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SAFETY DEVICE FOR HOLDING CONTROL VALVE IN OPEN POSITION DURING FILLING OPERATION

Filed Sept. 1, 1959 4 Sheets-Sheet 1

Fig. 5a.

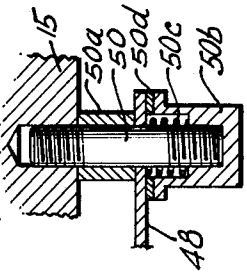
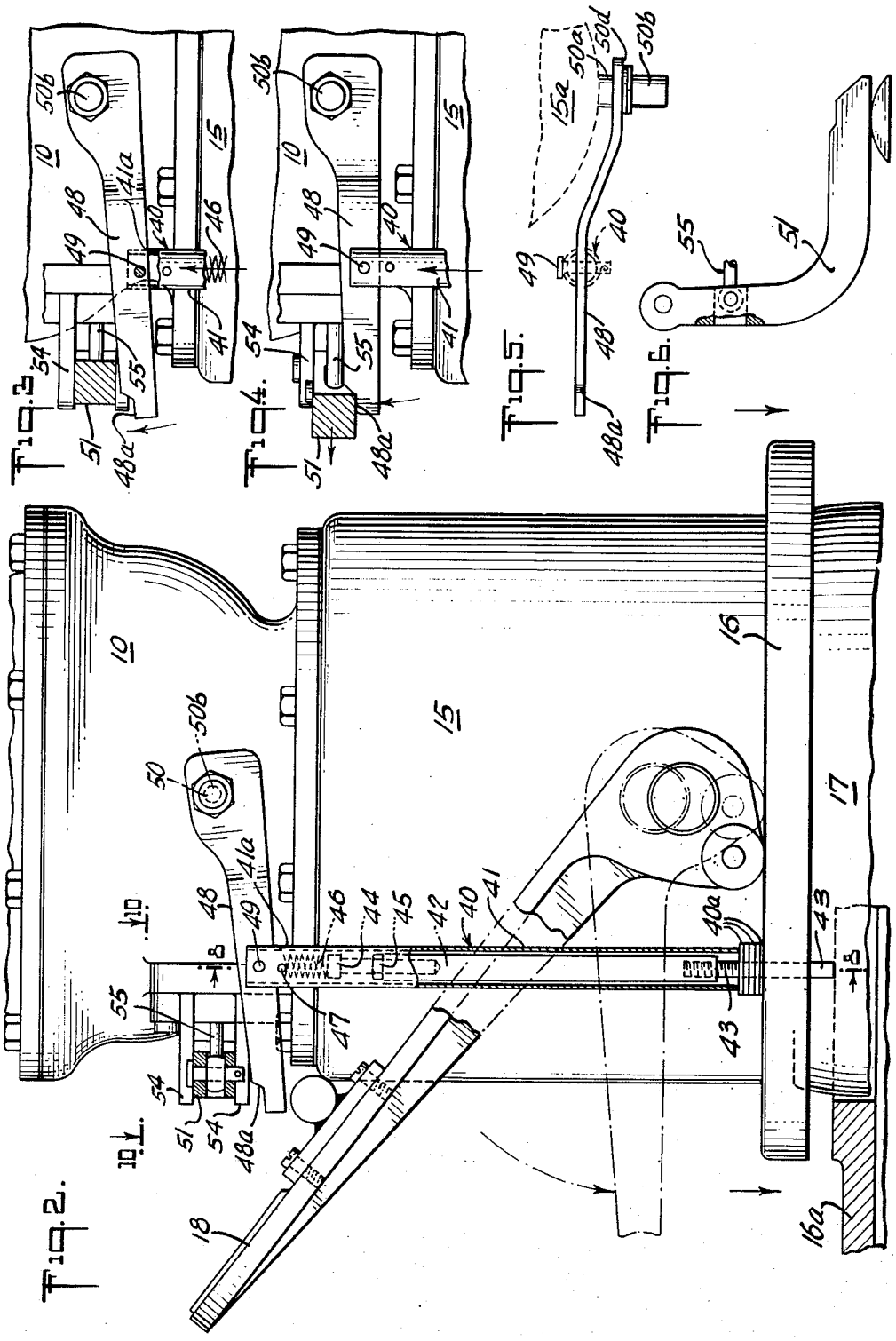


Fig. 1.

