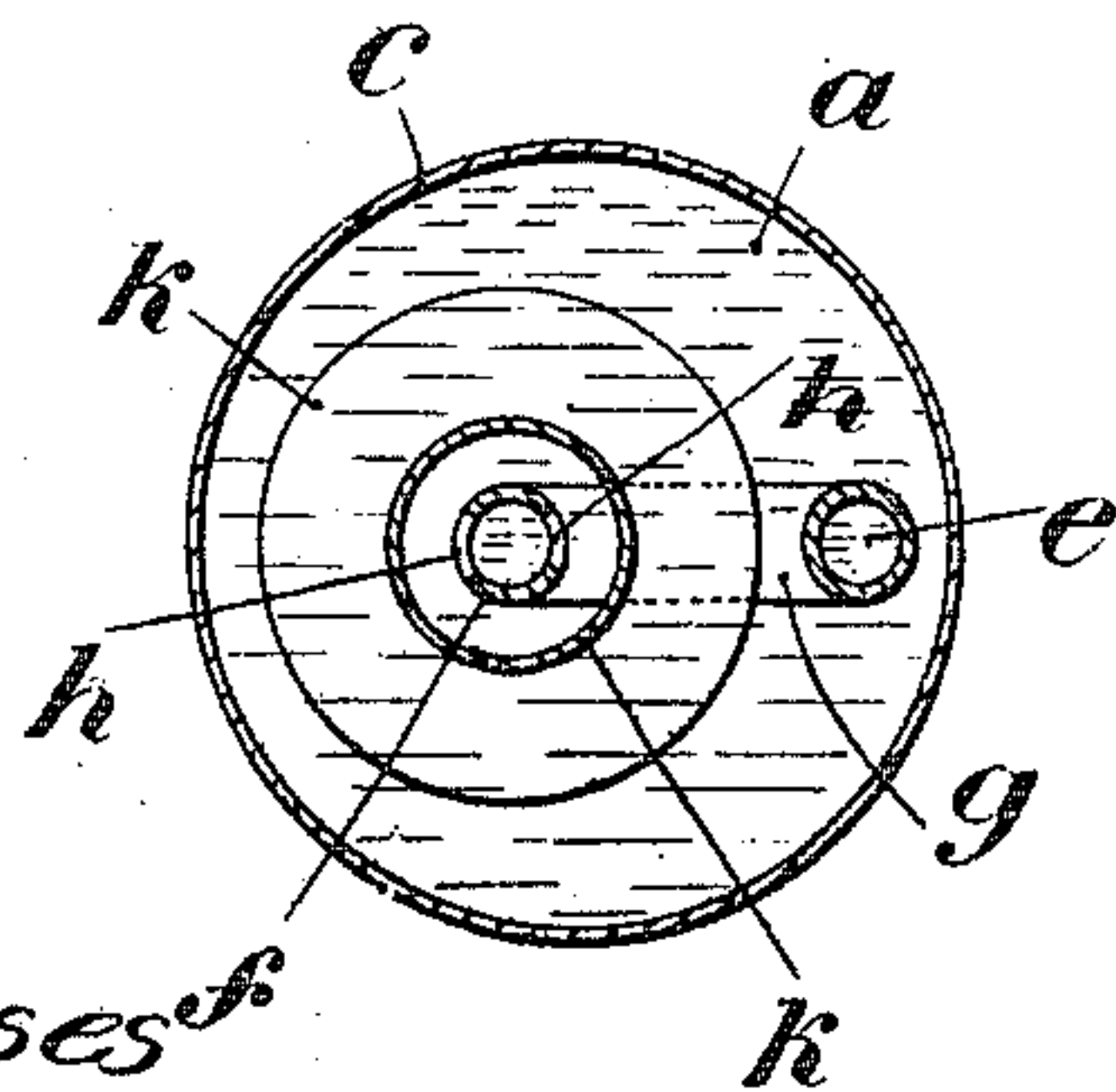
*Fig. 1.*



*Fig. 3.*



*Fig. 2.*



Witnesses

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Inventor

Heinrich Knapp

By

*[Signature]*  
Att'y.



# UNITED STATES PATENT OFFICE.

HEINRICH KNAPP, OF WEIMAR, GERMANY.

LIQUID-SEAL BACK-PRESSURE VALVE.

994,645.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed May 23, 1910. Serial No. 562,896.

*To all whom it may concern:*

Be it known that I, HEINRICH KNAPP, a subject of the German Emperor, residing at Weimar, Grand Duchy of Saxe-Weimar-Eisenach, Germany, have invented certain new and useful Improvements in Liquid-Seal Back-Pressure Valves for Oxygen Blast-Engines, of which the following is a specification.

