(No Model.)

L. M. V. BLANC.

APPARATUS FOR PREVENTING ESCAPE OF STEAM FROM BOILERS IN CASE OF RUPTURE OF PIPES.

No. 597,810. Patented Jan. 25, 1898.

FIG: 1.

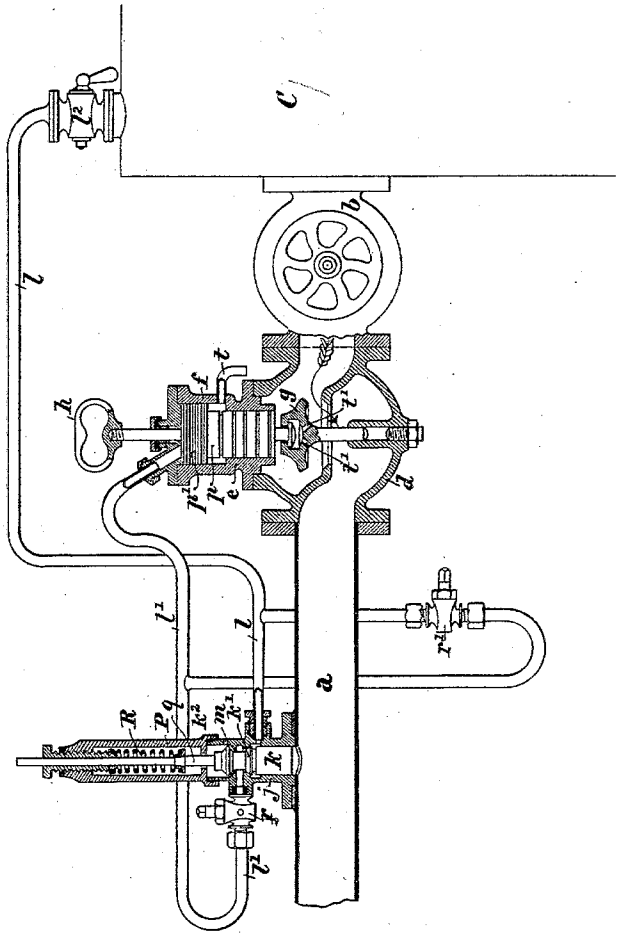
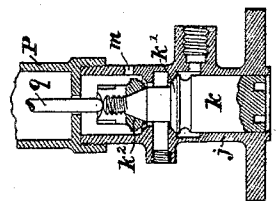


FIG: 2.



Witnesses
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UNITED STATES PATENT OFFICE.

LOUIS MARIUS VALENTIN BLANC, OF PARIS, FRANCE.

APPARATUS FOR PREVENTING ESCAPE OF STEAM FROM BOILERS IN CASE OF RUPTURE OF PIPE.

SPECIFICATION forming part of Letters Patent No. 597,810, dated January 25, 1898.

Application filed February 3, 1897. Serial No. 621,806. (No model.) Patented in France September 5, 1895, No. 250,080; in Belgium September 7, 1895, No. 117,299, and in England September 7, 1895, No. 16,795.

To all whom it may concern:

Be it known that I, LOUIS MARIUS VALENTIN BLANC, engineer, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Apparatus for Preventing the Escape of Steam from Steam-Boilers in Case of Rupture of the Steam-Pipe and Applicable to other Vessels Containing Fluid under Pressure, (for which I have obtained patents in France, No. 250,080, bearing date September 5, 1895; in Belgium, No. 117,299, bearing date September 7, 1895, and in Great Britain, No. 16,795, bearing date September 7, 1895,) of which the following is a specification.

My invention relates to an automatic device intended to prevent the occurrence of accidents consequent upon the bursting of steam-pipes in installations of marine or other boilers by cutting off all communication between the boiler and the atmosphere immediately upon the bursting of a pipe.

In the accompanying drawings, Figure 1 is a general view of my safety device or automatically-closing valve in sectional elevation. Fig. 2 is a detail view of a portion of the device upon a larger scale.