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Fig. 7.

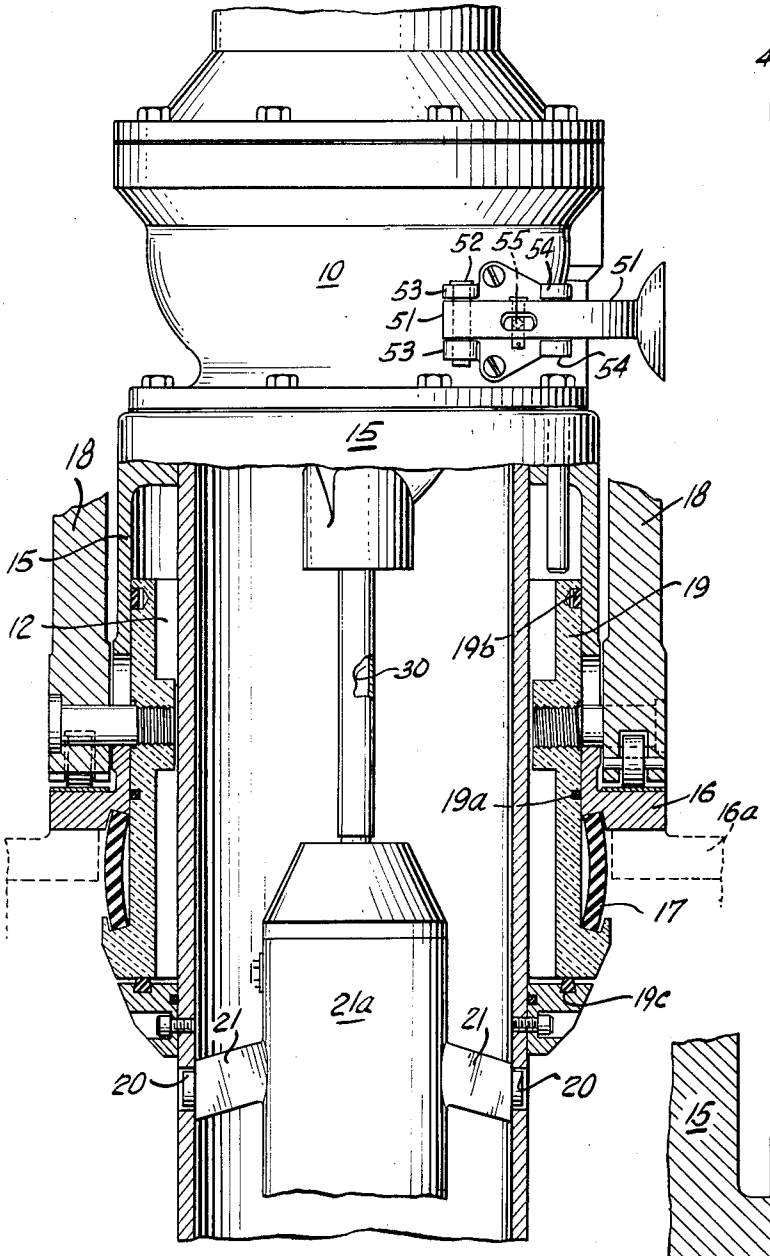
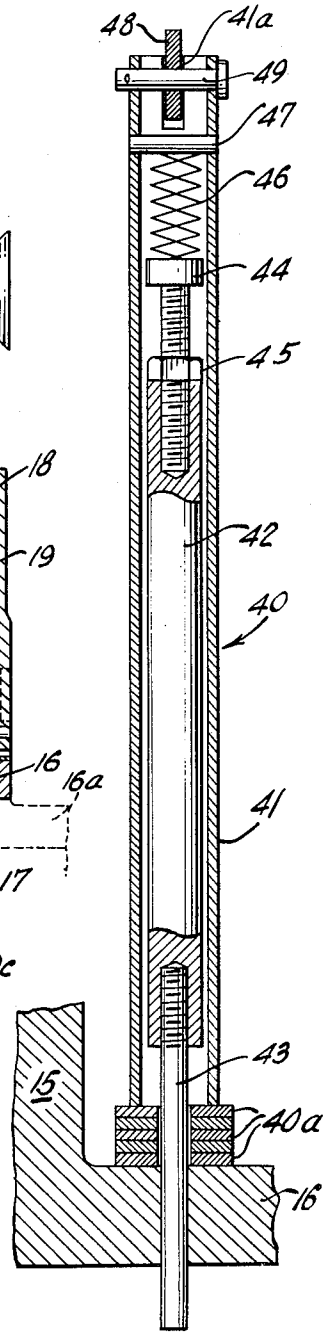


Fig. 8.



