

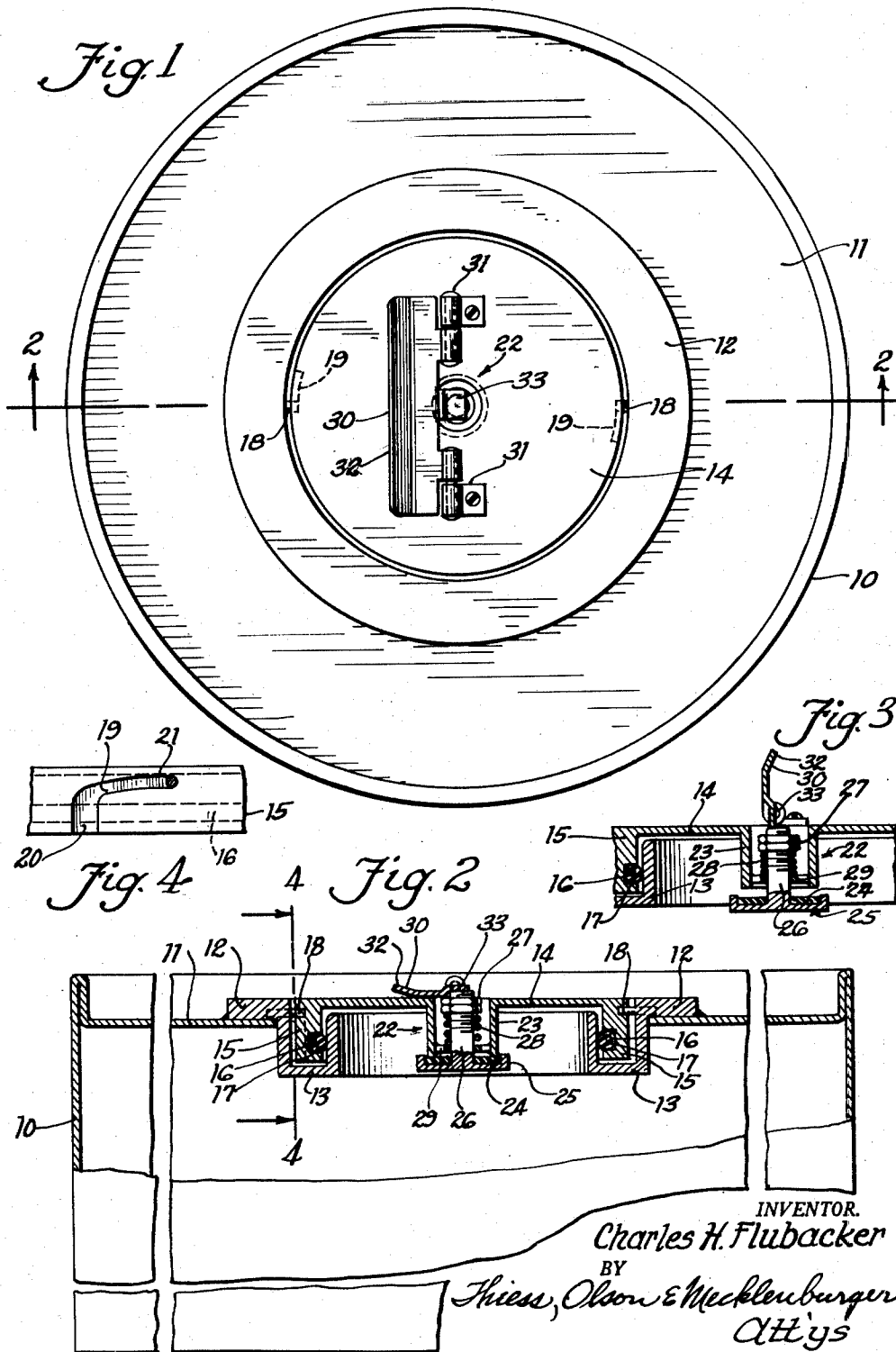
April 28, 1953

C. H. FLUBACKER

2,636,634

SAFETY CAP FOR PRESSURIZED GAS TANKS

Filed Sept. 8, 1949



UNITED STATES PATENT OFFICE

2,636,634

SAFETY CAP FOR PRESSURIZED GAS TANKS

Charles H. Flubacker, Chicago, Ill., assignor to
Cook Electric Company, Chicago, Ill., a corporation of Illinois

