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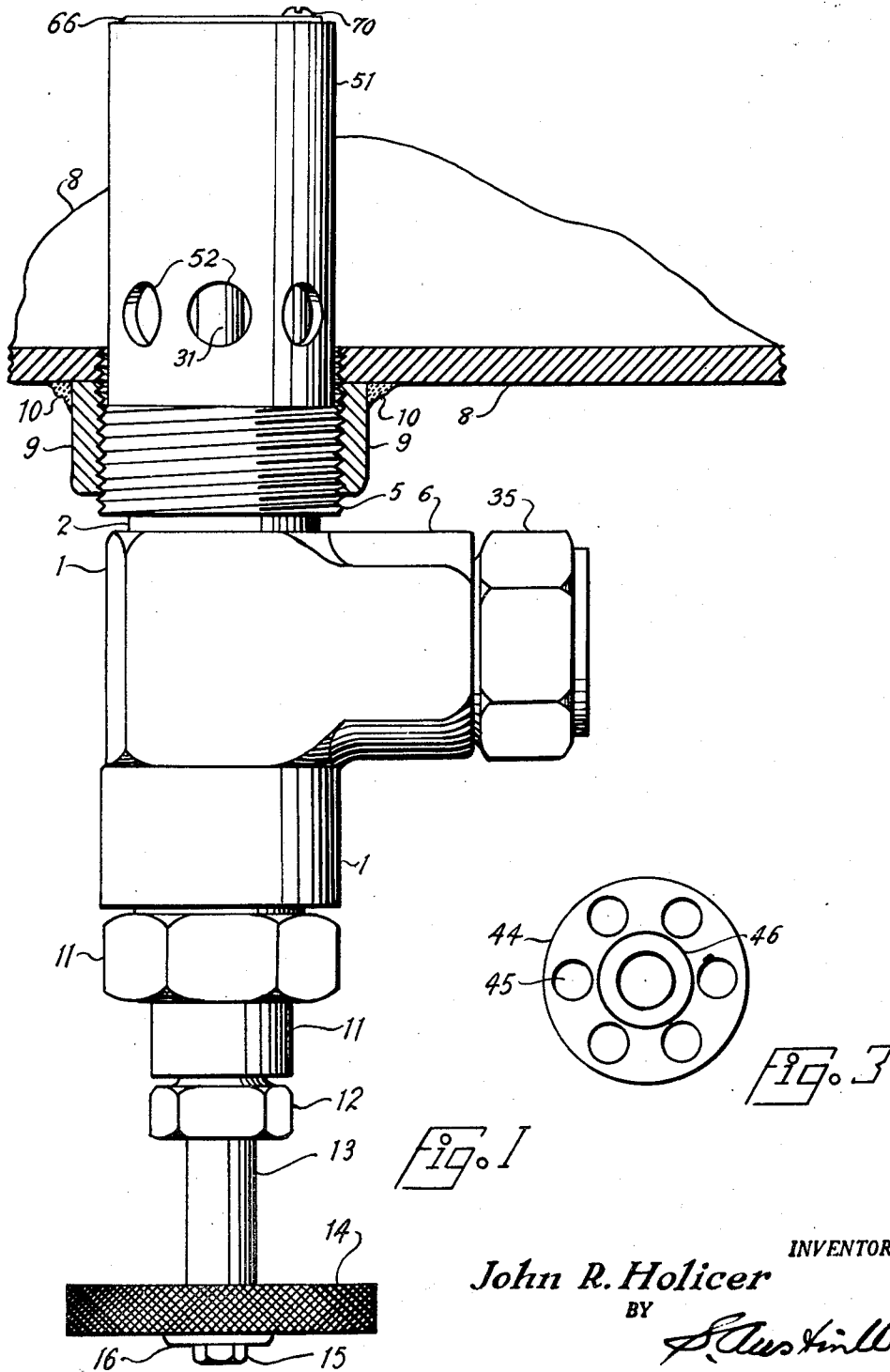
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2,563,244