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SAFETY DEVICE FOR HOLDING CONTROL VALVE IN OPEN POSITION DURING FILLING OPERATION

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Fig. 9.

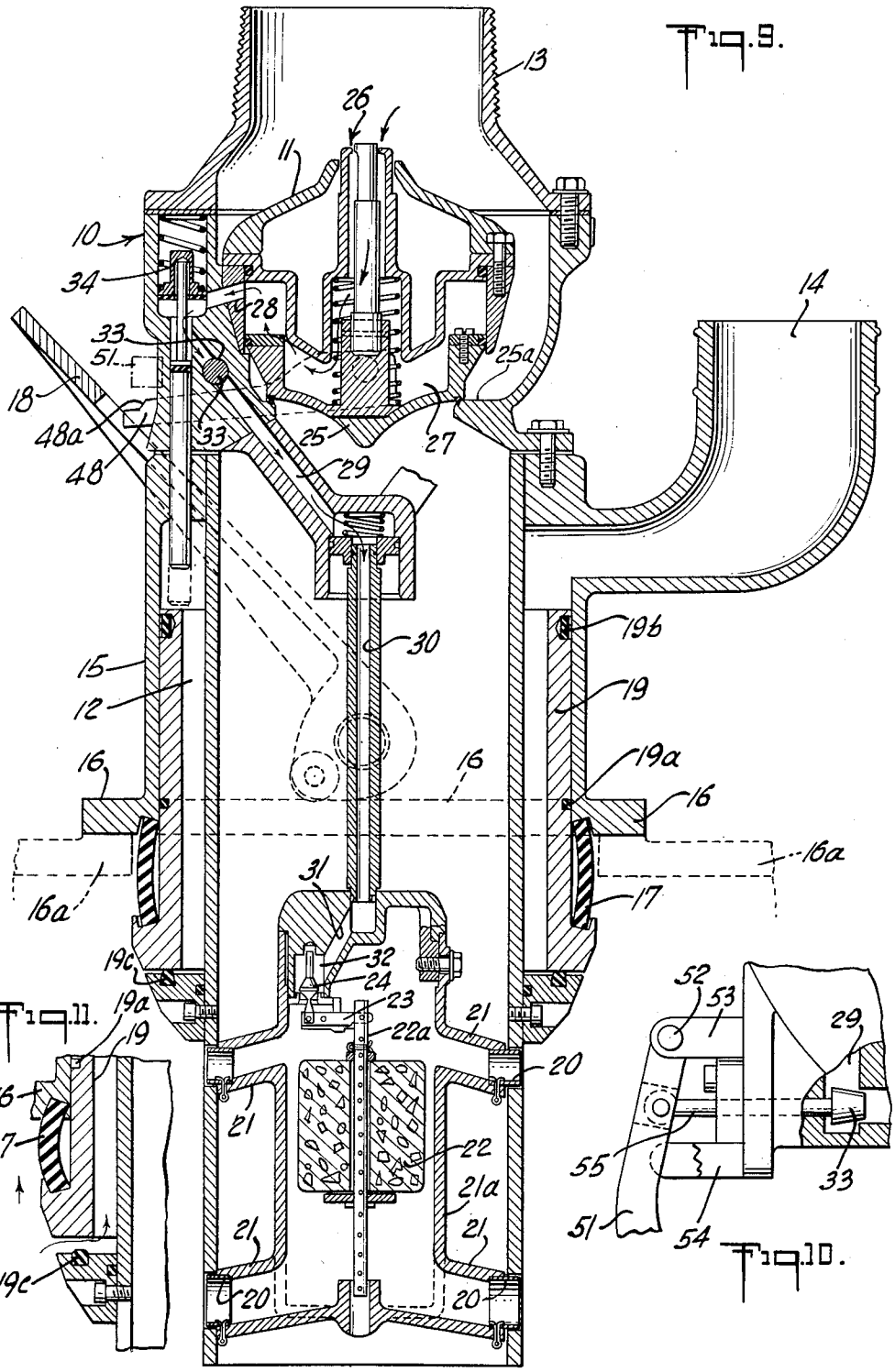


Fig. 11.