10 The constructions known heretofore for preventing the injurious effects of back pressure of the gas used for oxyhydrogen blow-pipes, are successful to the extent that they prevent the passage of the oxygen into the  
15 gas collector and an entraining of air; said constructions are, however, of such nature that when the gas mixture explodes, the flame forced back enters an extended space wherein the explosion continues with in-  
20 tense force and produces a loud detonation. The combustion of a considerable quantity of gas contained in a comparatively large gas collector is liable to cause the explosion of the whole gas vessel and more particu-  
25 larly when the water charge cannot escape as quickly as is required by the pressure of the exploding gases. In order to prevent the explosion of a greater volume of gas and to reduce to a minimum the quantity of the gas  
30 forced backward and presented to combustion, the present invention proposes a piping contained in a liquid seal vessel and having its leg through which the gas ascends provided with apertures which communicate  
35 with the interior of said vessel. The apertures are within the confines of a body shaped like a screen and open at its lower end, the said body having a surrounding relation to the discharge leg of the piping.

40 The present construction therefore provides that no greater space is presented to the gases forced backward than that above the water level in the discharge leg of the piping through which the gases pass; that  
45 the return shock of the gases is gradually absorbed and made practically without effect and that the explosion takes place without noise and consequent shock.

Embodiments of the invention are shown  
50 in the accompanying drawings, wherein—

Figure 1 is a vertical longitudinal section of a preferred construction; Fig. 2 is a horizontal section on the line A—B of Fig. 1; and Fig. 3 is a longitudinal section of a  
55 modified construction.

Similar characters of reference designate

corresponding parts throughout the several views.

The construction shown in Fig. 1, includes a vessel *c*, having a closed bottom *a* and  
60 having its top either open or fitted with a hinged lid *b*. This vessel is practically filled with water and incloses a substantially U-shaped pipe having an entrance leg *e*, a discharge leg *f*, and a connecting leg *g* be-  
65 tween the legs *e* and *f*. The leg *e* has exterior connection with the gas supply pipe and the leg *f* has exterior connection with the burner and is provided below the water level *i* with one or more openings *h* where-  
70 by the water seeks the same level in the inclosed U-shaped pipe that it has in the vessel *c*. A screen-like member *k* is fitted on the leg *f* at a point above the openings *h*. This member which is preferably of conical  
75 outline and is open at its lower end, prevents the entering gas from passing across the apertures *h* into the vessel *c*, the gas being thus caused to pass upwardly throughout the full extent of the leg *f*. The member *k* also  
80 serves as a distributor and sound deadener for the gases which are forced backward and passed through the openings *h* into the vessels *c*. When gas is admitted under pressure it shifts the water column in the legs *e* and  
85 *g* to such an extent as to leave a free space in said legs which extends from the lower edge *n* to the leg *f*; the water displaced passes through the openings *h* of the leg *f* into the vessel *c* and in this way a slight  
90 elevation of the water level is produced. Then the gas flowing through the legs *e* and *g* rises in the form of bubbles through the water column in the leg *f*. The escape of gas from said leg *f* is prevented by the  
95 member *k* and consequently the gas finds exit from said leg through the drawing off pipe *m*. When from any cause whatever, *e. g.*, owing to an excess of pressure in the leg *f* or to an explosion of the mixture of  
100 gas and air, the gas moves back from the exit pipe *m* to the leg *f*, the consequent back pressure shifts the water column in the leg *f* from the common water level *i* as far as the lower edge of the openings *h*. Through  
105 the openings *h* the gases pass into the confines of the member *k*, bubble through the water within said member and then pass over its lower rim *l* into the vessel *c*, rising upward therein and escaping from the upper  
110 end thereof.

The construction above described provides



a water column between the points approximately equal in its extent to the distance between the points *n* and *l*, as a separating means between the flowing back and the entering current of gas, which means obviously intercepts any connection between these bodies.

When the member *k* is formed as a funnel, increasing in diameter toward its lower end, as is represented in the drawings, the gases forced backwardly are distributed over a comparatively extensive area and the noise of explosion is effectually reduced.

In the construction shown in Fig. 3, the leg *f* is interrupted, that is to say, is formed of an upper and a lower section. The lower section of the leg is closed at its upper end and is provided just below its upper end with the openings *h* while the upper section of the leg terminates at its lower end in the member *k* which surrounds the upper portion of the lower section of said leg and within the confines of which the openings *h* are arranged. In this case, the gas which is forced backwardly through the upper section of the leg *f* cannot escape into the lower section of said leg and into the legs *g* and *e*. Moreover it will be observed that the funnel in this construction is extended downwardly and in this way forms a gas collecting chamber.

Having fully described my invention, I claim:

1. A liquid seal back pressure valve for

oxygen blast engines comprising a water containing vessel, piping confined in the vessel and including vertical legs and a leg connecting the lower end of the vertical legs, the gas entering through one of the vertical legs and discharging through the other vertical leg, the discharge leg being provided with apertures below the water level, and a member associated with the discharge leg and constructed to serve as a screen to prevent the gas in its normal passage through the discharge leg from passing into the vessel.

2. A liquid seal back pressure valve for oxygen blast engines comprising a water containing vessel, piping confined in the vessel and including vertical legs and a leg connecting the lower end of the vertical legs, the gas entering through one of the vertical legs and discharging through the other vertical leg, the discharge leg being provided with apertures below the water level, and a member of inverted conical form, open at its lower end, and surrounding the discharge leg, the said apertures being arranged within the confines of said member.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HEINRICH KNAPP.

Witnesses:

ERNST EBERHARDT,  
CHAS. BORNGRAEBER.