

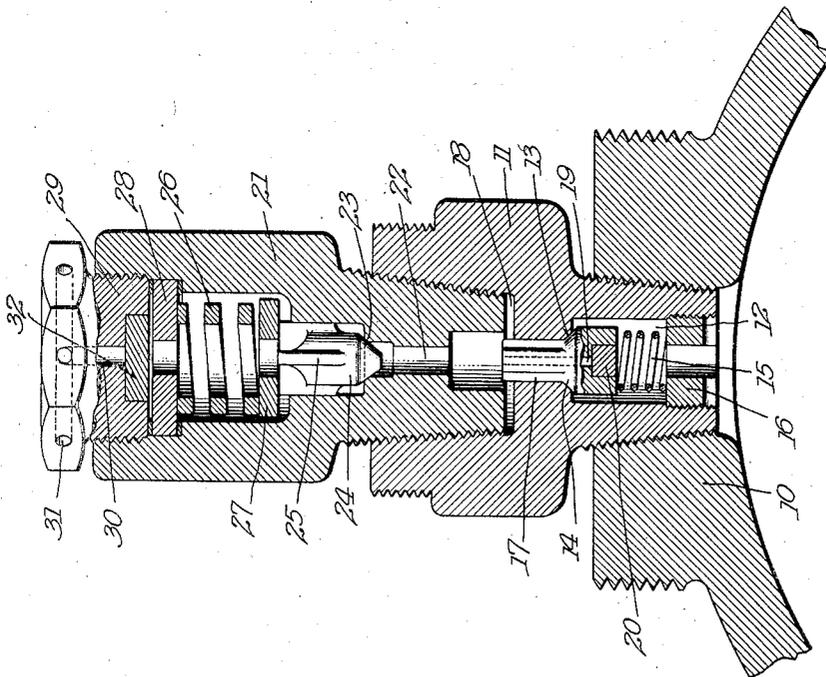
July 19, 1927.

1,636,065

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HIGH PRESSURE GAS VALVE AND SHIPPING PLUG

Filed Jan. 16, 1922



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HIGH-PRESSURE GAS VALVE AND SHIPPING PLUG.

Application filed January 16, 1922. Serial No. 529,798.

The present invention relates to pressure controlling and retaining devices for fluid containers, and in the particular embodiment herein shown and described, will be disclosed in connection with gas containers, but it will be understood that it may be used with any fluid container in which pressure must be retained or controlled.

Primarily, the development is intended for use with the cylinders in which rare or lethal gases are stored. In the storage of gases of this character, it is essential that their escape be very carefully guarded against, as the loss of the rare gas by leakage is costly, and the escape of lethal gas is, of course, dangerous. The containers or cylinders in which these gases are ordinarily stored are subjected to various conditions in transportation and in storage warehouses, and it is necessary to provide sealing means for such containers which will meet any extraordinary conditions, as, for example, high temperatures which would cause expansion of the gases beyond the safety point, and explosion of the containers. Furthermore, means must be provided for the filling or drawing off of the gases from the container, and such means must, of course, be capable of effectively controlling the flow to and from the containers to the receptacles which receive the gas, and must be so made as that all danger of escape, except through the desired conduit, will be eliminated.

The retaining and controlling devices, herein disclosed, are adapted to accomplish all of these results, and comprise a sealing plug for use when the cylinders are in storage or in transit, which will effectively retain the contents of the cylinder and which will respond to temperatures which would be dangerous by permitting escape of the exact proportion of the contents of the cylinder which is necessary to the maintenance of a normal or safe pressure, immediately closing when the pressure is reduced to normal; and a controlling and release valve for use in delivering the gas from the container, which control and release valve is also provided with a safety device so as to guard against excessive expansion due to an unusual rise in temperature or other causes.

The development takes several forms, as

will appear from the drawing and description, and in said drawing:

The drawing is a vertical sectional view of a shipping plug, a portion of any suitable cylinder or retainer being conventionally shown.

Referring to the drawings by numbers, like numbers indicating like parts in the several views, 10 indicates any suitable container having a threaded neck portion to receive a shipping plug or valve.

In the form of the development shown in the drawing the plug member 11 is threaded into the neck of the container with preferably a tapered gas tight joint. The member 11 has a through passage, the lower end 12 of which is enlarged and has a valve seat 13 formed at its top. A valve member 14 seats against this valve seat 13 and is normally held by the spring 15 in closed position, that spring being supported by an annular plug 16 threaded into the lower end of the chamber 12, the plug 16 being nicked or otherwise fashioned to receive a suitable tool for inserting or removing it from the chamber 12. The stem 17 of the valve passes upwardly through the passage in the member 11 projecting slightly above the bottom of the recess 18 in the plug member 11. The said stem 17 has a through passage 19, the lower end of which is closed by a seal 20 of material which will fuse at a predetermined temperature so as to open the passage 19 in the valve and permit escape of excess pressure due to increased temperature.

It is obvious that if no provision was made for controlling the escape of gas after the seal 20 has melted, the entire contents of the container 10 will escape, and this, in the case of rare gases, would be costly, and in the case of lethal gases, dangerous. In order to control this escape of gas, reduce pressure only to the point of safety, and minimize the loss of gas, there is provided the safety and control member 21, the lower end of which is threaded or otherwise suitably secured in the recess or socket 18 in the top of the plug member 11. The member 21 has the passage 22, the lower end of which is enlarged, as shown, so that when the member 21 is inserted in the recess 18, the enlarged lower end of the

passage 22 will span the upper end of the stem 17 of the valve, and all danger of unseating that valve is eliminated. The passage 22 has formed, at its upper end, a valve seat 23 against which is the downwardly seating valve 24 having wing projections 25 which guide its movements in the valve receiving chamber, the valve 24 being held normally closed by a spring 26, an annular washer 27 being interposed between the spring and the valve, the upper end of the spring bearing against an annular washer 28, which washer is suitably packed in its seat and is held tightly thereto by the screw plug 29 threaded in the upper end of the member 21 and provided with the vertical passage 30 and lateral passages 31. The passage 30 in the screw plug is sealed, at its lower end, by a disk of material 32 which will fuse at a predetermined temperature.

