

[54] **SAFETY VALVE**

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[58] Field of Search..... 137/489, 487.5, 488, 137/489.5, 492.5

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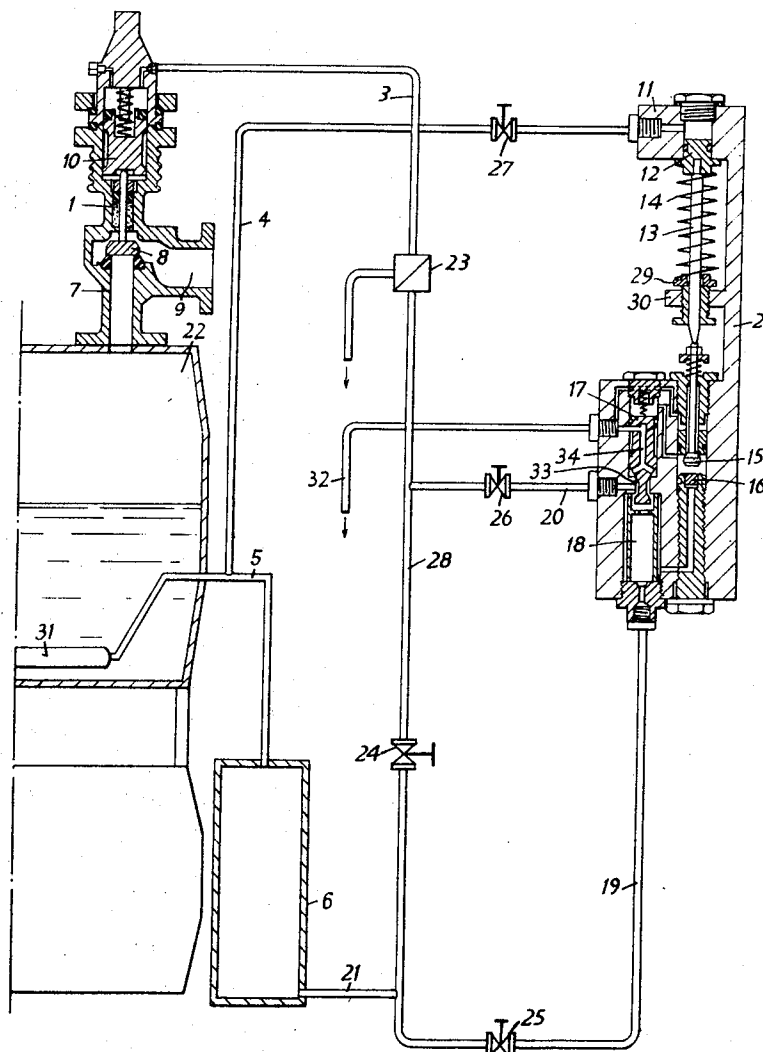
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[57] **ABSTRACT**

