

No. 658,160.

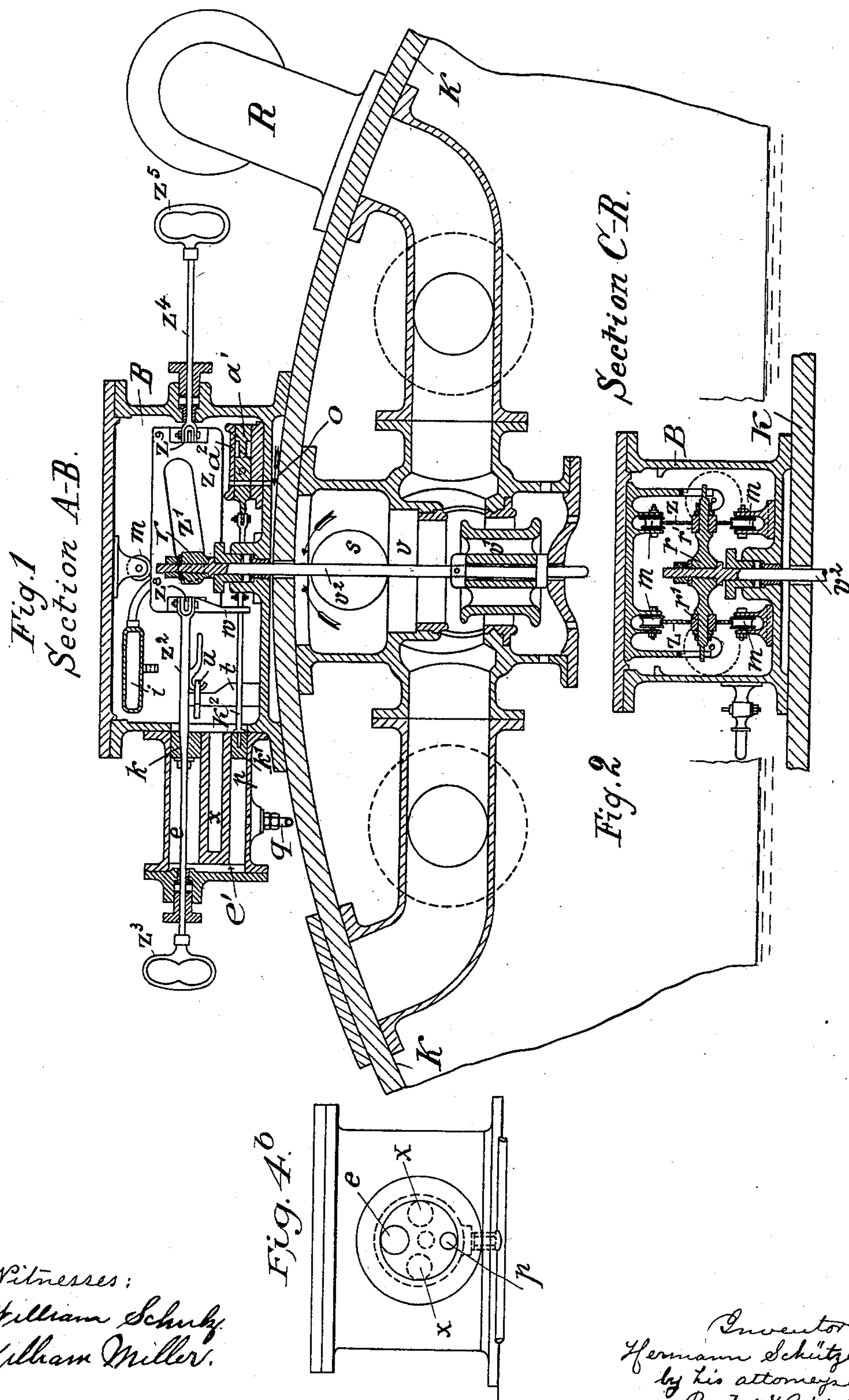
Patented Sept. 18, 1900.

H. SCHÜTZE.
THROTTLE.

(Application filed Dec. 28, 1899.)

(No Model.)

2 Sheets—Sheet 1.



UNITED STATES PATENT OFFICE.

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THROTTLE.

SPECIFICATION forming part of Letters Patent No. 658,160, dated September 18, 1900.

Application filed December 28, 1899. Serial No. 741,786. (No model.)

To all whom it may concern:

Be it known that I, HERMANN SCHÜTZE, manager of the gas and water works of Bremerhaven, a citizen of the free town of Bremen, residing at Bremerhaven, Germany, have invented certain new and useful Improvements in Devices for Automatically Shutting Off the Steam of Boilers in Case of Rupture of Steam-Pipes, of which the following is a specification.