Upon the main steam-pipe a, leading from the boiler C to the machinery, is first arranged the ordinary stop-valve b, and after this valve-box d, upon which are fitted the cylinders e f, of unequal diameters, which serve as a cover for the said valve-box. The valve g, arranged in the box d, allows the passage of the steam from the boiler to the pipe a when raised and completely interrupts such passage of the steam when it is resting upon its seat. The valve g moves as a whole with the pistons p p', which are mounted upon the same rod and slide easily in the cylinders e and f. These pistons can be moved directly by hand by means of the handle h, but they are also moved at the proper moment by the steam coming from the boiler C, the handle h then serving only to indicate the position of the valve g by means of a scale marked upon it. Upon the pipe a is also arranged at a short distance from the valve-box d a cylinder j, in which moves a piston k, rigidly connected with the two drop-valves k' k^2, and from which lead two pipes l l', of which l leads directly to the boiler C and is governed by the steam-cock l^2, while the other pipe l' communicates with the upper portion of the cylinder f. The cylinder j is also provided with an orifice m, communicating with the atmosphere, and has arranged upon it a second cylinder P, in which a spiral spring R is located. The spring R acts directly in a downward direction upon the piston k and the drop-valves k' k^2 by means of the rod q, as is clearly shown in the drawings. The resistance of this spring is calculated in such a manner as to be always inferior to the force exercised by the steam coming from the boiler at full pressure. For a boiler-pressure of twenty-two pounds, for example, the spring employed should be capable of resisting a pressure of about sixteen to eighteen pounds.

Now when steam at full pressure passes along the pipe a the piston k, and with it the drop-valves k' k^2, is lifted. The drop-valve k^2 having thus left its seat, the pipe l' is placed in free communication with the air by means of the opening m, while the drop-valve k' being pressed upon its seat the steam in the pipe l cannot pass above the piston k. If, on the other hand, the pressure in the pipe a suddenly falls, as a result of a fracture, the spring R causes the piston k, and with it the valves k' k^2, to descend. The drop-valve k^2 rests upon its seat and cuts off the pipe l' from communication with the atmosphere. The drop-valve k' leaves its seat and places the pipes l and l' in communication. Finally, as accessories, a three-way cock r is arranged in the pipe l' near the cylinder j, a waste-pipe t is provided in the lower portion of the cylinder f, and openings t' t' are bored in the valve g to permit of the lifting of this valve should it have been allowed to remain upon its seat when the stop-valve b was opened.

The action of the device is as follows: When the machinery is being started, the piston k and valves k' k^2 are in their lower position, the cock l^2 for admitting steam to the pipe l is closed, and the cock r places the pipe l', and consequently the upper face of the piston p', in communication with the atmosphere. First, the valve g is raised by

hand by means of the handle h, and the stop-valve b is then opened. As the pipe a now contains steam at full pressure the resistance of the spring R is overcome and the piston k, with valves k' k^2, is raised. The cock r is turned so as to place the pipe l' in communication with the cylinder j, and the steam-cock l^2 of the pipe is opened. The upper face of the piston p' is thus in communication with the atmosphere by means of the pipe l', the cylinder j, and the opening m; but the steam which now fills the pipe l is not able to pass above the piston k into the cylinder j, as the valve k' is closed. The lower face of the piston p, which is rigidly connected with the piston p', being acted upon by the pressure of the steam, it follows that the valve g will remain raised and the supply of steam to the engine will take place in the ordinary manner. If, however, a fracture should occur in the steam-pipe a, the pressure beneath the piston k will suddenly fall, and the said piston, together with the valves k' k^2, will descend under the action of the spring R. Communication between the pipe l' and the atmosphere is interrupted by the closing of the valve k^2, the pipes l and l' being placed in communication, owing to the opening of the valve k'. The steam coming into the pipe l thus passes into the pipe l' and so acts upon the upper face of the piston p'. The diameter of the piston p' being greater than the diameter of the piston p, both pistons descend and the valve g is instantly closed. All communication between the boiler C and the pipe a is cut off and the possibility of an accident is prevented.

