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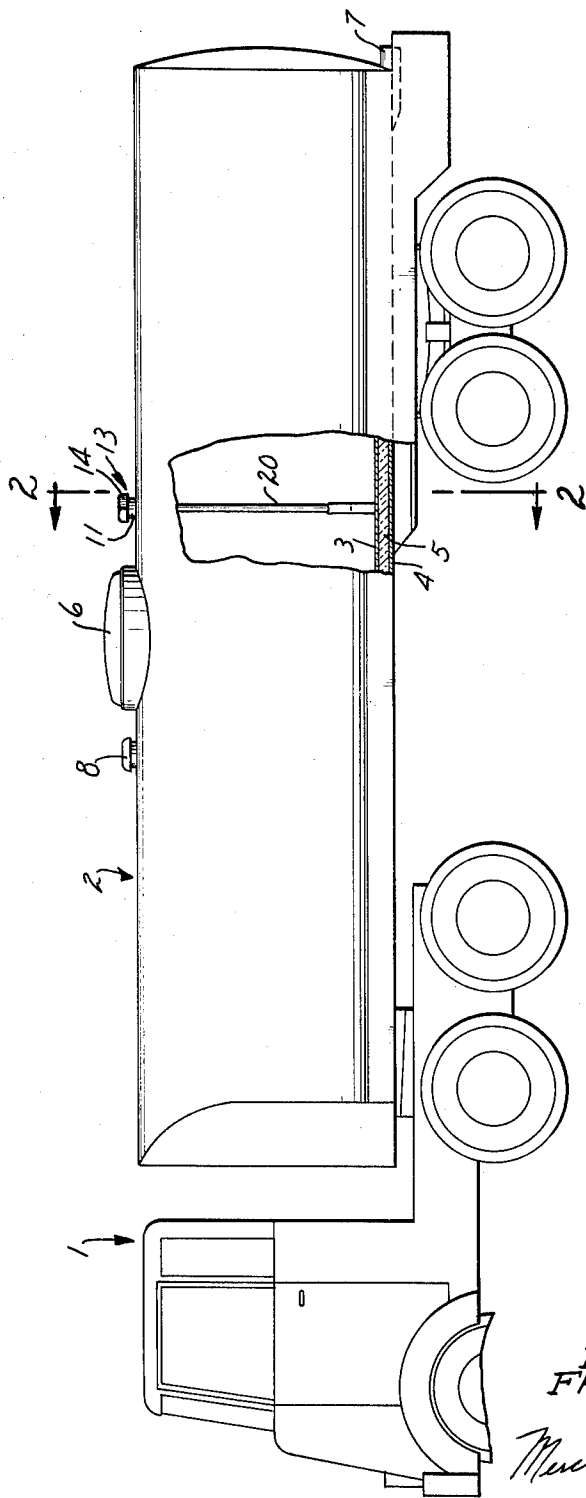
B. E. TRAUT ETAL

3,247,859

ANTI-IMPLOSION DEVICE FOR MILK TANKS AND THE LIKE

Filed March 4, 1963

2 Sheets-Sheet 1



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FIG. 2

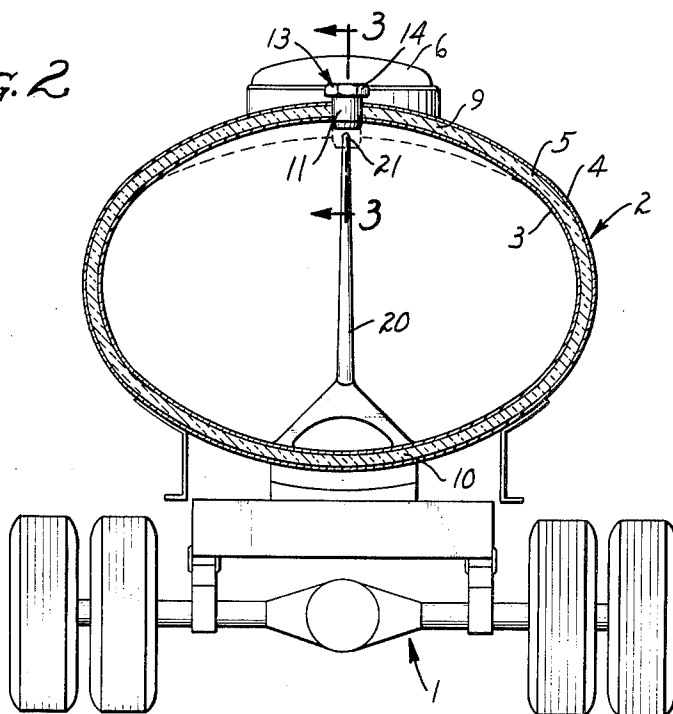
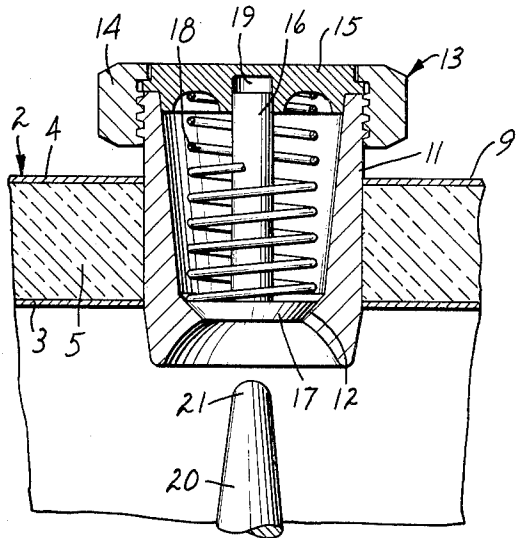