Fig. 10.

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3,033,246

SAFETY DEVICE FOR HOLDING CONTROL VALVE IN OPEN POSITION DURING FILLING OPERATION

Eusebius L. Civerolo, Pasadena, Calif., assignor to Texaco Inc., New York, N.Y., a corporation of Delaware

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2 Claims. (Cl. 141—208)

This invention relates generally to a valve assembly for use in bulk loading of petroleum products and specifically is concerned with a safety device for the control of the loading valve of the assembly. In one detailed aspect of the invention, it is practiced with a vapor recovery system at a petroleum products loading rack.

During the bulk loading of liquids having low vapor pressures, e.g. gasoline, through the hatches of tank transports, vapors may flash off and be lost to the atmosphere unless they are restrained. The current drive against air pollution, especially in areas where petroleum processing and distributing activities are concentrated, are being directed to the prevention of such vapor losses. Besides polluting the air, the vapors are a source of danger, because of possible formation of explosive mixtures, and are a revenue loss, since most of these vapors may be recovered for reprocessing.

In addition, fire safety regulations require the use of a bulk loading valve assembly with a so-called "dead man" control, which must be held open manually to permit flow of liquid during loading of the tank transport, to reduce and/or avoid spillage of fuel and so minimize the danger of air pollution, fire and explosion. This results in individual personnel operation for the loading of each individual compartment of the transport.

Accordingly, it is an object of the present invention to provide an improved means for the bulk loading of vapor-emitting liquids.

Another object of the invention is to provide an improved valve assembly for assuring safety during the loading of liquids having low vapor pressures.

Still another object of the present invention is to provide means to assure the bulk loading of liquids having low vapor pressures with the loading controlled and closed off during times of imminent spillage.

And still another object of the present invention is to provide an improved means for assuring the closing of a bulk loading valve despite the circumvention of a "dead man" control.

And another object of the present invention is to provide an improved means for the bulk loading of low vapor pressure liquids with a loading valve assembly having a "dead man" control which does not require the use of individual personnel for filling the individual compartments in the tank transport.

These and other objects, features and advantages of the invention will become apparent from the following description and claims when read in conjunction with the accompanying drawings wherein:

FIG. 1 is an isometric view of a vapor recovery valve assembly with an automatic overflow shut-off means and safety device for the "dead man" control in position for use in loading a low vapor pressure liquid;

FIG. 2 is a diagrammatic sectional elevation view of the valve assembly of FIG. 1 being inserted for loading with the safety triggering device in position;

FIG. 3 is a close up view of the top end of the safety device disclosed in FIG. 2, with the locking arm in inoperative position;

FIG. 4 is a similar close-up view of the safety device with the locking arm in operative position in contact with the manually opened, automatically closing control valve handle;

FIG. 5 is a top view of the locking arm;

FIG. 5*a* is a partial view showing details of the pivot fastening means for the locking arm;

FIG. 6 is a top view of the handle for the manually opened or "dead man" control;

FIG. 7 is a partial sectional view of the loading valve assembly as inserted in a hatch and before being fastened therein;

FIG. 8 is an enlarged sectional view of the safety device or spring loading trigger for the locking arm, taken along the line 8—8 of Fig. 2;

FIG. 9 is a cross sectional view taken at right angle to FIG. 7;

FIG. 10 is a partial sectional view taken along line 10—10 of FIG. 2; and

FIG. 11 is a partial view of the position of the sealing means of the loading valve assembly when locked into a loading hatch.

The objects of the invention are achieved by means of a trigger release device for permitting the "dead man" control structure to become operative automatically when the bulk loading valve assembly is disconnected from the loading opening.

Referring particularly to FIGS. 1, 2, 7 and 9 of the drawings, a vapor recovery type of bulk loading valve assembly is disclosed generally at **10**, including a float actuated automatic filling valve element at **11**, FIG. 9, and vapor return collecting chamber at **12**. The loading arm connection for joining the valve assembly to the source of fluid to be loaded is indicated by the screw threading at **13** and the vapor return connection is at **14** leading from the body **15** of the valve assembly.