When a pipe has burst and the device has acted, the stop-valve b is closed, the supply of steam to the pipe l is stopped by closing the cock l^2, and the cock r is so turned as to place the pipe l' in free communication with the air. When the necessary repairs have been effected, the conditions are the same as when the engines were originally started. If at the moment of the opening the stop-valve b the valve g should have been allowed to remain upon its seat, the lifting of the said valve will take place automatically, owing to the openings t' t', with which it has been provided. This effect will be produced by means of the piston p, which rests upon the valve and prevents the steam from reaching the openings t' by passing around the guide-rod of the valve, which piston will be slightly raised at first. The steam will then pass through the openings t', and when the pressure beneath the valve g is sufficient the whole assemblage of parts will be raised and the normal conditions will be established. Finally, in order to permit of the closing of the valve g at any moment and on the occurrence of the slightest unusual noise in the working of the machinery a cock r' is interposed between the pipes l and l', as represented in Fig. 1 of the drawings. A workman provided with a key can by opening this cock bring about the instantaneous closing of the valve g, since the steam from the boiler is then conducted into the cylinder f above the piston p'.

In the case of a series of boilers my safety device arranged upon each steam-pipe before the collecting-conduit absolutely prevents an explosion being transmitted from one boiler to another should an explosion of one of them take place, because immediately upon the occurrence of an explosion the pressure falls instantly in all the steam-pipes and the various valves thereupon close, thus cutting off all communication between the boilers and between each one of them and the atmosphere.

My automatically and optionally acting safety device is capable of being applied to any installation in which a fluid under pressure is the motive force.

I claim—

1. The combination with a motive-fluid conduit, a normally open cut-off valve therein, an actuating-piston for said valve, of an auxiliary conduit connecting the piston with the source of motive-fluid supply, and an independent auxiliary cut-off valve interposed in said auxiliary conduit and controlled by the pressure in the main conduit to establish and cut off the flow of motive fluid through the auxiliary conduit, for the purpose set forth.

2. The combination with a main conduit, of a normally open cut-off valve, an independent auxiliary valve, pipe connections between said valves and source of fluid-supply, said auxiliary valve controlled by pressure in the main conduit and adapted to automatically establish and cut off communication between the cut-off valve and source of fluid-supply, and means independent of the auxiliary valve for establishing communication between the cut-off valve and source of fluid-supply, substantially as set forth.

3. The combination with the main conduit, of a normally open cut-off valve, an independent auxiliary valve controlled by pressure in the main conduit, and pipe connections from the source of fluid-supply through the auxiliary valve to the cut-off valve, the auxiliary valve adapted to automatically establish and cut off fluid-supply from the cut-off valve, and means independent of the auxiliary valve for admitting fluid from the source of fluid-supply to the cut-off valve, substantially as set forth.

4. A valve-casing, a piston suitably guided, a stem depending from said piston, in combination with a valve loosely mounted on said stem and ports in said valve, so that the loose mounting and ports constitute a by-pass and allow the automatic lifting of the valve from its seat, substantially as set forth.

5. A valve-casing, two superposed pistons of different areas suitably guided, a stem depending from said pistons, in combination with a valve loosely mounted on the end of said stem, ports in said valve, so that the loose mounting and ports constitute a by-

pass to allow the automatic opening of the valve, and means for supplying fluid above the pistons to close the valve, substantially as set forth.

6. A valve adapted to regulate the supply of a fluid in an auxiliary conduit and operated by fluid-pressure in a main conduit, comprising a suitable casing, a piston, a valve and port above said piston, and a second valve and port above the first, a fluid-inlet into a chamber between the piston and first valve and a fluid-outlet in a chamber between the two valves, said fluid-outlet normally in communication with the atmosphere through the port of the second valve, whereby communication is established from the inlet through the first valve-port to the outlet due to a fall of pressure in the main conduit and communication from the outlet to the atmosphere cut off, substantially as set forth.

7. A valve adapted to regulate the supply of a fluid in an auxiliary conduit and operated by fluid-pressure in a main conduit, comprising a suitable casing, a piston, a valve and port above said piston, a second valve and port above the first, both valves rigidly connected to the piston, a spring controlling the valves to insure their opening and closing, a fluid-inlet into a chamber between the first valve and piston, and a fluid-outlet in a chamber between the two valves, said fluid-outlet normally in communication with the atmosphere through the port of the second valve whereby communication is established from the fluid-inlet through the first valve-port to the fluid-outlet due to a drop of pressure in the main conduit and communication with the fluid-outlet and atmosphere simultaneously cut off, substantially as set forth.

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

LOUIS MARIUS VALENTIN BLANC.

Witnesses:
FR. PAUL HAENSELL,
D. HORACE BRANDON.