

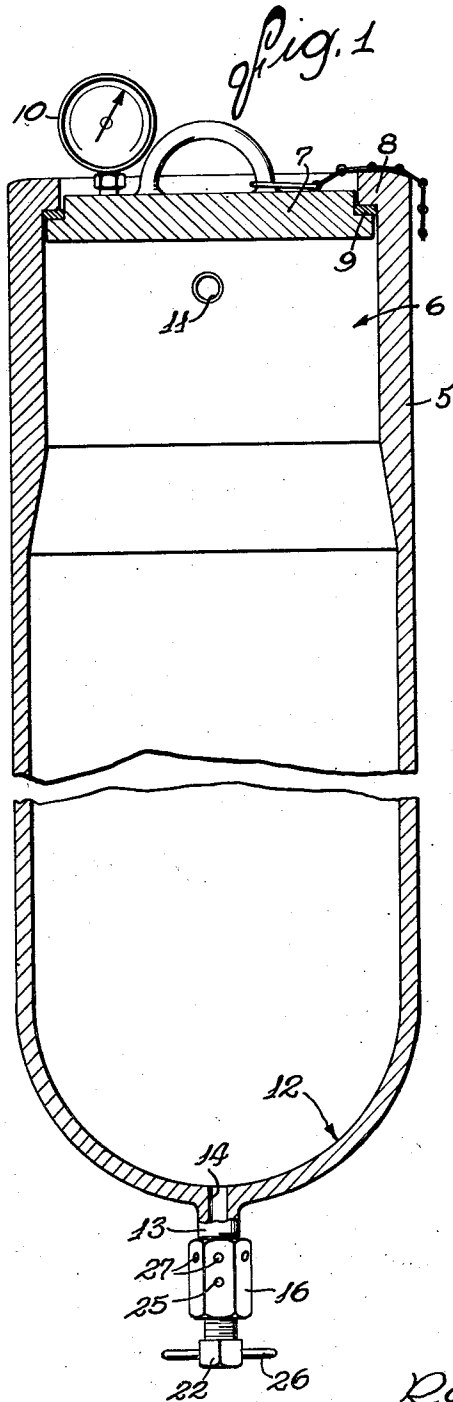
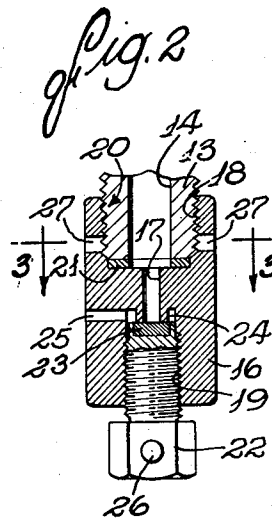
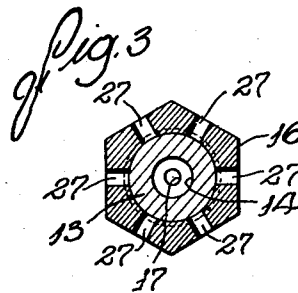
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BLOWOFF VALVE FOR CARBON DIOXIDE CONVERTERS

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BLOWOFF VALVE FOR CARBON DIOXIDE CONVERTERS

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1 Claim. (Cl. 137—21)

The invention relates to blowoff or scavenging valves for pressure vessels and more particularly to an improved blowoff valve suitable for use with carbon dioxide converters.

5 The improved blowoff valve is particularly suitable for use with carbon dioxide converters of the general type shown in my Patent No. 2,181,195 granted November 28, 1939. Such converters include a strong metal vessel or container adapted to receive solid carbon dioxide which is converted therein to gaseous form. Any foreign matter contained in the carbon dioxide, such as oil or the like, collects in the bottom of the container and is removed through an outlet in the bottom wall. It is customary to equip the outlet with a manually operable valve which can be utilized to relieve the pressure in the container and at the same time permit discharge of the foreign material. It is also desirable at times to remove the valve to permit convenient access to its interior as well as to the interior of the container for more thorough cleaning. Because of the extremely high pressure involved, it is inadvisable to remove the valve without first bleeding off the gas in the container or at least substantially reducing the pressure.