From the foregoing, it will be seen that, under normal conditions, escape of the contents of the chamber 10 is prevented by the two valves 14 and 24, the valve 14 being held tightly to its seat by pressure within the container, and the valve 24 being held tightly to its seat by the spring 26, which is of sufficient strength to maintain that valve 24 closed against the normal pressure in the container 10. If, therefore, for any reason, the valve 14 should become deranged, the gas would still be effectively held by the second valve 24, and a double element of safety is, therefore, provided.

It will be seen, however, that in event of excess pressure developing in the container because of high temperature, the sealing disks 20 and 32, responding to that same high temperature, will melt, and there will then be a through passage from the container 10 to the escape passages 31 in the screw plug 29; the valve 24, of course, responding to the excess pressure in the cylinder, will be opened against the spring 26 and permit the dangerous pressure to escape. It will be observed, however, that the valve 24 and its spring 26 will, the instant pressure has been reduced to normal, close and effectively prevent the loss of the entire contents of the container. This is of great importance, for, after the reduction of a comparatively few pounds in the container, the point of danger of explosion has been passed, and the contents remaining in the cylinder can thus be retained.

This constitutes the shipping plug for fluid containers. It will be understood that the plug members 11 and 21 are hexed, or otherwise suitably formed, for the application of proper tools for inserting or removing them from their assembled condition, and the container 10 will, as is usual, be provided with an exteriorly threaded neck to receive a temporary protecting cap (not

shown) to guard the shipping plug against injury in transportation.

It is to be understood, that instead of the fusible seals 20 and 32, we may, if desired, use seals made of frangible material, which will break when the pressure reaches a danger point.

Changes in the construction and assembly of parts as constitute mechanical skill and the adoption of equivalent expedients may, of course, be made to this disclosure, and still be within the purview of the invention.

We claim:

1. In a pressure storage container, a part having a passage therethrough, a valve in said passage seated by the pressure within the container, means associated with said valve to relieve pressure past said valve under emergency conditions, a second valve controlling the flow past said first named valve, and means normally closing said second valve against pressure.

2. In a device of the class described, a part having a passage therethrough, a pressure seated valve in said passage, means associated with said valve to relieve pressure past said valve under emergency conditions, a second valve controlling the flow past said first named valve, means normally closing said second valve against pressure, and means associated with said second valve to relieve pressure to atmosphere under emergency conditions.

3. In a device of the class described, a part having a passage therethrough, a pressure seated valve in said passage, destructible means normally preventing flow past said valve, a second valve controlling the flow past said first named valve, means normally closing said second valve, and means destructible under emergency conditions normally preventing flow past said second valve.

4. In a device of the class described, a part having a passage therethrough, a pressure seated valve in said passage having an escape aperture, destructible means normally closing said aperture, a second valve controlling flow from said aperture, means for closing said second valve, an emergency escape passage leading to atmosphere, and fusible means normally closing said escape passage.

5. In a device of the class described, the combination of a part having a passage, a pressure seated valve in said passage having an escape aperture, fusible means normally closing said aperture, a second valve in said passage opening under pressure, and means for seating said second valve against normal pressure.

6. In a device of the class described, the combination of a part having a passage, a pressure seated valve in said passage having an escape aperture, fusible means normally

5 closing said aperture, a second valve in said
 passage opening under pressure, means for
 seating said second valve against normal
 pressure, an emergency escape passage lead-
 10 ing to atmosphere, and fusible means closing
 said escape passage.

7. In a device of the class described, the
 combination of a part having a passage
 therethrough, a pressure closed valve in said
 10 passage having an escape aperture, fusible
 means closing said aperture, a pressure
 opened valve in said passage, a spring clos-
 ing said valve against normal pressure, an
 15 emergency escape opening to atmosphere be-
 hind said second valve, and fusible means
 closing said second emergency escape pas-
 sage.

8. In a device of the class described, the
 combination of a member adapted to be in-
 20 serted in an aperture in a container and hav-
 ing a passage therethrough, a valve normal-
 ly closed by the container pressure in said
 passage and having an escape aperture, fusi-
 ble means closing said aperture, a second
 25 member detachably connected with said first

member and having a passage therethrough,
 a pressure opened valve in said passage, a
 spring closing said second valve against nor-
 mal pressure, an emergency escape passage
 to atmosphere in said second member behind
 30 said valve, and fusible means closing said
 second escape passage.

9. In a device of the class described, a plug
 member adapted to engage an aperture in a
 container and having a passage there-
 35 through, a pressure closed apertured valve
 in said passage, fusible means closing the
 aperture in said valve, a second member de-
 tachably connected to said first named mem-
 ber and having a through passage, a valve
 40 closing against pressure mounted in said
 passage, a spring closing said valve against
 normal pressure, a screw plug in said second
 member having an emergency escape pas-
 sage therethrough, and fusible means nor-
 45 mally closing said passage.

In testimony whereof we have hereunto
 set our hands.

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