FIG. 3

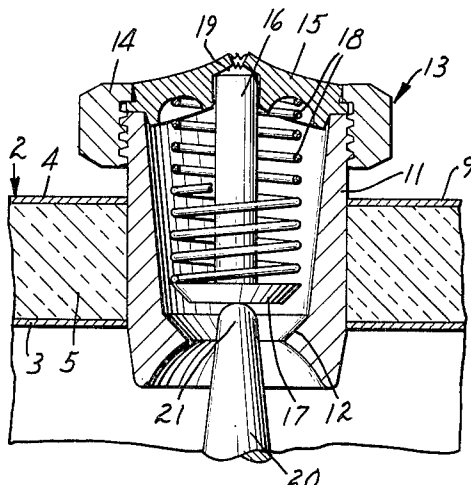


FIG. 4

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1

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ANTI-IMPLOSION DEVICE FOR MILK TANKS AND THE LIKE

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4 Claims. (Cl. 137—70)

Our invention relates to anti-implosion devices for vehicle-mounted fluid transporting tanks and more particularly to anti-implosion devices for milk collecting and transporting tanks. All such tanks are provided with fluid outlet valves in their bottom portions and with fluid receiving openings and breather valves in their upper walls. The function of the breather valves is obviously to permit quick withdrawal of a collected load from the tank by power pumps, in a minimum of time, at the creamery or other point of discharge.

For sanitation purposes, a great majority of the milk collection tanks presently in use are formed from the relatively non-corrosive stainless steel. Furthermore, for the purpose of reducing the overall height of such vehicle-mounted tanks, most thereof are elliptical in cross-section with the minor transverse axis thereof lying in a generally vertical plane. Such tanks obviously do not have the ability to withstand collapsing pressures that do cylindrical tanks or tanks formed from the more corrosive steels having higher carbon content. Consequently, under adverse conditions such as brought about by frost, when the breather valves are rendered inoperative, it is not uncommon for a relative vacuum to build up in the tank so rapidly as to cause a collapse or implosion of the walls thereof during rapid drainage thereof by the power pumps.

The primary object of our invention is the provision of novel anti-implosion means for tanks of the type immediately above described which will automatically and positively permit entrance of air into the upper portion of a tank upon initial (but non-damaging) flexing movements of the upper and/or lower walls thereof due to increasing vacuum built up therewithin by the conditions immediately above described.

A further object of our invention is the provision of a device of the class described which is completely fool-proof and positive in its operation.

A further object of our invention is the provision of a device of the class above described which incorporates a minimum of working parts and which may be installed and maintained at a minimum cost.

A further object of our invention is the provision of a device of the class above described which may be readily rinsed and is completely sanitary.

A further object of our invention is the provision of a device which may be again rendered operative, after having functioned to prevent implosion, with a minimum of skill and a minimum of time and expense.

The above and still further objects of our invention will become apparent from the following specification, appended claims and attached drawings.

Referring to the drawings wherein like characters indicate like parts throughout the several views:

FIG. 1 is a view in side elevation of a vehicle-mounted milk collection tank constructed in accordance with our invention, some parts being broken away and some parts shown in section;

FIG. 2 is a view in transverse section taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary view in section taken on the line 3—3 of FIG. 2; and

FIG. 4 is a view similar to FIG. 3 but showing a different position of some of the parts.

2

Referring with greater particularity to the drawings, the numeral 1 indicates a vehicle having mounted thereon a horizontally disposed milk collection tank 2, the longitudinal axis of which extends in the direction of travel of the vehicle 1. For purposes of sanitation, the tank is of stainless steel construction having inner and outer shells 3, 4, which are suitably spaced from each other by insulation 5. For the purpose of reducing the overall height of the tank 2, so as to enable the vehicle 1 to negotiate low clearances frequently occasioned in rural areas, the tank 2 has an elliptical transverse cross-section, the minor axis of which lies in a generally vertical plane.

