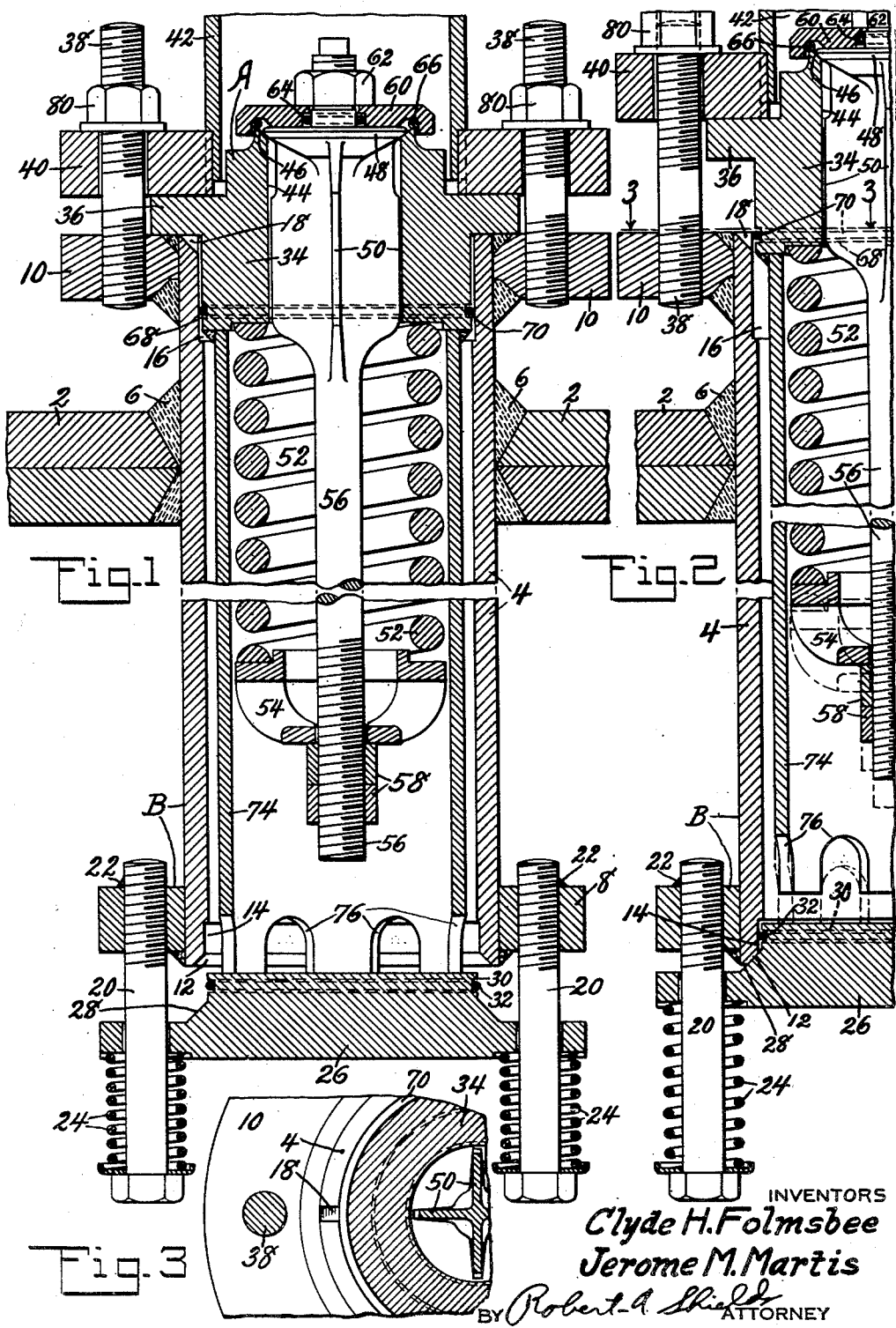


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DUAL SAFETY VALVE ASSEMBLY

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DUAL SAFETY VALVE ASSEMBLY

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This invention relates to safety valves in general and in particular to dual safety valves intended for use with inflammable or corrosive gases in storage.

In recent years a large business has developed in the storage of inflammable gases such as butane and propane and corrosive gases such as anhydrous ammonia, chlorine, etc. These gases are normally stored in comparatively large quantities and over a considerable period of time, with the result that safety valves of a very dependable type must be installed. It is necessary that these valves be lifted and tested at periodic intervals and occasionally a safety valve when so tested will develop leaks of such a nature that the entire storage tank has to be discharged and the defective safety valve removed for repair. Since these storage tanks are usually in populated areas it is necessary to close off and evacuate people from large areas during the period that the tank is being discharged. This results in tremendous losses and inconvenience to the owner and neighboring business and people. It is an object, therefore, of the present invention to provide a safety valve which can be removed from the storage tank and completely repaired without any significant loss of material from the tank.