One object of the invention is to provide a valve of novel and advantageous construction arranged to automatically vent the container to the atmosphere in a safe manner as an incident to its removal from the container.

It is also an object of the invention to provide a valve structure of the above general character which is easy to clean, and which, by reason of its simple rugged construction, is inexpensive to manufacture and capable of giving long service without attention, and which is safe, efficient and reliable in operation.

In the drawing:

40 Figure 1 is a longitudinal sectional view of a carbon dioxide converter equipped with a blowoff valve embodying the features of the invention.

Fig. 2 is a vertical sectional view of the valve.

45 Fig. 3 is a transverse sectional view of the valve taken along the line 3—3 of Fig. 2.

By way of illustration, the improved valve constituting the present invention has been shown and described herein as installed in one of the units of a carbon dioxide converter of the type disclosed in my patent above referred to. The unit as shown comprises a hollow generally cylindrical vessel 5 adapted to be supported in a vertical position. This vessel constitutes a container for solid carbon dioxide, blocks of which 55 may be inserted therein through a large opening

6 in its upper end. The opening is closed by a suitable cover 7 having its peripheral edge portion shaped to cooperate with a downwardly facing shoulder or flange 8 extending around the opening. An annular gasket 9 may be interposed 5 between the cover and the flange and, as the pressure in the container builds up due to the conversion of the solid carbon dioxide to a gaseous state, the cover is forced upwardly against the gasket to effectually seal the container. A 10 pressure gauge 10 may be mounted on the cover 7 to provide a visual indication of the pressure conditions in the container.

As is well known, the conversion of the solid carbon dioxide to its gaseous state is effected 15 upon warming of the container as by exposure to ordinary room temperatures. The gas so formed is confined in the container under pressures often reaching 1,000 pounds per square inch and may be drawn off through a suitable outlet 11. 20 This outlet is preferably located in the upper portion of the container so that none of the foreign material such as liquid or solid impurities introduced with the carbon dioxide, are entrapped in the withdrawn gas. The foreign materials collect at the bottom of the tank and may be removed periodically as explained hereinafter.

To facilitate the removal of foreign material, the container is formed with side walls which converge to form a generally rounded surface at the bottom of the container as indicated at 12. Formed integrally with the container walls is a nipple 13 through which extends an outlet port 14 opening into the bottom of the container. The novel blowoff valve provided by the present 35 invention is particularly adapted for removable attachment to the nipple 13 for controlling the flow of gas through the outlet port to relieve the pressure and to scavenge the container.

Referring more particularly to Fig. 2 of the 40 drawing, the improved blowoff valve as herein shown comprises an elongated metal body 16 preferably of hexagonal cross-section which may be made in the form of a casting or machined from bar stock as desired. In either case only 45 simple machine operations are required to produce the finished valve, thus reducing manufacturing costs to a minimum.

Extending axially through the valve body 16 is a bore 17 of relatively small diameter which 50 opens into large counterbores 18 and 19 in opposite ends of the body. The counterbore 18, which is located at the upper end of the body, is dimensioned to fit over the end of the nipple 13 and is threaded internally for cooperation with 55

external threads formed on the nipple. The elimination of the internal threads from the nipple is advantageous in eliminating surface irregularities in which foreign matter might collect and thus materially facilitates cleaning of the container. The valve structure, of course, can be easily detached from the container for cleaning and, due to its relatively small size and simple construction, all parts are readily accessible for this purpose.

To insure a tight seal between the valve body 16 and the nipple 13, an annular washer 21 of fiber or other suitable material is inserted in the counterbore 18 for engagement with the end of the nipple which is desirably accurately machined to provide a tight sealing fit. Due to the hexagonal form of the body, its installation on the nipple and removal therefrom may be effected with an ordinary wrench.