FLUID CONTROL MECHANISM

Filed May 15, 1945

3 Sheets-Sheet 1



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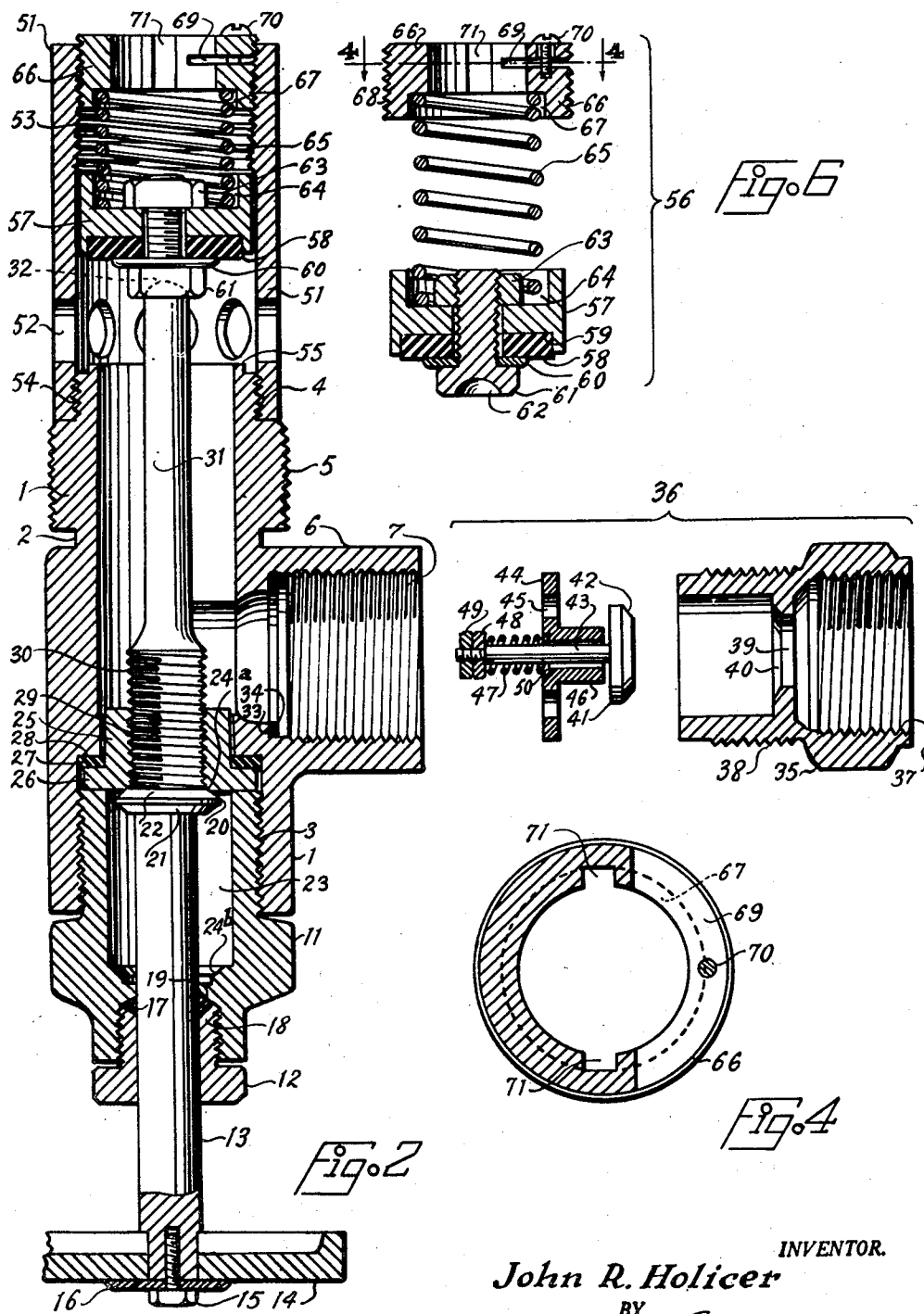
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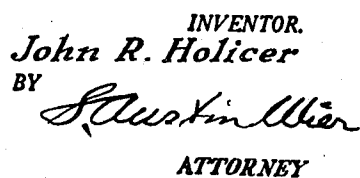


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FLUID CONTROL MECHANISM

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

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FLUID CONTROL MECHANISM

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7 Claims. (Cl. 62—1)

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This invention has to do with valving mechanisms arranged for safely controlling inflammable and explosive fluids, particularly as they are being discharged from containers; and it is designed to promote safety in the handling and controlling of all volatile fluids, especially in transit.

