July 12, 1960 H. OETIKER 2,944,699

SAFETY DEVICE FOR CONTAINER COVER

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Fig. 1.

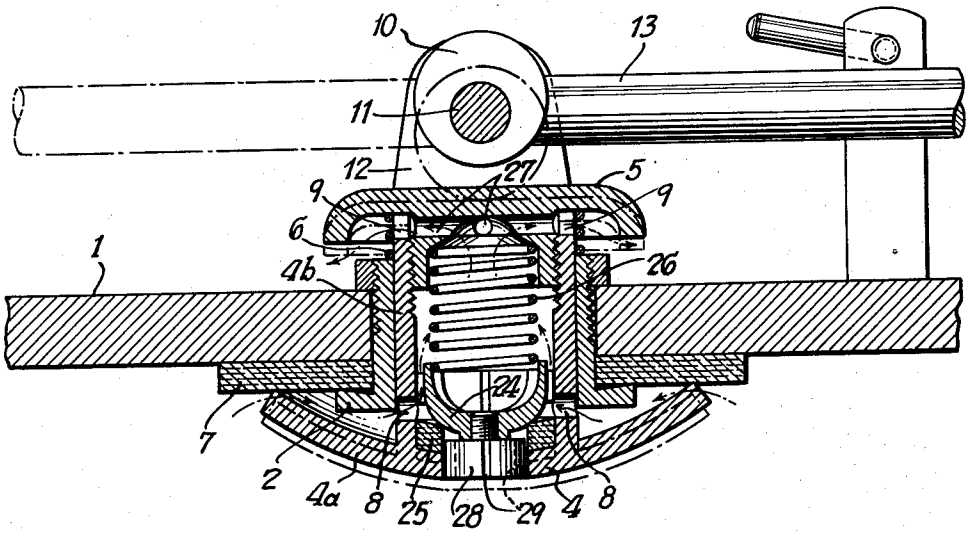
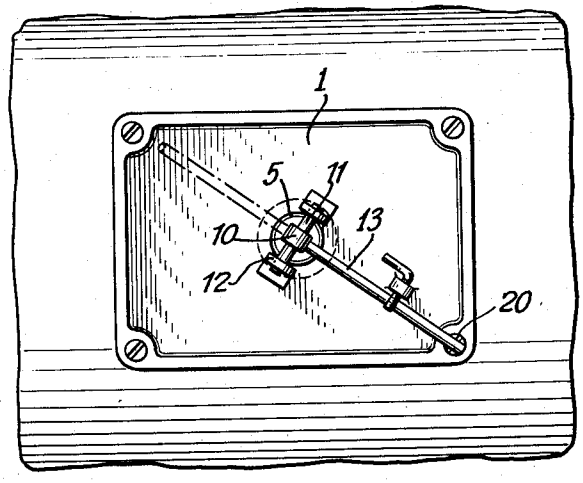


Fig. 2.



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SAFETY DEVICE FOR CONTAINER COVER

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3 Claims. (Cl. 220—44)

The present invention relates to a safety device for equalizing the inside and outside pressures of a container prior to opening the container.

Tumbling barrels as are used for cleaning, removing sharp edges, or polishing small metal parts are usually closed airtight by a cover. A rise of the temperature inside the barrel may cause an inside pressure which is greater than the pressure outside of the barrel. When the barrel is used for cleaning, chemical agents are employed which also may produce excess pressure inside the barrel. Safety valves may be used to prevent dangerously high inside pressures. These valves, however, often permit building up of enough pressure inside the tank or barrel to make removal of the cover dangerous. If the covers are bolted to the barrel, serious accidents have happened during removal of the last bolt.

A reduction of the temperature inside the barrel or chemical actions may reduce the pressure inside the barrel. Though this is not a dangerous situation, it makes removal of the cover very difficult.

It is an object of the present invention to facilitate removal of a cover from a container inside of which the pressure is different from the outside pressure and to eliminate all danger involved when opening a cover on a vessel inside of which the pressure is greater than outside. This is accomplished by providing means which afford an equalization of the inside and outside pressures prior to loosening the means which make the cover fast on the vessel.

According to the invention an air valve is provided in the cover of the barrel or vessel. A handle adapted to open the valve is so associated with at least one of the fastening means which hold the cover to the vessel that loosening of the fastening means with which the handle is associated is not possible unless the air valve is opened by manipulation of the handle. If there is more than one fastening means the handle is preferably connected to that one of the fastening means which is loosened or removed last for the purpose of opening the cover. The fastening means may be bolts, latches, tilting or tipping devices, or the like.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of an embodiment thereof when read in connection with the accompanying drawing, in which:

Fig. 1 is a cross sectional view of an air valve and actuating mechanism therefor;

Fig. 2 is a top view of a cover equipped according to the invention.