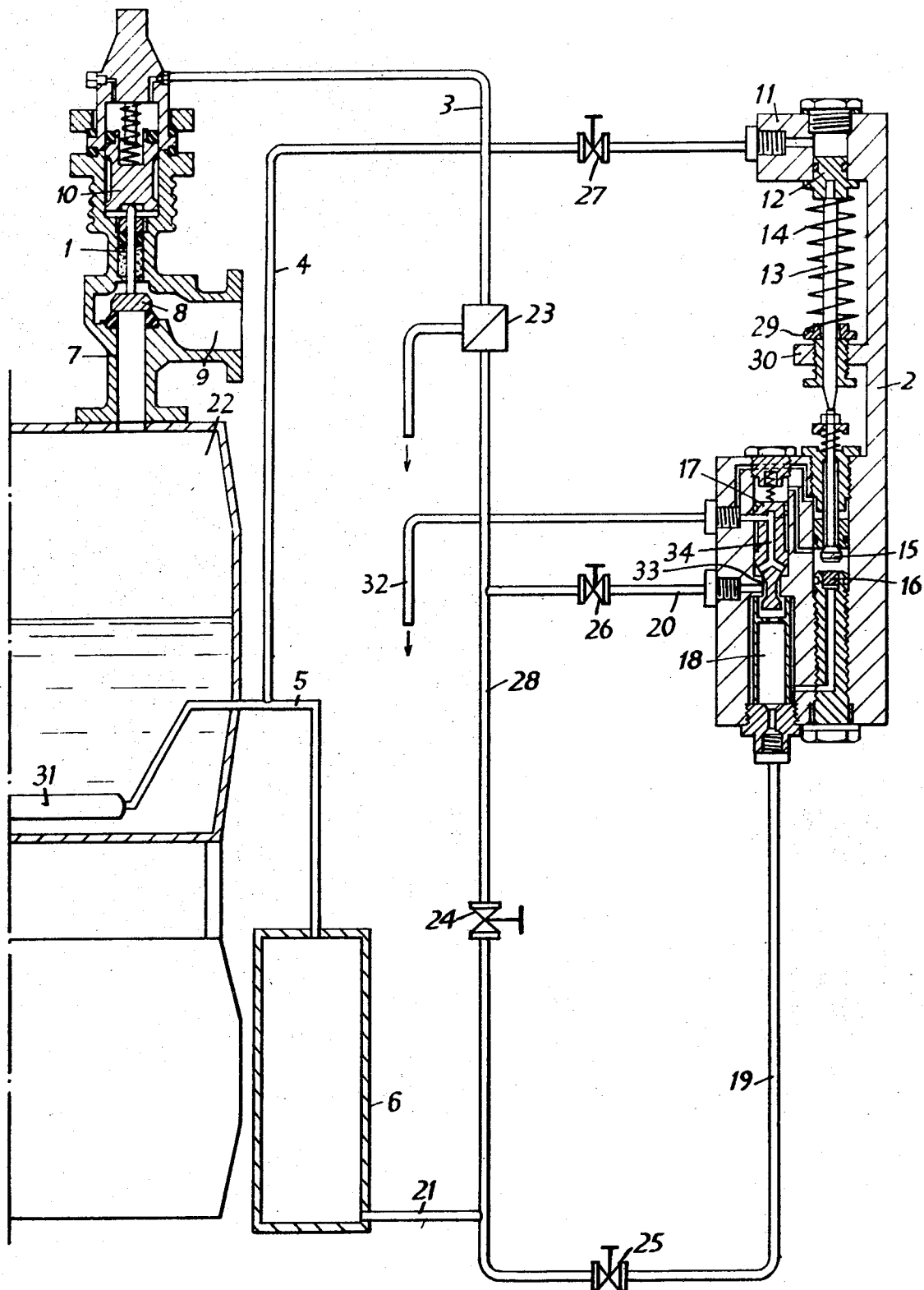
A safety system for a pressure fluid container has a blow-off valve to provide communication between the interior of the container and the atmosphere, a hydraulic ram controlling the blow-off valve, a hydraulic pressure feed circuit for the ram which is connected to the interior of the container through a buffer capacity, and pressure sensing means in which the pressure in the container acts in opposition to spring loading to control pilot valve means, so that when the container pressure rises above a predetermined value, pressure is reduced in the hydraulic pressure feed circuit to the ram, allowing the blow-off valve to open.

3 Claims, 1 Drawing Figure



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SAFETY VALVE

This is a continuation-in-part of my co-pending United States Patent application Ser. No. 807640 dated 17th March 1969 now abandoned.

The invention relates to a safety system designed to be fitted to equipment such as containers for storage or transport of fluids, liquids or gases, and in general to all installations where a safety device is required.

Its aim is to provide by means of its constructional features, a working precision suited to high-pressure equipment, and to make it possible to ensure remote control under all circumstances.

According to the present invention a safety system for a pressure fluid container comprises in combination, a blow-off valve to provide communication between the interior of the container and the atmosphere, a hydraulic ram controlling the blow-off valve, a hydraulic pressure feed circuit for the ram which is connected to the interior of the container through a buffer capacity, and pressure sensing means in which the pressure in the container acts in opposition to spring loading to control pilot valve means so that when the container pressure rises above a predetermined value, pressure is reduced in the hydraulic pressure feed circuit of the ram, allowing the blow-off valve to open.

Preferably the pilot valve means communicate with the hydraulic feed circuit between said buffer capacity and the ram.

Advantageously the hydraulic feed circuit of the ram includes a remote control valve interposed between the buffer capacity and the ram.

If desired butterfly valves are included in the hydraulic feed circuit in order to isolate the pressure sensing means.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing.

The device is shown diagrammatically as a whole.

The device comprises a blow-off valve 1, a pressure sensing means 2 which operates the blow-off valve 1 and intermediate piping 3, 4 and 5, and a buffer container 6.

The blow-off valve 1 is constituted by a casing 7 which is mounted onto the container to be protected 22, a valve member 8 which is urged into its closed position by means of a hydraulic ram 10, and an outlet 9 for the fluid to be released.

The pressure sensing means 2 is provided with an upper cylinder 11 in which a thrust piston 12 is provided; the thrust piston 12 is connected to a rod 13 and acted upon by a spring 14. The pressure exerted upon the thrust piston 12 by the spring 14 is adjustable by means of a threaded mounting 29 for the spring 14. The threaded mounting 29 is engaged with a threaded portion 30 of the framework of the pressure sensing means 2. Rod 13 acts on the stem of a valve member 15 against spring means.