For the purpose of loading the tank 2, a suitable fluid receiving opening, not shown, but of conventional design, is provided beneath the removable dome-like cover 6. To permit withdrawal of the fluid from the tank 2 an outlet valve, also of conventional design, not shown but enclosed within the housing 7, is provided in the lower end of the tank. To facilitate rapid removal of the collected contents of the tank 2 by power pumps or the like located at the unloading destination such as a creamery, a breather valve, identified in its entirety by 8, is provided in the upper wall 9 of the tank 2. Breather valve 8 may take any conventional form such as that shown in Patent No. 2,909,186.

As above indicated, the breather valve 8 is apt to be rendered inoperative under such conditions as freezing of the splashing contents of the tank 2 during transportation in sub-freezing temperatures. If such an inoperative breather valve is not detected prior to the power unloading conditions above described, the upper and lower walls 9, 10 of the tank 2 may be caused to collapse so as to render the tank 2 useless. In order to avoid this situation, we provide a tubular valve body 11 which projects through the upper wall 9 of the tank 2 with its axis in general alignment with the minor transverse axis of said tank. The lower end portion of the valve body 11 is formed to define an annular valve seat 12, whereas the opening in the upper end thereof is closed by a puncturable plug identified in its entirety by 13. As shown, the plug 13 comprises an annular nut-like member 14 and a replaceable readily fractureable cap-like insert 15 which may be formed from any suitable material, such as plastic. Housed within the tubular valve body 11 is an axially extended punch 16 formed to define an enlarged poppet valve-acting head 17 at its lower end. Valve 17 is adapted to have sealing engagement with the valve seat 12 and is yieldingly biased toward such engagement by a coil compression spring 18 which is interposed therebetween and the replaceable insert 15 of the plug 13. As shown, the insert 15 is formed to define a downwardly opening axial recess 19 which guides and receives the reduced upper end portion of the punch 16.

Supported by the bottom wall 10 of the tank 2 is a vertically disposed finger 20, the upper end 21 of which is normally spaced immediately under and in vertical alignment with the valve-acting head 17 of the punch 16, as shown particularly in FIG. 3, and is directly engageable with said head 17 upon relative movement of the walls 9, 10 toward each other, as shown in FIG. 4. For the purpose of cleansing and sanitation, the finger 20, as well as the depending portions of the valve body 11 and head 17, are free of dirt-catching recesses and are also preferably formed from some non-corrosive material such as stainless steel.

With our novel anti-implosion device immediately above described when, under conditions wherein the breather valve 8 is rendered inoperative during rapid withdrawal of collected fluid from within the tank 2, the upper and lower walls 9, 10, respectively, will be forced

3

toward each other because of the differentials in atmospheric pressure without and within the tank 2. These initial flexing movements, however, will cause the upper end 21 of the finger 20 to engage the valve-acting head 17 whereby to unseat same from the seat 12, against yielding bias of coil spring 18. Such movement, as indicated in FIG. 4, will cause the upper end of the punch 16 to fracture the replaceable insert 15 thereby permitting air to freely enter the tank 2 and to equalize the pressures therewithin and without. The walls of the tank 2 are constructed to absorb this amount of distortion without damage and consequently when the air pressure has been equalized within and without the tank, the upper wall 9 will again assume the position of FIG. 3 whereby to again space the finger 20 from the valve-acting head 17.

Our invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects, and while we have shown and described a preferred embodiment, we wish it to be specifically understood that the same is capable of modification without departure from the spirit and scope of the appended claims.

What is claimed is:

1. In a cross-sectionally elliptical tank for transporting fluids, said tank being horizontally disposed with its minor transverse axis lying in a generally vertical plane and having a breather valve in its upper portion and a fluid withdrawal valve in its lower portion, the improvement which comprises

- (a) a tubular valve body projecting through the upper wall of said tank intermediate the ends thereof and with its axis in general alignment with said minor axis of said tank,

4

(b) a readily puncturable plug normally closing the opening defined by said tubular body,

(c) and means for puncturing said plug responsive to relative movement of said upper wall toward the lower wall of said tank during fluid withdrawal under conditions wherein said breather valve has been rendered inoperative.

2. The structure defined in claim 1 in which said means includes a vertically disposed finger supported by the bottom wall of said tank and having its upper end so disposed with respect to said plug to operatively puncture said plug upon the movement of said tank walls above described.

3. The structure defined in claim 2 in which said plug is in the nature of a frangible cap on the upper end of said tubular valve body and in which the lower end portion of said body is formed to define an annular valve seat, and in further combination with an axially extended punch within said tubular body, said punch having an enlarged head at its lower end formed to define a valve adapted to have sealing engagement with said valve seat, and yielding means interposed between said cap and said valve-acting head and biasing said head into engagement with said seat, said finger being adapted to engage said punch and raise same against bias of said yielding means to fracture said cap.

4. The structure defined in claim 3 in which said cap is formed to define a downwardly opening axial recess which receives and guides the upper end of said punch.

No references cited.

ISADOR WEIL, *Primary Examiner.*