A primary object of the device is to lessen and prevent the hazards of fire and explosions in the loading, shipping, transporting, trucking, delivery and discharge of fluids having the general characteristics and properties common to liquefied petroleum gases; and it presents a safety device for valving pressure vessels and containers of such dangerous fluid, whether movable or stationary. It safeguards the shipping of explosive fluids in tank cars and by truck; and it lessens public danger in the transportation of oil and gasoline and other petroleum derivatives, and of fuels, refrigerants, gases and other inflammable fluids. It is concerned with protecting both the public and the handlers of inflammable fluids by rail and by highway and at places of storage.

A further object is found in the provision of means of automatic nature for closing and maintaining closure of the valve whenever the fitting is disconnected, damaged, broken or misused by accident or design.

A valued object is found in the protective enclosure of the main valving mechanism within the fluid container or transporting tank itself.

A further object is to provide a safety control device that may be installed on a tank to facilitate the introduction and withdrawal of combustible fluids, so constructed that most of its parts may be removed, replaced, cleaned or repaired, while the tank is in use and under pressure, without the occurrence of leaks and fires and the dangers ordinarily incident thereto.

A valued object is attained in such construction of a fitting and its arrangement with respect to a tank, that should all exposed parts and its external connections be broken off the valve will still hold and the tank will not leak, the place of breakage being predetermined in contemplation of unusually violent shocks.

Another object is to provide special closing and sealing mechanism cooperating with the valve stem so that no fluid may leak about the stem, either when the valve is fully opened or fully closed.

Another object is to provide a movable head within a sleeve which will automatically close the valve against the escape of fluid (with or without the use of a spring) whenever the manual

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means normally used for operating the valve is removed or broken off.

Another object is found in that design and construction of the device which will allow the separate and inexpensive removal, repair and replacement of damaged parts, such as valve stem, valve bonnet, valve head, discs, seats, sleeves or springs without any need to replace or renew the valve body or its means for attachment to the tank.

A further object is to provide valving mechanism of this general character arranged to cooperate with an excess flow check valve to automatically prevent the unwanted delivery of fluid in excess of normal demand.

The ordinary commercial valves used in controlling pressure-producing inflammable fluids, stored or carried in containers, are usually so constructed and installed that whenever their exposed parts are broken, damaged or spring a leak they cannot be repaired inexpensively, they cannot be repaired at all while remaining in the pressure filled vessel, and they become at once converted into extremely dangerous instruments producing fires and explosions; and this is especially true when they are used in the liquefied petroleum gas industry.

Ordinary valve arrangements heretofore used have been found altogether inadequate and unsatisfactory for the safe control of inflammable and explosive fluids, especially while in transit and when being discharged. Altogether too numerous have been the widespread accidents and explosions following the use of imperfect valve controls in the handling of butane with the result that much property has been destroyed and many lives have been lost. Especially is this true where all or most of the valve closure parts have been exposed or carried on the outside of a tank. The exposed parts have quite frequently been broken off, leaving no control whatever over the escaping fluid.

When connections are made to a tank car even a slight movement in the car may break a connection. When a truck is used to transport dangerous fluids the truck may back into a loading dock and break off an exposed discharge valve or, after a coupling or connection has been made to the truck, it may roll and break the connecting pipe or hose, frequently deforming the body of the discharge valve or its stem so that the valve may not be closed even manually.

When this invention is used and the connection is severed or the fitting body is broken off the main valve is automatically closed by either the

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internal pressure within the tank or by action of the valve spring which normally keeps the valve closed; and this is true even though the exposed parts of the fitting are broken off or the valve stem is lost altogether or the coupling or discharge conduit is completely severed. Indeed, the valve stem will fall off when the body is broken. The stem is not fixed to the valve head in this device.

The automatic closing part of this valving device is completely encased in the tank where it may suffer no distortion and is completely protected from any force which may be applied accidentally or otherwise. In addition to the protected main operating valve, which may be closed automatically or manually, there is provided a complementary excess flow check valve which is also capable of automatic closure if the delivery conduit is broken.

Safety is a primary object in the design and construction of this device; and the safety of travellers on the highways and in public places is one of its definite objectives. Also the transporters, handlers, and users of inflammable fluids are protected by its use. Even the careless are safeguarded.

In one typical arrangement of this valving mechanism the installation may be made in the bottom of a tank, as is usual; and in another and modified form of the device installation may be made in the top of a tank, affording even more protection. The two forms of arrangement, for top and bottom installations, are illustrated and described; and the drawings disclose such adaptations.