Referring more particularly to the drawing, numeral 2 designates a bushing inserted in a bore of a cover 1 for the filler opening of a tumbler barrel. A mushroom-like air valve 4 having a calotte-like portion is axially movable in the bushing 2. The valve 4 has a tubular stem portion 4*b* extending outside of the cover and a

cover member 5 which is screwed into the tubular stem portion 4*b*. A pressure spring 6 is placed between the outer end of the bushing 2 and the cover member 5. A gasket or sealing ring 7, for example, made of rubber is interposed between an outward flange of the bushing 2 and the inside of the cover 1. A rim or edge portion 4*a* of the valve 4 is pressed against the ring 7 by the spring 6. The interior of the cover 1 and of the vessel is thereby sealed airtight. The tubular stem part of the valve 4 has openings 8 and 9 through which the space inside the cap of the mushroom-like valve communicates with the outside. When the valve is pressed to move inwards of the vessel, air escapes through said openings.

The cover member 5 is adapted to be engaged by an eccentric or cam 10 which is rotatable on a pin 11 which extends between two supports 12 mounted on the cover 1. A lever 13 is connected to the eccentric 10 which can be moved counterclockwise from the position shown in Fig. 1. This causes engagement of the eccentric with the cover member 5 of the valve and presses the latter downward or inside of the vessel whereby the valve is opened and the pressures inside and outside of the vessel are equalized.

The lever 13 is so placed on the cover 1 that its free end extends over a bolt or screw 20 fastening the cover to the vessel. This prevents access to the bolt or screw and loosening of the latter. In any case the operator is reminded that the lever must be turned before the bolt 20 is removed. After removal of all other bolts which fasten the cover to the vessel, the lever 13 must be turned and the valve opened thereby before the last bolt (20) can be removed. In this way removing of the cover is made safe.

A spring-loaded safety valve is built into the valve 4. This safety valve includes a valve member 24 having a surface portion pressed by a spring 26 against an annular edge of a gasket 25 which may be made of rubber. The spring 26 has one end resting on the cover member 5; the other end rests on the valve member 24. If there is a predetermined excess pressure inside the container over the outside pressure, the safety valve opens against the action of the spring 26 and relieves air through apertures or channels 27 in the cover member 5 and through the holes 9 in the valve 4. The member 24 is preferably provided with a cylindrical guide portion 28 movable in a bore in the lower portion of the valve 4. This cylindrical portion is provided with radial slots 29 affording passage of air. The outer end surface of the cylindrical guide portion 28 is preferably flush with the outer surface of the calotte portion of the valve 4 so that dead spaces inviting the accumulation of dirt are avoided.

The calotte-like portion of the valve 4 which is curved into the interior of the tumbler barrel affords rolling of the objects treated in the tumbler over the valve without damaging the valve. The edge of the valve 4 seating on the gasket 7 and the valve 24 seating on the edge of the gasket 25 prevents settling of small particles between the valves and their seats which would prevent tight closing of the valves.

The safety device according to the invention can be used wherever two spaces in which there are different pressures are connected by removable covers, doors, and the like and where it is desired to equalize the pressures prior to opening the covers or doors.

I claim:

1. In combination with a cover for closing the filler opening of a tumbler barrel, a plurality of screws for fastening the cover to the barrel, a pressure equalizing valve built into said cover and having a stem portion extending outside of the cover, a spring interposed between the cover and said stem portion for closing the valve, a lever having one end pivotally connected to said cover, a

cam mounted on the aforesaid end of said lever and adapted to engage said stem portion for opening said valve against the action of said spring when said lever is in one of its extreme positions, said cam being disengaged from said stem portion permitting the valve to be closed by said spring when said lever is in the opposite extreme position, said lever having a free end portion placed above one of said screws, preventing access to and loosening of said screw, when said lever is in said opposite extreme position, said free end portion of said lever being away from said screw, affording access to and loosening of said screw, when said lever is in the first extreme position wherein said cam engages said stem portion for opening said valve against the pressure of said spring.

2. The combination set forth in claim 1 wherein a gasket is mounted on the inside of said cover, said valve having a calotte-like portion placed on the inside of said cover and curved toward the inside of the barrel, said calotte-like portion having an annular edge engaging said gasket when the valve is in closed position.

3. The combination according to claim 2 wherein said stem portion is hollow, said calotte-like portion having

an aperture through which the inside of said stem portion communicates with the inside of said barrel, an annular gasket being mounted inside said stem portion and having an annular edge, a spring-loaded safety valve being placed inside said stem portion and having a surface portion resting on the annular edge of said gasket when the safety valve is closed for preventing communication between the inside and the outside of the barrel through said aperture and said stem portion.

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