Application September 8, 1949, Serial No. 114,665

7 Claims. (Cl. 220—40)

1

This invention relates to improvements in a safety cap for pressurized gas tank whereby the pressure of the gas, air or the like in the tank, from whatever cause, is relieved before the cap is removed.

Such tanks are apt to be deceptive as to the presence of sufficient pressure therein to cause trouble if the cap is sought to be removed. Such pressure may result from various causes, as from the standing idle of the tank for a period with a small quantity of volatile liquid therein, or from the failure of the pressure therein to discharge the liquid through the usual channel, such as a spray hose, for example, thus giving rise to the thought that the pressure in the tank is exhausted but in which there is still sufficient pressure to cause trouble if the cap is attempted to be removed. Or, an operator may be careless or forgetful of the condition of the pressure in the tank. In any such case the cap is apt to be blown skyward and the liquid splashed and thrown out, to the possible injury of the operator and damage to the tank, cap or surroundings.

It is an object of this invention to provide a cap construction for such pressurized tanks having provision for bleeding the pressure in the tank before removal of the cap and so arranged as necessarily to so bleed the same before the cap may be removed.

A further object of the invention is the provision of a cap construction for pressure tanks in which the cap has a peripheral holding and sealing engagement with the seat therefor attached to the tank opening, and carries a normally closed bleeder valve which is opened by the manipulation of the cap handle or member in the attempted removal of the cap and which allows the pressure to escape before the cap is removed.

Further objects and advantages will appear from the description and claims to follow, in connection with the accompanying drawing which illustrates, by way of example but not of limitation, an embodiment of the invention, and in which—

Fig. 1 is a plan view of the cap construction with the cap in place on a tank;

Fig. 2 is a sectional elevation of the apparatus of Fig. 1, the plane of section being indicated by

2

the line 2—2 of Fig. 1, the hinged flap or handle member of the cap and the bleeder valve being shown in their normal closed positions;

Fig. 3 is a similar section through the cap and valve but showing the handle and valve in their raised and open positions; and

Fig. 4 is a detail sketch of the bayonet slot peripheral connection between the cap and its seat.

In the drawing, the pressure tank 10, which may be of sheet metal pressed into usual form and of any desired size, as indicated in Fig. 2, is provided with an opening in the head or end 11 in which the peripheral ring seat 12 with its inner flange 13, U-shaped in cross section, is fitted and secured to the tank head by welding, soldering, or the like, to provide a strong, rigid, and sealed connection between tank and seat.

To provide a readily attachable and removable closure for this opening in the tank and in sealed relation thereto when applied, a disc or plate-like cap 14 is provided with a peripheral inner flange 15 which is adapted to enter deeply into the U-ring 13 of the ring seat 12, as indicated in Fig. 2, when the cap is applied to the tank or drum 10. The inner face of this flange 15 is provided with an annular groove 16 in which is located preferably a silicone O-ring type of gasket 17 which effectually pressure-seals against the passage of air or gas between the cap and seat notwithstanding any clearance that may be present between the cap and seat ring flange surfaces in the joint and the travel of the gas pressure from the inside of the tank to the O-ring. In fact, the greater the pressure the tighter the seal. The silicone O-ring also facilitates the application and removal of the cap, due to its ability to slide and roll on the surfaces without damage or loss of efficiency.