The drawings

Fig. 1 is an elevational side view of a typical fitting for installation in the bottom of a tank.

Fig. 2 is a sectionalized elevation of a typical fitting for installation in the bottom of a tank, in which the excess flow check valve mechanism is removed from its housing and shown in exploded position.

Fig. 3 is a plan view of the excess flow check valve plate.

Fig. 4 is a plan view of the main valve adjusting disc, taken along line 4—4 of Fig. 2.

Fig. 5 is a partially sectionalized elevation of the mechanism as modified for installation in the top of a tank.

Fig. 6 is an exploded sectionalized view of the main valve head, its spring and adjusting disc, as carried in the device shown in Fig. 2.

Fig. 7 is an exploded and partially cut away elevation of the main valve head assembly, carried in the device shown in Fig. 5.

In the drawings, numerals are used to indicate the various members of the mechanism; and the first 50 numerals used indicate parts common to both the typical device shown in Figs. 1, 2 and 3 and the modified device shown in Fig. 5.

In the drawings, the numeral 1 indicates a valve body which is usually vertically disposed, but it nonetheless may very obviously be carried in the side wall of a tank.

Intermediate the ends of this valve body there is provided an annular external groove 2 in the body affording a less strong wall section so that external force applied to the exposed part of the body sufficient to sever it along the line of the groove would allow the exposed part of the body beyond the groove to break off and permit the valve stem to fall out of the valve body. This stem is not attached to the valve base or to the valve head. The result would be instant closure

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of the main valve by reason of the pressure of the confined fluid within the tank and/or by reason of a strong valve closing spring associated with the base of the body remaining in the tank.

Vertical threads 3, are provided internally of the exposed end of the body to receive the valve bonnet 11. Vertical threads 4 are provided externally of the encased base end of the body to receive the valve sleeve. Threads 5 are provided about the body base near the inlet end thereof for mounting the body in a tank. Obviously, for these several threads there may be provided alternate means of attachment, such as flanges and bolts, or any other suitable means.

There is arranged an outlet branch 6 from the side wall of the body through which fluid may be discharged and delivered when the main valve is open; and this branch is provided with threads 7 or with other suitable connecting or coupling means for providing conduit connection to a discharge hose or pipe.

In the usual installation the tank 8, within which the main valve and body base is carried, is provided with a collar 9 on the tank wall, or with other suitable means to receive the valve. This collar may be secured to the tank by using a welded joint 10 or by flanging and bolting it.

The exposed end of valve body 1 is arranged to carry valve bonnet 11 which in turn receives and carries compression plug 12, through which is inserted valve stem 13. This stem is provided with a knurled handwheel 14 or other means for turning the stem. When the wheel is used it is ordinarily held in place by screw 15 cooperating with washer 16.

Valve stem packing 17 is arranged within recess 18 constructed within the encased end of plug 12. This recess is constructed to cooperate with tapered shoulder 19 in the valve bonnet to provide space for packing 17.

Intermediate its ends the valve stem is provided with a ring 20 which is constructed to afford beveled external face 21 and beveled internal face 22. A cylindrical auxiliary valve chamber 23 is provided within the valve bonnet to allow the movement therealong of ring 20.

Beveled seat 24a is provided in valve body adapter 25 at one end of chamber 23, so constructed as to receive and cooperate with face 22 to provide a primary auxiliary valve to close the chamber when the main valve is opened wide.

A somewhat similar beveled seat 24b is arranged at the opposite end of chamber 23, being constructed as a part of the internal arrangement of bonnet 11. This second beveled seat is fashioned to receive the beveled face 21 of ring 20 and cooperate therewith to form a secondary auxiliary valve which may be maintained tightly closed whenever the main valve is closed and valve stem 13 is extended from the bonnet.

Thus it will be seen that valve stem ring 20 is provided with alternate valve faces, for articulation with their respective seats, provided at opposite ends of chamber 23, so that the valve stem is sealed against the escape of any fluid therearound both when the main valve is entirely open and when the main valve is entirely closed; and the sealing action of these auxiliary valves, arranged to close chamber 23, is in addition to the sealing effect of valve stem packing 17. Thus no leak can possibly come about around the valve stem when the main valve is closed or open or partly open.