The body **15** includes the flange at **16** which is adapted to seat on the outside edge of the loading hatch or opening of the tank, indicated in dotted lines at **16***a*, FIG. 9. The sealing ring for the hatch or opening is indicated at **17**, FIGS. 7 and 9, in relaxed position, and is shown expanded, in FIG. 11, into sealing position with the edge of the hatch or opening, by means of the foot operated cam lever at **18** which raises the sleeve at **19** causing the sealing ring **17** to be flexed outwardly. The full line showing of the lever **18** in FIG. 2 is for the unlocked position of the valve assembly and the dotted line showing is when the assembly is locked in position. Appropriate sealing rings and gaskets, disclosed at **19***a* and **19***b*, are carried by the sleeve **19** for sealing off the contact surface with the body **15**, and at **19***c* to serve as the vapor return sealing ring. When the sleeve **19** is raised into position by the cam lever, there is an opening between it and the sealing ring **19***c*, FIG. 11, to permit and define a vapor passage, as disclosed by the arrows to indicate the vapor flow outwardly.

The valve assembly disclosed in FIG. 9 shows the automatic filling valve in closed or seated position without the flow of any pressurized fluid. Considering first the operation of the automatic overflow control valve which can function separately from the "dead man" control, as the level of fluid loaded into the tank compartment rises in the tank and passes through the openings at **20** into the passages of the hollow spiders **21** leading to float chamber **21***a*, the float **22** is raised together with its guide rod **22***a* to which is pivoted the lever **23**. The overflow control valve at **24** is pivotally connected to lever **23** and, when it is seated by the raising of the float **22**, serves to unbalance the differential pressure of the valve assembly causing the valve **11** to be closed, as will be described below.

Filling begins as pressurized fluid is provided the loading valve assembly and the floating valve element **25** of valve **11** is unseated, i.e. raised off the valve seat at **25***a*, by the difference in pressures exerted on the inner and outer surfaces of this valve element which occurs as

the fluid passes by the throttle at **26**, into the chamber at **27**, flowing through the passages **28**, **29**, **30** and **31** as indicated by the arrow into the valve chamber at **32**, whence it flows into the float chamber **21***a* and through the openings **20** into the tank.

In passage **29**, there is interposed a "dead man" control or valve structure, indicated at **33**, spring biased for automatic closing (not shown), as well known in the art. In order that differential pressure may exist and unseat the floating valve element **25** of the automatic valve **11**, the "dead man" control must be opened to allow free fluid flow in the passage **29**, and, because of the leverage system controlling the overflow valve **24**, the latter will be in open position to permit a free flow of fluid through the valve chamber **32**, the float chamber **21***a*, and through the passages of the hollow spiders **21** and openings **20** into the tank. It should be evident that if the "dead man" control is in closed position, the flow of fluid through passage **29** is impossible and the valve element **25** remains seated. Obviously, the flow of fluid through passage **29** may be stopped, even if the "dead man" control is kept in open position, as would occur when the overflow control valve **24** is seated by the action of the float **22**. The spring loaded controller, indicated generally at **34**, is arranged so that there may be a free flow of fluid and interconnection between the passages **28** and **29**.

Referring to the remaining figures of the drawings and particularly to FIGS. 2 and 8, the safety or triggering device of the present invention is disclosed in general at **40**, consisting of a piece of hollow tubing **41** for housing a member of lesser diameter, such as the rod indicated at **42**, threaded internally at both ends. Rod **42** receives another rod-like member **43**, at one end, while at the opposite end of the rod **42**, there is inserted a headed bolt-like member **44** which supports a position locking nut **45**. The head of the bolt-like member **44** serves as a seat for the spring **46**, maintained in the tubing **41** by the pin **47**, which is inserted through and fastened in appropriate holes in the tubing **41**. Although the elements **42**, **43**, **44** and **45** are shown as separate for ease in adjustment of length, they may be combined into an integral structure for standardized manufacture of specific lengths. Variations in the length of the tubing **41** are compensated for by the use of a series of washers, indicated at **40***a*. The tubing **41** of the safety or triggering device **40** has a notch **41***a* at its upper end for receiving the locking arm **48**, being fastened together by the pivot pin **49**.