A further object of the invention is the provision of a dual safety valve assembly for tanks in which a part thereof is built into the tank and another part can be removed from the tank.

A still further object of the invention is the provision of a self contained safety valve which can be placed on and removed from a storage tank while under pressure and without loss of material from the tank.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which

Fig. 1 is a sectional view through the improved valve assembly;

Fig. 2 is a similar sectional view but showing the safety valve in position for removal, and

Fig. 3 is a sectional view taken substantially on line 3-3 of Fig. 2.

Referring now to the drawings in detail it will be seen that the dual safety valve assembly is made up of a removable part A and a part B which is permanently built into the tank and can not be tampered with except when the tank is completely emptied and cleaned. The shell of the storage tank is indicated at 2 and this shell is pierced to receive a tubular nozzle 4 permanently

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welded or otherwise attached as at 6 to the shell of the storage tank. This nozzle has welded thereto adjacent its lower or inner end a ring 8 and adjacent its upper end is welded a ring 10. The lower inner surface of the nozzle is beveled as at 12 and this merges into a machined surface 14. The upper end of the nozzle has its interior surface machined as at 16 and a small notch or groove 18 is cut so as to provide a vent later to be referred to.

The lower ring 8 carries a plurality of bolts or similar means 20 which are threaded into the ring and welded against movement as at 22. These bolts or similar means provide a thrust surface for the lower ends of spring 24, the upper ends of which bear against a stop valve plate 26 guided for movement on the bolts 20. The stop valve plate is provided with a beveled seating surface 28 adapted to contact with the beveled seating surface 12 of the nozzle. The stop valve is also provided with a vertical extension grooved as at 30 to receive a resilient sealing ring 32 of circular cross-section, which ring is adapted to lightly engage the machined surface 14 to effectively seal against leakage.

The safety valve consists of a body 34 having flanges 36 adapted to be clamped onto the upper end of the nozzle by means of bolts 38 which extend through a clamping ring 40 and into the nozzle ring 10. The clamping ring as shown is provided with a discharge stack 42 of any suitable length. The safety valve body is pierced to provide a passageway 44, at the upper end of which is provided a valve seat 46 adapted to engage a similarly formed seat 48 on the valve stem member. The valve stem member is provided with wings 50 guiding it in the body opening and the seats 46 and 48 are held in intimate contact by means of a spring 52 bearing at one end on the valve body and at the other end on cage 54 adjustably held on the valve stem 56 by nuts or other means 58. In order to prevent any leakage past seats 46 and 48 a cap member 60 is clamped onto the valve by means of the nut or other means 62 and this cap is grooved to receive a resilient ring 64 of circular cross-section which will prevent any leakage past the stem extension of the valve. A similar ring 66 of resilient material and circular cross-section is received in a groove formed in the cap and this ring engages a portion of the body to prevent any leakage between the cap and body. In this manner leakage of material through the safety valve is prevented except when the valve should open or "pop" under excessive pressure. The outer surface of

the valve body 34 is grooved as at 68 to receive a circular ring 70 of circular cross-section and resilient material which is adapted to engage the machined surface 16 of the tank tube or nozzle and thus effectively prevent leakage between the safety valve body and the tank tube or nozzle. A tubular extension 74 is welded or otherwise attached to the inner surface of the valve body 34 and is of sufficient length as to hold the stop valve assembly 26 from engaging the lower end of the tank tube or nozzle when the safety valve is in position. In order to permit ready entrance of material from the tank into the tube 74 semi-circular openings 76 are formed in the lower end thereof.