In order to provide a still more positive seal against the escape of fluid into auxiliary cham-

ber 23 when the main valve is open and the primary auxiliary valve is closed, the valve body adapter 25 is provided with an annular extension 26 thereof, to be kept in position by valve bonnet 11; and this extension is cushioned against sealing gasket ring 27 which is fitted tightly against internal shoulder 28 provided within valve body 1 to accommodate this gasket ring. This allows some latitude and cushioning effect whenever the primary auxiliary valve is forced to tight closure by the final progress of the valve stem into the valve body.

The adapter 25 is provided with internal threads 29 of reverse character, generally known as left hand threads; and that part of the valve stem which travels along the adapter is provided with external threads 30 of like character. Thus, when hand wheel 14 is rotated to the right, the usual direction for closing a valve, the main valve mechanism in this device is closed, and it may be opened by rotating the wheel to the left. However, the conventional right hand threads may be used if desired.

The valve stem has an encased extension 31 (usually made smaller than the main stem 13); and this extension continues beyond the adapter and terminates in a rounded end 32 to engage and move the main valve head without being attached thereto.

When the main valve is open fluid flows freely from the tank (due to the pressure of expansible fluid in the tank or to gravity); and it is discharged from the valve body through outlet branch 6 which is provided with an internal shoulder 33 to receive gasket ring 34 which has the function of preventing leaks from the branch.

A coupling member 35 is provided with threads 37 to connect to a discharge conduit (not shown) which may be a pipe or a hose, usually leading to some fixed tank or container where the fluid may be stored. The coupling member also has threads 38 for attachment to branch 6.

The excess flow check valve assembly is indicated as 36 and is carried by the branch which, together with member 35, houses the movable parts of the valve assembly. There is an annular shelf 39 within member 35 and it is provided with a beveled valve seat 40 to receive the excess flow valve disc 41 which also has a beveled face 42 to cooperate with the seat, forming a valve.

This valve is normally kept open by spring 47 arranged about spindle 43 which carries the valve disc. The spindle passes through valve plate 44 which has a plurality of openings 45 therethrough and an extension therefrom to form valve guide 46. Spring retaining recess 50 within plate 44 receives one end of the spring which is kept in normal compression by retaining nut 48 and lock nut 49.

Fluid discharged from the tank is normally discharged against such pressure that its flow is never extremely rapid unless the discharge conduit from the valve is ruptured or the pressure is otherwise relieved. When this happens (without the exposed part of the valve body being broken off, as at the groove 2) then the excess flow check valve closes automatically and the flow ceases. This closure comes about by the increase in velocity and volume of the escaping fluid. This fluid presses against the back of disc 41 which is forced to its seat, overcoming the resistance of spring 47. Thus breakage of the delivery hose causes the excess flow check valve to close and prevent the escape of dangerous

fluid. This safety provision is in addition to that furnished by the arrangement which causes the main valve within the tank to close when the exposed valve body is broken off. A double precaution against explosion and fire is thus provided to make safety still more safe, and in one compact unit.

In the typical construction of this device when used to valve an opening in the bottom of a tank the main valve head assembly 56 is carried in a sleeve or casing 51 installed within tank 8; and this sleeve is provided with a plurality of ports 52, of such size and number as to allow the passage therethrough of fluid in the maximum volume which can be discharged by the valve. These ports are preferably disposed in the casing at or near the bottom of the tank, so that all fluid within the tank may eventually drain into and through these ports.

The sleeve 51 is provided with internal threads 53 in its upper end, and with internal threads 54 in its lower end. These latter threads are arranged for attachment to threads 4 on the base of valve body 1; and on the extreme upper end of this body there is provided valve seat 55 so that it will be encased by the sleeve.

The entire valve head assembly 56 is carried within this sleeve, so that valve head 57 may cooperate with valve seat 55 to form the main valve of the mechanism.

A resilient disc 58, which comes to rest upon the valve seat, is maintained in the lower recess 59, provided in the valve head, by washer 60 which is held in place by lock screw 61, the head of which is formed to present a concave recess 62, to receive the rounded end 32 of the valve stem; and a lock nut 63 is fixed around member 61 in the upper recess 64, also provided in the valve head. A compression spring 65 nests around this nut and has its lower end in the last named recess.