The cap 14 is secured and retained in the seat ring 12 preferably by a bayonet and slot connection, such as indicated more clearly in Fig. 4. As thus shown, a pin 18 is fixedly inserted in the wall of the ring 12 and projects inwardly a short distance into the path of the flange 15 of the cap in its entrance into the U space of the ring seat. The flange 15 of the cap has a bayonet slot or groove 19 in its outer face adapted to receive the projecting end of said pin at its entrance 20 at the lower edge of the flange. Then by push-

ing inwardly on the cap and turning or twisting it clockwise slightly the slot travels so that the pin passes up into and along the inclined portion of the groove 19 as the flange of the cap enters the U groove until the upper end 21 of the groove 19 is reached, where the groove may be substantially horizontal or slightly curved upward to provide a locking effect for the pin to prevent its being jarred loose and tending to loosen the cap. In this position, the cap is fully and tightly sealed in the ring seat 12 and effectually closes the opening in the tank.

At least another similar pin and slot connection is placed diametrically opposite across the cap and seat ring, as indicated in Fig. 1, or any suitable number of such connections may be disposed symmetrically about the seat and cap flanges.

In order that the pressure in the tank may be relieved, vented or bled therefrom before removal of the cap, a valve 22 in the nature of a bleeder valve is located in the cap 14. This comprises a tubular projection 23 downwardly from an aperture in the cap, the lower end of which forming a valve seat is normally closed by a suitable gasket or ring 24 seated in the upper face of the plunger head or valve disc 25 which is carried at the lower end of the valve plunger 26 extending up through the tubular projection 23. Near the upper end of this plunger a suitable nut or disc 27, or a pair of them, is threaded thereon and bears on the upper end of a coiled spring 28, the lower end of which is supported on a bearing or bearings 29 preferably in the form of a ring projecting inwardly from the wall of tubular projection 23, said ring having suitable apertures therein for the passage of gas or air therethrough.

Normally, as shown in Fig. 2, the valve disc 25 and gasket 24 are held up against the seat at the end of projection 23 and prevents the escape of pressure therethrough. Any pressure in the tank adds to the closing pressure on this valve tending to hold it seated in sealing condition.

When sufficient downward pressure is exerted on the plunger 26, the valve 25 is pushed down away from its seat, Fig. 3, and the valve is opened sufficiently to bleed and relieve the pressure from the tank and without discharge of the liquid therein, after which the cap may be removed without danger.

The cap is provided with a turning flap, finger or handle wing or member 30 which may be hinged as at 31 (Fig. 1) to the cap and normally lies down flatwise on the cap, as indicated in Figs. 1 and 2, but which is manually raised up, as in Fig. 3, and grasped to handle and manipulate the cap, as for inserting or removing it from its seat, turning or twisting it to lock or unlock it in the seat, and for other purposes, and a suitable wrench may be applied thereto if desired.

The outer edge 32 of this wing 30 or a portion thereof, may be turned up slightly, as indicated, to enable the fingers or a suitable tool to be worked thereunder initially to start raising the same from its prone position on the face of the cap.

To prevent any failure in the opening of the bleeder valve 25 before releasing the cap from the tank, whether through ignorance, forgetfulness, carelessness, or other reason, the said handle or wing 30 is preferably associated, connected or interlocked therewith, whereby upon

raising the wing from its flat position to its perpendicular position or preparing so to do or acting preparatory to turning and releasing the cap, the said valve is forced and held open to relieve any pressure in the tank and thoroughly to bleed the same therefrom, so that the cap may be removed with ease and safety, the gas or gas and liquid are not discharged in large volume as a blast in the face of and over the operator and there are no flying missiles like the blown-off cap.