When the parts are in the position shown in Fig. 1 the safety valve with its extension will maintain the stop valve 26 in its full open position or at least in a position that an area for passage of material into tube 74 is provided which is equal to or greater than the total discharge area past the safety valve when open or "popped." If for any reason the safety valve should develop a slight leak or be damaged in any way it can be removed by rotating nuts 80 on bolts 38 thereby permitting the internal tank pressure to lift the safety valve in the nozzle. As the nuts 80 are backed off of the bolts the safety valve will follow with all leakage prevented by the resilient ring 70. When the safety valve has been raised sufficiently the seating surface 28 of the stop valve will engage the seating surface 12 of the tank tube or nozzle and further movement of the stop valve will be checked. Prior to this time, however, the circular ring 32 of resilient material will have entered the nozzle and engaged the machined surface 14 thus sealing the lower end of the tank tube or nozzle. The stop valve then becomes a thrust member pushing the safety valve upwardly with its motion controlled by the rate at which the nuts 80 are backed off the bolt. Any pressure trapped within the tank tube or nozzle will continue to lift the valve after the stop valve has become seated. As soon, however, as the resilient ring 70 has passed the lower end of groove 18 this trapped pressure will be vented and the nuts 80 may be then fully removed without danger. As soon as these nuts are removed the stack and its ring 40 may be removed and the entire safety valve removed for inspection and necessary repair. After inspection and repair the safety valve may be again inserted into the tank tube or nozzle with the resilient ring 70 sealing against any escape of material between the nozzle and valve body. Forcing of the safety valve into its final position will be accomplished by tightening the nuts 80 onto the bolts 38, thereby forcing the safety valve into its final position during which time the stop valve will be moved to its open position as shown in Fig. 1.

From the preceding it will be seen that the stop valve is attached to the tank tube or nozzle on the inside of the tank and prevents escape of gas or material from the tank when the safety valve is removed. It will also be apparent that the safety valve can be removed, repaired and reinserted in the tube or nozzle without any danger or loss of material other than the loss of the small amount of material which is trapped within the tank tube or nozzle at the time of closing the stop valve 26. While the construction has been described more or less in detail with specific reference to the drawings, it will be obvious that slight modifications may be made without de-

parting from the scope of the invention as defined by the following claims.

What is claimed is:

1. A dual valve construction comprising, a nozzle structure, a pressure relief valve assembly having at least portions thereof located within the nozzle structure, means retaining said pressure relief valve assembly portions in said nozzle structure and adapted to allow removal of said assembly, sealing means interposed between said assembly and nozzle structure to prevent leakage therebetween during at least part of the removal movement of said pressure relief valve assembly, a stop valve carried by said nozzle structure adjacent the inner end thereof, an extension on said pressure relief valve assembly holding said stop valve in spaced relationship to said nozzle structure when said relief valve assembly is retained in said nozzle structure by the retaining means, and a sealing means adapted to engage said nozzle structure and stop valve to prevent leakage therebetween following partial removal of said pressure relief valve assembly.

2. The structure of claim 1 characterized in that, said last named sealing means is carried in a groove formed on said stop valve and is of substantially circular cross section.

3. The structure of claim 1 characterized in that, said nozzle structure is provided with vent means to allow escape of pressure trapped within the nozzle structure between said sealing means during removal of said pressure relief valve assembly.

4. A dual valve construction comprising, a nozzle, a pressure relief valve assembly connected to the nozzle but removable therefrom, an extension carried by said assembly and extending into the nozzle to adjacent the remote end thereof, a stop valve carried by said remote end of the nozzle and normally held in spaced relation thereto by said extension when said relief valve assembly is fully connected to the nozzle structure, and seal means occupying the space between said pressure relief valve assembly and nozzle and between said stop valve and nozzle to prevent leakage of matter past said valves during connection and removal of the relief valve assembly.

5. A dual valve construction comprising, a nozzle, a pressure relief valve assembly located within the nozzle but removable therefrom, an extension carried by said assembly and extending to adjacent the remote end of the nozzle, a stop valve carried by said remote end of the nozzle and held in spaced relation thereto by said extension, and seal means occupying the space between said pressure relief valve and nozzle and between said stop valve and nozzle to prevent leakage of matter past said valves, said seal means and valves being so constructed and arranged that one at least is always in constant sealing engagement with said nozzle during removal of said pressure relief valve assembly.

6. A dual safety valve construction comprising a tubular nozzle structure, a pressure relief valve assembly removably clamped onto said nozzle structure adjacent one end thereof, said relief valve structure including a body portion positioned in said nozzle when said parts are assembled, said body portion being formed with an annular groove, a circular ring of circular cross section formed of resilient material positioned in said groove and contacting the inner surface of said tubular structure, a stop valve carried by the other end of said tubular structure, said stop

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valve being formed with a vertical annular extension for movement into said nozzle structure during seating of said valve, said extension being formed with an annular groove, a circular ring of circular cross-section formed of resilient material positioned in said groove for contacting the inner surface of said tubular structure, spring means normally urging said stop valve toward its seat on said nozzle structure, and means depending from said relief valve body portion for holding said stop valve from its seat against the tension of said spring means.

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