Above the spring is provided adjusting disc 66 which has a recess 67 in its under side to receive the top of the spring. External threads 68 are provided around the periphery of the adjusting disc so that it may be screwed into the upper end of the sleeve. The depth to which it is thus inserted determines the tension and force of the spring, which is relatively strong. In order to prevent such adjustment as may be made from changing by reason of movement in the adjusting disc the latter is provided with a peripheral slot 69 in a segment of the disc; and through this segment there is arranged a lock screw 70, which when made down fast slightly closes the slot and causes the peripheral threads on the disc to tightly impinge the threads in the sleeve; and thus the disc is made fast, so to remain until a different adjustment is needed. To make such adjustment by turning the disc a key wrench or another appropriate tool may be inserted in the key slots 71 which are arranged in the adjusting disc.

The sleeve 51 may be made integral with and as an extension of valve body 1, if preferred.

All of the above enumerated parts and elements of construction are used in making up the typical device for use in the bottom of a tank; and in operation it will be seen that the sleeve or casing 51 of the mechanism may be inserted into the bottom of a tank through collar 9 until threads 5 on the base of the valve body 1 are made up tight and leak-proof into the collar. The safety groove 2, which slightly weakens the wall of the valve body, appears approximately in

line with the bottom edge of the collar; and all the remaining parts of the mechanism then depend below the bottom of the tank.

If the installation is made on a typical truck tank this device is usually installed on the bottom at the rear of the tank, so that the truck may be backed up to a place of delivery and a hose or pipe may be connected to coupling 35 and extended to a permanent storage vessel on the premises where the delivery is to be made. Though this is the usual place and manner for attachment and use of this device, it appears, obviously, that it may be installed on the front end of a truck tank just as well; and it may be installed anywhere along the bottom of a truck tank or railroad tank car; and the device will operate quite well if installed in the end wall of a tank or in the side wall.

However installed, the device is primarily intended to afford valve mechanism for the delivery and discharge of fluid from a tank, usually of portable character. Yet, the device may be installed on a receiving or storage tank, which may be permanently located; and in the latter event fluid enters through coupling 35, passes through the open space within valve body 1, up into the main valve, out of ports 52 and into the storage container. There is not as much likelihood that tank valve apparatus will be broken when it is installed in a permanent or non-moving container; but such may happen; and where this device is used in a fixed storage container it affords complete safety and protection whenever the delivery hose on its couplings are severed or the valve body is broken off.

In operating this device it is to be remembered that the main valve within sleeve 51 remains normally closed, by reason of the pressure of the tank's contents on the upper side of valve head 57, and because of free communication between such head and the tank through the central opening within adjusting disc 56. However, the better to insure such valve closure spring 55 is added. Either force will keep the valve normally closed.

To open the valve it is necessary to rotate stem 13, which has a left hand thread as it passes through valve body adapter 25; and when the stem is rotated to the left the main valve will open until valve head 57 has passed upwardly within sleeve 51 to expose ports 52, through which fluid will flow into the valve body and be discharged from the valve through branch 6 and coupling 35. Nothing then hinders the free discharge of the fluid from the tank, unless there is an accident, such as a break in the conduit leading from coupling 35 to the storage container. When this happens the excess flow check valve, carried in branch 6, closes instantly and shuts off the flow. If a more severe accident occurs, such as one in which the body of the main valve is broken off at groove 2, there is an instant disengagement of the upper end 31 of the valve stem from its point of contact within the recess 52 provided in the bottom of valve head assembly 56, with the result that spring 55 and the pressure within the tank promptly cause the main valve to close by setting resilient disc 58 on valve seat 55. When such break occurs it is therefore quite evident that all of the parts of this device below groove 2 fall away from the tank, including the valve stem which normally supports valve head 57 when the valve is in open position.

Whenever it is desired to install this device in

the top or upper part of a tank there is provided a slight modification of the elements of the device which are carried entirely within the tank; and this modification is explained as follows: A closed sleeve on casing 81 is provided (in place of the usual sleeve 51); and a pickup pipe 82 is fastened in place through the use of internal threads 84 in the lower end of the modified sleeve, or through the use of other suitable means of attachment.

This sleeve is not provided with any ports or holes in its sides, but it is made with internal threads 83 in its upper end for attachment to the base of valve body 1, which base carries threads 4 for such accommodation.

The valve seat 85 provided on the lower end of valve body 1 is made exactly like valve seat 55 in the typical installation made for use in the bottom of a tank.