Adjacent to valve member 15 are a pressure reducer 16, a free slidable member 17 and a filter element 18 which are all fed by piping 19.

24, 25, 26 and 27 are butterfly valves, valve 24 being closed during normal operation, valves 25, 26 and 27 being open.

The pressure in container 22 is transmitted through the piping 5 and then through piping 4 to the upper cylinder 11. When the pressure in the upper cylinder 11 exceeds the pressure imposed on the thrust piston 12

by the spring 14 it will cause the thrust piston 12 and the rod 13 to move downwardly and open valve 15. Opening of valve 15 will allow fluid to flow from piping 19 through filter member 18 and pressure reducer 16 past valve 15 and out through outlet 32.

Pressure is also transmitted through the piping 5 into the buffer container 6 and thence via piping 21 and 19 to the lower end of the free slidable member 17 via filter element 18.

The free slidable element 17 is urged downwardly by spring means in combination with pressure acting on its upper end. However, when valve 15 is open there is a release of pressure in the fluid acting on the upper end of element 17, and a relative increase of pressure acting through piping 19 onto its lower end. This causes element 17 to slide upwardly allowing fluid from piping 20 to flow through the aperture 33 past the lower end of the element 17 and to escape from the system via outlet 32. With the escape of fluid through outlet 32 pressure will be reduced in piping 3 which feeds the hydraulic ram 10.

Following reduction of pressure in piping 3 and the consequential reduction of pressure in the hydraulic ram 10, the valve member 8 will lift and allow excess pressure from the container 22 to escape via outlet 9. Owing to the back pressure in the piping 3 the valve member 8 will open smoothly but completely.

After valve member 8 has opened the pressure in container 22 will fall and the pressure drop will be transmitted via piping 5 and 4 to the upper cylinder 11 of the sensing means 2, which will cause the thrust piston 12 and rod 13 to move upwardly under the influence of spring 14. Valve 15 will then close under the action of its own spring. (Valve 15 is of the type commonly called a "clack", i.e. it is either wholly open or wholly closed, it has no intermediate positions).

When valve 15 closes fluid entering the pressure sensing means 2 via piping 19 passes through filter element 18 and pressure reducer 16 acts on the upper end of free slidable member 17 and with the aid of the spring moves the free slidable member 17 downwards into the aperture 33 thus cutting off the flow through the outlet 32. This in turn causes pressure to be re-established in piping 20 and 3.

When the pressure in piping 20 and 3 builds up and attains the pressure in container 22 the hydraulic ram 10 will move downwardly causing valve member 8 to close and the apparatus is reset.

Buffer container 6 protects the pressure sensing means 2 from sudden shocks caused by a rapid rise or fall in pressure.

It is possible, by opening the butterfly valve 24, and closing the butterfly valves 25, 26, to eliminate the part played by the pressure sensing means 2, while retaining the possibility of remotely controlling the safety valve by operating a remote control valve 23.

The butterfly valve 27 makes it possible, by the closing of the butterfly valves 25, 26, 27, completely to isolate the pressure sensing means and possibly to replace it with an instrument calibrated in advance, this to allow inspection of the pressure sensing means without shutting down the installation.

The remote control valve 23 allows the safety valve to be operated irrespective of the pressure inside the container 22, by manually allowing pressure to drop in piping 3.

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This remote control valve 23 may be incorporated in a control panel even a considerable distance from the container.

The sensing means 2 is fitted with the filter element 18 so that the circuits cannot become blocked, and the operating of the free slidable member 17 and the valve 15 cannot be disturbed, which makes the device completely safe in operation. All parts are immediately accessible.

I claim:

1. A safety system for a pressure fluid container comprising in combination, a blow-off valve to provide communication between the interior of the container and the atmosphere, a hydraulic ram controlling the blow off valve, a hydraulic pressure feed circuit for the ram which is connected to the interior of the container

through a buffer capacity, pressure sensing means in which the pressure in the container acts in opposition to spring loading to control pilot valve means so that when the container pressure rises above a predetermined value, pressure is reduced in the hydraulic pressure feed circuit of the ram, allowing the blow-off valve to open, and valves which when closed isolate the pressure sensing means from the buffer capacity.

2. A safety system as claimed in claim 1, wherein the pilot valve means communicate with the hydraulic feed circuit between said buffer capacity and the ram.

3. A safety system as claimed in claim 1, wherein the hydraulic feed circuit of the ram includes a remote control valve interposed between the buffer capacity and the ram.

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