The counterbore 19 which is located at the lower end of the body 16 is threaded for the reception of a threaded valve member 22. The valve member is formed at its inner end with a recess for holding a disk-shaped sealing member 23 of fiber or the like adapted to seat against the end wall of the counterbore and effectually close the lower end of the bore 17. To insure proper seating of the member 23 and to confine the wear to the member, the end wall of the counterbore may be undercut as indicated at 24. When the valve member is backed off, in this instance by turning it in a counterclockwise direction as viewed in Fig. 2, the sealing member 23 is drawn back from the bore 17 and the gas flowing therethrough is discharged through a transverse bleeder port 25 which opens from the upper end of the counterbore 19.

As the bleeding operation is a frequent occurrence, it is desirable that the valve member be capable of manual operation. To this end the bore 17 and the port 25 are made relatively small so that excessive binding, due to the high pressures involved, is avoided. Moreover, the valve member is provided with suitable means such as a cross pin 26 which can be conveniently gripped by the fingers for turning the member.

When the valve is opened in the above manner, the flow of gas acts to scrub the bottom walls of the container and to carry the accumulated foreign material out through the valve bore and bleeder port. Any material entrapped in the valve structure itself may be conveniently removed by unscrewing the valve body 16 and the valve member 22, thus providing convenient access to the interior parts of the structure.

Before the valve body is removed from the container for cleaning or other purposes, the pressure in the container should be reduced substantially to atmospheric pressure to avoid damage to the threads, or other parts of the container and valve structure and to preclude any possibility of the attendant being injured by a sudden discharge of gas under extremely high pressure. The pressure may be relieved, of course,

by backing off the valve member 22 but this is sometimes overlooked when the attendant is required to service a number of converters or when quick action is necessary. To avoid trouble from such oversights, means is provided for venting the container to the atmosphere when the valve body is turned a small amount as an incident to unscrewing it from the nipple. For this purpose the body is formed with a plurality of transverse vent holes 27 opening into the counterbore 18 closely adjacent the top of the washer 21. Thus, while the vent holes are effectually sealed when the valve body is screwed up tight on the nipple, even a slight turn of the body will serve to break the seal provided by the washer 21 so that leakage of gas through the vent holes may take place. This should warn the attendant to relieve the pressure in the usual way, but if the warning is ignored, further turning of the valve body will fully expose the vent holes which, in the aggregate, provide sufficient venting capacity to allow a high volume of pressure gas to escape and thus quickly reduce the pressure in the container.

It will be apparent from the foregoing that the invention provides a blowoff valve of novel and advantageous construction particularly suitable for use with high pressure vessels such as those employed in carbon dioxide converters. The valve is of very simple and rugged construction which makes it inexpensive to manufacture and simple to keep in proper working order. Further, by reason of its simplicity and the novel manner in which it is applied to the container, cleaning of both the valve and container is materially facilitated. Moreover, the valve incorporates safety features which automatically insure that the pressure in the container will be relieved before the valve is detached therefrom.

I claim as my invention:

A blowoff valve for a high pressure gas container having an outlet port extending through an externally threaded nipple, said valve comprising a body having a restricted axial bore communicating with enlarged counterbores opening at the upper and lower ends of the body respectively, the counterbore at the upper end of the body being internally threaded for engagement with the externally threaded nipple of the container, a transverse bleeder port extending through the body and opening into the counterbore at the lower end of the body, a manually operable valve member threaded into said last mentioned counterbore for controlling the flow of gas from the container through said axial bore to said bleeder port, and means for venting the container to the atmosphere independently of said bleeder port as an incident to the unscrewing of the valve body from the nipple of the container, said venting means including a vent hole extending through the body and opening into the counterbore at the upper end of the body above but closely adjacent the bottom of the counterbore.

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