In order to accomplish this in one way, the inner or hinged edge of the wing flap 30 may be provided with a projecting portion, lug, tongue, or lever member 33, which is arranged to bear upon the free end of bleeder valve stem or plunger 26 in such manner, as indicated, that when the flap is folded down against the face of the cap (Fig. 2) the member 33 engages the end of the valve plunger 26 and the spring pressure of the latter tends to hold the said flap 30 in that position against the face of the cap while still holding its valve disc 25 closed. When, however, the wing 30 is raised, the member 33 depresses the plunger 26 and opens the bleeder valve, and when so raised to the full extent, as indicated in Fig. 3, the member 33 bears on the end of the plunger 26 and the relationship of the parts and the spring pressure are such as to hold the wing in that upright position with the bleeder valve held open.

In this open position of the valve the gas passes up through the tubular portion 23 and around and through the spring and parts therein to escape into the outside air. The short length of the projection 33 as compared to the width of the wing 30 gives a sufficient leverage to enable the pressure of the spring and of the gas on the valve disc 25 to be readily overcome in starting to raise the wing 30 to the open position. The valve spring thus tends both to hold the flap 30 closed and to hold it open, the latter being a convenience in handling and manipulating the valve and the former in keeping the wing down out of the way and free from chattering.

The construction and operation are thought to be clear from the foregoing. The cap cannot be removed from the pressure tank without operation of the bleeder valve to relieve the pressure, if any, therein, and this is accomplished in the ordinary acts necessary to remove the cap, so that no new technique must be learned for the full enjoyment of the protection.

Without further elaboration, the foregoing will so fully explain the gist of the invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, without eliminating certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured by the following claims.

I claim:

1. A safety cap for an opening in a pressurized gas tank comprising a U-shaped peripheral ring seat for the opening thereof, a removable cap for the opening having peripheral holding and sealing engagement within the U-shaped seat, a manually operated wing flap by which to manipulate said cap in handling and in applying the same to and removing it from said seat, said flap being hinged at an edge on the top of said cap and being nonrotatable with re-

5

6

spect thereto and adapted to be turned down flatly against the same or to be turned up to stand perpendicularly upright therefrom, a spring-closed bleeder plunger valve located in the cap adjacent the hinged edge of said flap, and a projection on the hinged edge of the flap engaging said valve plunger and pressing down on the same to open the valve when the flap is so turned up.

2. A safety cap for a wall opening in a pressurized gas tank comprising a U-shaped ring seat for the wall opening, a removable cap for the opening having peripheral holding and sealing engagement within said U-shaped seat, said cap being applied to and removed from said seat by a rotary movement thereof, a manually operated wing flap by which to manipulate and turn said cap in applying the same to and removing it from said seat, said flap being hinged at an edge to the top of said cap and adapted to be turned flatly down against the same when the cap is seated and sealed or to be turned perpendicularly upright therefrom for manipulation of the cap, a spring-closed bleeder plunger valve located in the cap adjacent the hinged edge of said flap, and a projection on the hinged edge of the flap engaging the top of the said valve plunger to depress the plunger and open the valve when the flap is so turned up, said plunger and projection being arranged to hold the flap up and the plunger so depressed when the flap is in the up position and to hold the flap down and the valve closed when the flap is in the down position.

3. A safety cap for a pressurized gas tank having a ring seat for the wall opening, comprising a removable cap for the opening having peripheral holding and sealing engagement with said seat, said cap being applied to and removed from said seat by a rotary movement thereof, a manually operated wing flap handle by which to handle said cap and to manipulate and turn said cap in applying the same to and removing it from said seat, said flap being hinged at an edge to the top of said cap and adapted to be turned down flatly against the same when not in use or to be turned perpendicularly upright therefrom when used, the cap having an opening therein adjacent the hinged edge of said flap, a tubular projection on the inside of the cap surrounding said opening, the lower end of said projection forming a valve seat, a plunger valve having a disc cooperating with said seat to open and close a vent passage therethrough, the plunger of said valve extending inwardly through said projection, a spring tending to close said valve disc on its said seat, a connection between said flap and plunger operating to open the valve when the flap is being raised, said valve disc being subject to pressure within the tank tending to hold the same tightly closed and sealed against the said seat when the cap is in position on the tank and the flap is turned down against the same.