This invention relates to an automatic device (which may be actuated also by hand) for shutting off the steam in boilers in case of explosions of steam-pipes or other explosions.

By this invention a safety device is provided serving to protect the enginemen against scalding in case of explosion by the escaping steam of high tension. The new construction is in particular suitable for marine boilers and steam-engines.

The main feature of the invention consists of the arrangement of a receiver on the outer (upper) or lateral boiler-shell, which may be termed an "accumulator" and is filled in its normal condition with steam having the same tension as that contained in the boiler, but which in case of an explosion maintains, when the tension in the pipe-conduit and in the boiler is suddenly reduced, a higher tension, serving to shut off the steam-conduit in the interior of the boiler by means of a suitable device.

In the accompanying drawings, Figure 1 is a vertical cross-section of part of a boiler provided with my improved shutting-off mechanism on line A' B', Fig. 3. Fig. 2 is a cross-section on line C D, Fig. 3. Fig. 3 is a plan of the accumulator B, with the cover removed; Fig. 4, a detail vertical section through slide-valve a' ; Fig. 4^a, a horizontal section of the same; Fig. 4^b, an exposed end view of cylinder e ; and Fig. 5, a horizontal section of valve a' and casing a , showing the pipe connections.

As may be seen from the cross-section of the boiler in Fig. 1, there is arranged in the interior of the boiler K a double-seat check-valve $v v'$, which when opened admits the steam of the boiler through the openings into the pipe-conduit R to the steam-conduit (ac-

cumulator) S, leading to the engines. Above this double-seat check-valve there is connected or riveted to the outer shell of the boiler a receiver (accumulator) B. The spindle v^2 of the check-valve passes through an aperture of the boiler-shell and through the bottom of the accumulator B into the interior of the latter. The passage of the valve-spindle v^2 through the bottom of the accumulator is tightened by means of a stuffing-box.

To the upper end of the spindle v^2 is secured a cross-bar r , Fig. 2, carrying on both ends rollers r' , engaging into two oblique slots Z' , provided in plates Z , which are guided on rollers m . The ends of these two plates Z are rigidly connected with each other by cross-bars $Z^8 Z^9$. The cross-bar Z^8 is connected with the piston-rod Z^2 and the latter with the piston k , sliding in the cylinder e . The lengthening-piece of the piston-rod Z^2 is passed, by means of a stuffing-box, through the bottom of the cylinder e , and at the outside it is provided with a handle Z^3 . The cross-bar Z^9 is connected to a drawing-rod Z^4 , provided with a handle Z^5 , which is led, by means of a stuffing-box, through the front wall of the accumulator B. By means of the handles Z^3 and Z^5 the plates guided between rollers m can be moved to and fro, and it results therefrom an opening and closing of the check-valve $v v'$, as owing to the slot Z' , arranged in plates Z , the valve-spindle v^2 is raised and lowered. The passage of the lengthened piston-rod Z^2 through the bottom of the cylinder e and the passage of the drawing-rod Z^4 through the opposite front wall of the accumulator (having the same diameters) have, however, not only for their purposes to allow of moving the valve by hand, but it has principally to effect that the equilibrium, and in consequence thereof also the working of the automatic check device, be insured at a determined difference of tension between the steam of the accumulator and of the conduit, also when an explosion takes place at a moment where the usual working pressure in the boiler is reduced by contrary winds or by the failing of the exhausters of the chimney or by the periodical formation of slag on the grates, &c., gradually to a small number of atmospheres.

Below the cylinder *e* a second cylinder *p* is arranged, which is in communication with the first cylinder *e* by duct *e'*, as shown in Fig. 1. In this cylinder *p* slides a piston *k'*,
 5 connected by a drawing-rod and yoke *k²* with a valve *a'* sliding in a cylinder *a*, open on both sides and arranged in the accumulator B. The working of this slide-valve *a'* will hereinafter be more fully described. As above al-
 10 ready said, the cylinders *e* and *p* are in communication with each other. By a conduit *q* these two cylinders are connected with the steam-collector S, as illustrated in Fig. 3. If an explosion of a pipe or another explosion
 15 occurs, the pressure will be reduced on account of the sudden violent escape of steam, first in the steam-collector S, and then also in the steam-boiler. The pressure will therefore be lower than in the accumulator B, for the
 20 steam in the accumulator B can return only slowly through the small section of the boring *o* into the interior of the boiler, so that in any case where the cross-section of the aperture suddenly produced by the explosion is larger
 25 than the cross-section of the boring *o* the production of a corresponding overpressure in the accumulator B is insured. In the conduit-pipe *q* there is at the same time a low pressure, likewise also in the cylinders *e* and *p*,
 30 being in communication with the conduit *q*. In consequence thereof the pistons *k* and *k'* are moved by the overpressure in the accumulator B to the left. By this motion to the left of the piston *k* the valve-spindle *v²* is raised
 35 and the double valve *v v'* closed. Owing to the simultaneous motion to the left of the piston *k'* the valve *a'*, which mediates in normal working the communication of the steam between the interior of the boiler and the accu-
 40 mulator B through the boring *o*, shuts off, on one hand, this communication but puts, on the other hand, by means of the recess *a²* and of the conduit-pipe *l*, the conduit *q* in communi-
 45 cation with the chimney, so that the steam contained in the broken conduit is led away and rendered innocuous. If after the damage caused by the explosion has been repaired working steam is to be introduced again into the collecting-pipe, the steam inclosed in the
 50 accumulator B is caused to flow through the cock *q'* into the collecting-pipe and the double-seat valve *v v'* is opened by moving the handles *z³ z⁵* to the right.