Referring to FIGS. 3, 4, 5 and 5*a* in particular, the locking arm **48** has a cutaway or notched section at one end, indicated at **48***a*, for the purposes to be described, and is fastened in pivoted relationship to the valve body **15** by means of a threaded stud at **50**, supporting a spacing washer at **50***a* between the valve body **15** and the locking arm **48** and at its outer end, supporting a cap nut or the like at **50***b* for retaining a spring **50***c*, both being spaced from the locking arm by the washer at **50***d*.

FIGS. 3 and 4 disclose the action of the safety or triggering device to maintain the handle of the "dead man" control in open position. FIG. 3 shows the position of the safety device prior to manual opening of the "dead man" control. At this time, the outer surface of the hatch opening **16***a* is in contact with the rod-like member **43**, which projects through an opening in the flange **16**. The fastening of the valve assembly in the hatch compresses the spring at **46**, placing the elements of the triggering device under compression and forcing the upper edge of the locking arm into contact with the bottom surface of the handle for the "dead man" control, indicated at **51**. When this valve handle is moved outwardly to open the valve of the "dead man" control, the notched end section **48***a* of the locking arm **48**, comes in contact with the lower inside edge of the valve handle

51, due to the action of the compressed spring **46** within the tubing **41** of the safety device **40**. There is sufficient spring force to prevent the valve handle **51** from closing, by rising out of notch **48***a* and over the top edge of the locking arm.

FIGS. 6 and 10 disclose further details of construction of the automatic hand shut off valve handle for the "dead man" control. The handle **51** is pivoted at **52** to appropriate ears **53** supported by the valve body **15** and is restrained between the guides at **54**. The valve **33** of the "dead man" control is pivotally fastened to the handle **51** by the valve stem **55** and is shown in open position in FIG. 10. In this open position, pressurized fluid unseats the floating valve element **25** and fluid flows through the valve assembly until either the "dead man" control valve **33** is closed or the float actuated valve **24** is seated, to cut off the flow of liquid through the valve chamber **32**.

Thus, there has been shown and described, means by which it is no longer necessary to have individual attention given to loading valve assemblies having "dead man" controls, the operations of which are not obviated, inasmuch as the flow of fluid is cut off automatically at a given level. Should the valve assembly be dislocated from its position in the hatch, by excess pressure or accidental contact, the rod-like member **43** no longer maintains the spring **46** under compression so that the forces acting to retain the locking arm **48** in contact with the valve handle **51** drop off and it is possible for the "dead man" control to function to seat the valve **33** to close off the flow of fluid through the passage **29**, and destroying the differential pressure in the valve assembly, permitting the floating valve element **25** to seat and cut off the flow of pressurized fluid.

Obviously, many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. In combination with a bulk loading valve assembly which includes a float actuated, automatic filling valve element, said valve assembly including a valve body, a flange on said body for seating on the edge of a loading hatch, and a manually opened control for said valve element, said control having a valve handle with a control valve joined thereto, a safety device for use with said handle of said control comprising means for retaining said handle in open control valve position including a spring loaded trigger device and a locking arm in pivotal engagement with said trigger device and with said valve body for contacting and locking said handle in open control valve position, said trigger device being mounted on said flange for support of said arm and being spring loaded by contact with the edge of a loading hatch, said arm breaking contact with said handle upon release of the spring loading, said arm being formed at its contact end for locking engagement with said handle.

2. In a valve assembly for bulk loading through a hatch, said assembly being mounted on the outside edge of said hatch when in loading position, said valve assembly including a valve body, a flange on said valve body, a float actuated control valve element housed in said valve body, means for actuating said control valve element, and a manually opened, automatic closing control with a control valve and interconnected handle for initiating the opening of said float actuated control valve element, the improvement which comprises means for retaining said manually opened control in open control valve position while loading through said valve assembly, said means including a locking arm for contacting said handle and a trigger assembly including a tubing means pivotally joined at one of its ends to said locking arm, said locking arm also being pivotally joined to said valve body, said trigger assembly being supported on the flange of

said valve body and further including spring means and loading means, said spring means being housed in said tubing, and said loading means for applying force against said spring means being housed also in said tubing, said loading means being forced into loading position against said spring means by contact with the edge of said loading hatch when said valve assembly is in position for filling, said trigger assembly releasing said locking arm from contact with said handle upon release of the spring loading, said arm being formed at its contact end for locking engagement with said handle.

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