4. A safety cap for a pressurized gas tank having a peripheral ring seat for the opening thereof, comprising a removable cap having an opening centrally located and a peripheral flange adapted to be retained within the ring seat, said flange having an annular recess on the internal surface thereof and a plurality of slots on the external surface, corresponding projections on said ring seat adapted to engage said slots for locking engagement upon rotation of said cap, a resilient annulus retained in said recess adapted to contact the ring seat in sealing engagement, a

normally closed valve adapted to seal the opening in said cap, a handle member hingedly mounted on the removable cap to facilitate the rotation and removal of said cap from the ring seat, said handle adapted to lie in a flat position against the cap when said cap is in a sealed position, and projecting means on the handle to depress said valve to an open position when the handle is raised to a position normal to the cap surface whereby the valve must be opened before the cap can be rotated and removed.

5. A safety cap for a pressurized gas tank having a U-shaped peripheral ring seat for the opening thereof, comprising a removable cap having a central cylindrical opening therein and a peripheral flange adapted to be retained within said ring seat, said flange having an annular recess on the inner surface thereof and a plurality of slots on the outer surface thereof, projections on said ring seat adapted to engage said slots in locking engagement upon rotation of the cap, a resilient annulus retained in said recess adapted to engage said ring seat in sealing engagement, a manually operated handle member by which to manipulate and turn said cap, said handle being hingedly secured to the top of the cap and adapted to be turned to a flat position against said cap when in the seated position, a spring-closed valve means located in said cylindrical opening, and a projection on said handle member to engage said valve means to open the valve means when the handle member is raised from said flat position to rotate and remove the cap.

6. A safety cap for a pressurized gas tank, comprising a U-shaped peripheral ring seat for the opening thereof, a removable cap having a central cylindrical opening therein and a peripheral flange adapted to be retained within said U-shaped ring seat, said flange having an annular recess on the inner surface thereof, a resilient annulus retained in said recess adapted to sealingly engage said U-shaped ring seat, the outer surface of said flanges having a plurality of slots therein, projections on said ring seat to engage in said slots for locking engagement upon rotation of said cap, a manually operated handle member by which to manipulate and turn said cap, said handle being hingedly secured to the top of the cap and adapted to be turned to a flat position against the cap when in the sealed position, a spring closed valve means located in said cylindrical opening, and a projection at the center of said handle member to engage said valve means to open the valve when the handle member is raised from said flat position to rotate and remove the cap.

7. A safety cap for a pressurized gas tank having a U-shaped peripheral ring seat for the opening thereof, comprising a removable cap having a central cylindrical opening therein and a peripheral flange adapted to be retained within said ring seat, said flange having an annular recess on the inner surface thereof, said cap and said ring seat having corresponding projections and shaped slots thereon whereby said ring seat and said cap are lockingly engaged upon rotation of said cap, a resilient annulus retained in said recess adapted to engage said ring seat in sealing engagement, a manually operated handle member by which to manipulate and turn said cap, said handle being hingedly secured to the top of the cap and adapted to be turned to a flat position against said cap when in the seated position, a spring-closed valve means located in said cylin-

drical opening, and a projection on said handle member to engage said valve means to open the valve means when the handle member is raised from said flat position to rotate and remove the cap.

CHARLES H. FLUBACKER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,079,359	Oppenheimer	Nov. 25, 1913
1,169,335	McManamin	Jan. 25, 1916

Number
2,316,923
2,346,723
2,436,566
5 2,529,645
2,544,854
2,570,818
2,597,576

Name	Date
Westberg	Apr. 20, 1943
Brown	Apr. 18, 1944
Goldberg	Feb. 24, 1948
Winks et al.	Nov. 14, 1950
Oys	Mar. 13, 1951
Kirkbridge et al.	Oct. 9, 1951
Donovan	May 20, 1952

FOREIGN PATENTS

Number	Country	Date
333,400	Great Britain	Aug. 14, 1930