All the check devices of the boilers of a
 55 ship may be connected to the conduit *q*, which is filled with steam from the steam-collector S, and separately be cut off by means of cocks. By this invention the result is obtained that in case of an explosion all the steam-boilers
 60 of a ship can be cut off at the same time.

In order that the steam introduced through the pipe-conduit *q* has in the cylinders *e* and *p* always the same tension as the steam in the accumulator B, it is led through a heater *i*,
 65 arranged in the interior of the accumulator B—that is to say, it is supplementarily heated, so that the same pressure is in the accumu-

lator B as in the cylinders *e* and *p*. The bores *x x x*, Fig. 1, at the left hand, which are in communication with the interior of the accu-
 70 mulator, serve also to heat the cylinders *e* and *p* for maintaining the steam therein at the tension of the steam in the accumulator B.

If steam coming from the steam-collector S were used without being heated supplementarily, a precise working of the check device would not be possible, as the conduit *q*, lead-
 75 ing this steam from the steam-collector S to the cylinders *e* and *p*, is exposed on its way, more or less, to cooling. In case of rupture
 80 of a pipe-conduit the steam of a boiler is therefore cut off automatically and with certainty by the described device. In this case or at any other moment of danger, in particu-
 85 lar when a rupture occurs in stopped machines, where no flow of steam takes place in the conduits and where the production of a difference of pressure necessary for actuating the safety device is uncertain, the latter can
 90 be put in action by hand from any room of the ship by cooling the pipe-conduit *p* in a high degree at any proper place, so that a partial condensation, and in consequence thereof
 95 a decrease of the pressure, is obtained in the conduit *q*. The result therefore, as above described, is a closing of the check-valve *v v'*. In Fig. 3 there is provided in the conduit *q* at *c*
 100 a loop, which is inclosed by a receiver *c'*. Into this receiver water is introduced from any suitable water-tank *w*, Fig. 3, by opening a
 105 cock *h*, so that the conduit *q* is cooled on the corresponding place and the tension of the steam contained therein reduced. The conduits of water leading to the cooling-place of the pipe *q* may be arranged in several parts
 110 of the ship, so that it is only necessary to open the cock *h*, provided at the corresponding place for putting the safety device in activity.

If more check devices are used for one
 115 boiler-battery, it is not necessary to try regularly all these devices in order to know whether the resistances in their mechanisms have increased. It will be sufficient to examine in this respect only one device, for
 120 by the regular working of one device all the other ones connected with the common conduit *q* are set to work with absolute certainty, as the steam contained in the conduit *q* is led away by means of a valve *a* into the chimney, so that the left surfaces of all the pistons *k*, Fig. 1, are completely released and put in motion.

I claim—

1. The combination of a boiler with an accumulator, means for connecting the boiler with the accumulator, a piston actuated by an excess of steam-pressure in the accumulator, and a steam-controlling valve actuated by the piston, substantially as specified.
 125 130

2. The combination of a boiler with an accumulator, a slide-valve that normally connects the boiler with the accumulator, a piston actuated by an excess of steam-pressure

in the accumulator, and a steam-controlling valve actuated by the piston, substantially as specified.

5 3. The combination of a boiler with an accumulator, a slide-valve that normally connects the boiler to the accumulator, a piston actuated by an excess of steam-pressure in the accumulator, a steam-heater within the accumulator, and a steam-controlling valve
10 actuated by the piston, substantially as specified.

4. The combination of a boiler with an accumulator having a cylinder, a piston mov-

able therein, means for connecting the piston with the steam-controlling valve, a steam- 15 pipe having a loop and communicating with the cylinder, and a cooling-reservoir inclosing the loop, substantially as specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing 20 witnesses.

HERMANN SCHÜTZE.

Witnesses:

A. ROHAC,
H. BEHREND.