In the modified form a different type of valve head assembly 86 is provided to be carried within sleeve 81. This assembly includes a valve cup 87 which is another form of valve head and which has resilient disc 88, maintained in upper recess 89 in the valve cup by washer 90 and held in place by lock screw 91, the head of which is formed to present a concave recess 92 (to receive the rounded end 32 of the valve stem). Lock nut 93 is fixed around member 91 within recess 94 arranged in the lower part of the valve cup, which recess also accommodates the upper end of spring 95; and an adjusting disc 96 is made and arranged exactly like the typical disc 56, except that it is turned upside down. This disc has a recess 97 to receive the lower end of the spring; and it is provided with external threads 98 and peripheral slot 99 which may be partly closed through the use of lock screw 100 to tighten the adjusting disc within the sleeve and prevent its movement. Slots 101 will receive adjusting wrench.

The valve cup is not solid (as is the typical valve head), the cup being provided with internal ports 102 and external ports 103, which latter are arranged around the periphery of the cup.

In this modified form of the device arranged for installation in the upper part of a tank its exposed parts are constructed and function exactly as the exposed parts of the installation made in the bottom of a tank, which has been fully described hereinabove. The only difference in operation is that the fluid passes up into the main valve through the many ports provided in the valve cup; and in order that the fluid may always reach these ports and pass therethrough the pickup pipe 82 is ordinarily extended to a point near the bottom of the tank.

Pressure producing expansible fluids normally maintain sufficient pressure from gas collecting in the upper part of the tank and emanating from liquid in the lower part of the tank to cause such liquid to freely flow upward in pipe 82 whenever the main valve of the device is open.

The eduction of liquid in the manner indicated is an easily accomplished fact when this invention is used to discharge liquefied petroleum gases, for which use it is ideally suited. In arranging the device on the upper part of a tank with the main valve mechanism depending in the tank end fully protected thereby there is a still greater measure of safety. The exposed parts of the mechanism are not as likely to be

broken off on top of the tank as when they are arranged below it.

By way of summary it should be apparent from the drawings and the foregoing description that this invention will make more safe the valving of tanks containing explosive and inflammable fluids and prevent fires and explosions by making impossible the escape to the atmosphere of such fluids as a result of accident or damage to the equipment, such as the severance of a delivery conduit or coupling, the breaking off of exposed parts of the valving mechanism, and the improper packing or non-packing of valve stems, to prevent which the main valve is entirely encased and protected from external damage by being placed within the tank, an auxiliary valve chamber is provided around the valve stem and fitted with a pair of auxiliary valves, a non-attached and free valve stem articulates with the valve head from which it may fall away to close the valve whenever the valve body is broken at a safety groove arranged about it, and a separate excess flow check valve prevents any flow when it becomes excessive.

I claim:

1. In apparatus for controlling fluids, a tank; a hollow valve body extending within the tank to provide a valve casing, said body being also constructed to extend outwardly of the tank to carry a valve stem; a valve head arranged to move within the casing; a valve seat constructed to cooperate with the head to form a valve; a valve stem arranged to open the valve by elevating the head against the pressure of fluid within the tank, said valve being closeable by said pressure on rupture of the outwardly extending portion of the valve body; and an auxiliary valve so arranged around the stem intermediate its ends as to prevent the escape of fluid about the stem when the first-named valve is open, said auxiliary valve including a floating beveled valve seat, a beveled movable valve head, a valve chamber cover arranged to hold the valve seat member in place, and an annular cushion arranged between said member and the casing whereby the seat member is allowed to accommodate itself to the movement of the said head when the auxiliary valve is being closed.

2. In fluid control apparatus, a hollow valve body having an outlet at one end; a cylindrical extension at the other end of the body arranged to be inserted within a tank; a valve encased by the extension and arranged to open and close it, the valve including a valve head moveable within the extension; ports arranged through the wall of the extension and so constructed as to communicate with the hollow body when the valve is open, the ports being so arranged that they may be closed by moving the valve head; valve stem means arranged to move the valve head, said means being so constructed as to extend between the outlet and the cylindrical extension and also partially from the body and allow manual manipulation thereof; a floating valve seat disposed about said stem, an auxiliary valve for said floating seat disposed about and movable with said stem, a casing on said body and enclosing said auxiliary valve, stem, and floating seat whereby to prevent leaks about the stem when the main valve is open.

3. In fluid control apparatus, a tank; a tubular body partially inserted in the tank; a valve seat formed on the end of the body within the tank; a casing attached to the body and extending within the tank; a slidable valve head arranged

within the casing and constructed to cooperate with the seat to form a valve; a valve stem arranged partly within the body and constructed to articulate with the head to lift it when the stem is moved; ports provided through the casing arranged to communicate with both the body and the tank when the head is lifted; and an auxiliary valve provided with a floating valve seat and disposed about the valve stem and enclosed in a casing, being so operable as to prevent leaks about the valve stem when the main valve is open and discharging.

4. As an article of manufacture, a hollow valve body arranged to carry a valve stem; a tubular extension from the body arranged to encase a main valve; a valve seat constructed in said extension; a moveable valve head carried in said extension and being arranged to co-act with the seat; a plurality of ports arranged through the extension wall and disposed above the valve seat, said ports being so disposed as to be closed by the valve head when the valve is closed; spring valve closing means carried in the extension above the head; means for providing adjustment to the spring, said means being also carried in the extension; a cylindrical chamber arranged about the valve stem so as to encase a part thereof, said chamber being carried by the body; an auxiliary valve seat arranged within the chamber; and an auxiliary valve head carried by the stem and arranged to cooperate with the auxiliary seat to form an auxiliary valve so constructed and disposed as to prevent leaks about the stem when the said valve is closed and while the main valve is discharging fluid.

5. In tank valving apparatus, a hollow body provided with a branch therefrom and an inlet; a flow valve arranged in said branch; spring flow control means cooperating with said valve and so constructed as to allow the passage therethrough of fluid of a predetermined volume and being further arranged to allow closure of the valve whenever the flow exceeds such predetermined volume; a valve stem extending into said body and being provided with a free end; a threaded adapter carried within the body intermediate the ends of the valve stem and being so constructed as to allow the movement of the valve stem therealong upon rotation of the stem; a cylindrical chamber partially enclosing the valve stem and arranged to house stem sealing valves; a valve head arranged on said stem intermediate the ends of said chamber, said head being provided with a pair of oppositely directed faces, and each face being arranged to cooperate with a valve seat positioned at each end of said chamber to provide sealing valves about the stem when it is retracted and when it is advanced; the innermost of said seats being threaded about the valve stem and being loosely held in place by the walls of the chamber the better to accommodate itself to its valve head when the stem is advanced; a valve sleeve arranged at the inlet of said valve body to extend the body; a main valve seat disposed within the said sleeve; and a slidable main valve head so arranged within the sleeve that fluid pressure within the sleeve normally maintains the said head in a position of contact with its seat and being so constructed that the advancement of the valve stem within the sleeve will move the head from its seat against the pressure of such fluid to open the main valve.

6. In valving apparatus for liquefied petroleum gas tanks, a valve body having a hollow passage-way therethrough; an annular valve seat carried

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by the body; a valve head slidably mounted above said seat and coacting therewith to form a main valve, arranged to open and close an inlet to the passageway; resilient means normally maintaining closure of the said valve; an auxiliary chamber carried by the body; a movable valve stem carried by and through the chamber, and being extendible into the passageway a sufficient distance to contact and lift the main valve head from its seat; a valved discharge branch of the hollow body arranged intermediate the main valve and the chamber; and auxiliary valve means arranged within the chamber and around the valve stem, said means including a floating valve seat and being so operable as to prevent the passage of fluid around said stem and into said chamber when the main valve is open and the discharge branch is closed.

7. In a liquefied petroleum gas controlling device, a tank; a cylindrical valve housing carried entirely within the tank; a slidable valve head mounted in said housing; a valve seat arranged in said housing and coacting with said head to form a main valve; a spring mounted on said valve head and normally acting to maintain closure of the valve; an annular adjusting disc carried above the spring in the housing; a peripheral slot horizontally dividing an arcuate section of the disc wall; means for slightly closing said slot so as to fix impingement between the disc and the housing and maintain adjustment of the spring; an elongated body attached to said housing and extending out of the tank and provided with a passageway therethrough; an outlet

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branch on the housing disposed below the tank; a floating auxiliary valve seat carried by said body below said outlet branch and arranged to be held in place against a shoulder provided in said body; a resilient ring carried between said seat and said shoulder; a cylindrical chamber carried below the body, the walls thereof being so arranged and disposed as to support the floating valve seat; a valve stem passing through said chamber and through said body, the stem being so constructed and arranged as to lift the main valve to open the same against the spring; an annular beveled valve head carried around said stem and within said chamber, such head being so arranged as to coact with the floating seat to make an auxiliary valve.

JOHN R. HOLICER.

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