July 12, 1938. M. KLEIN ET AL 2,123,652

CONTROL DEVICE

Filed Dec. 2, 1935

Fig. 1

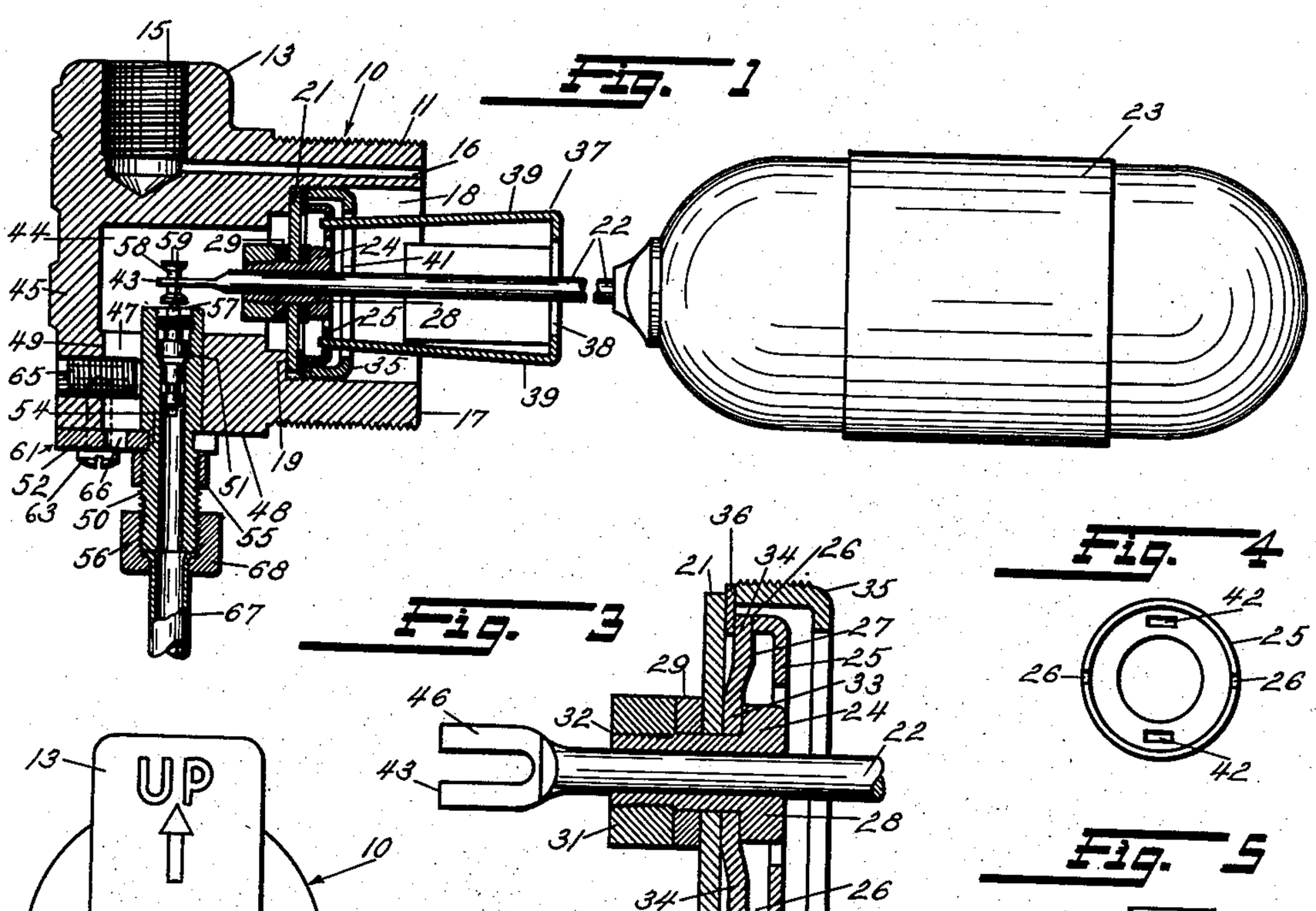


Fig. 3

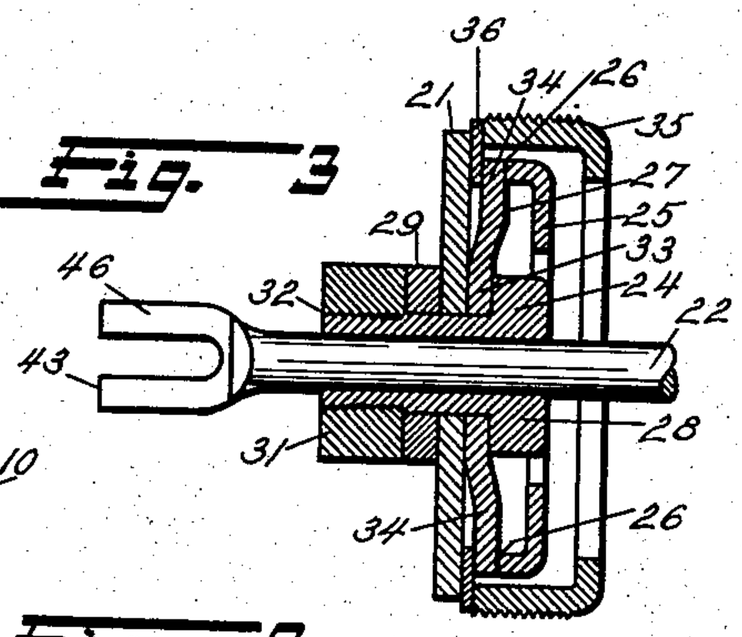


Fig. 4

Fig. 5

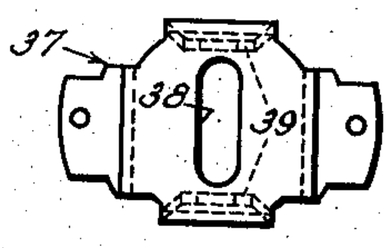


Fig. 6

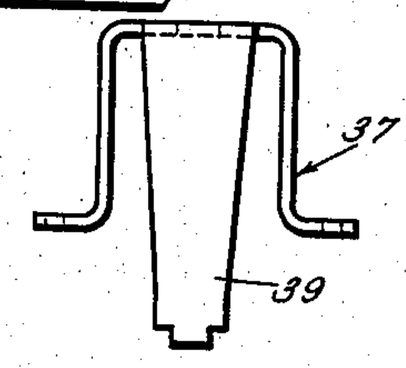


Fig. 7

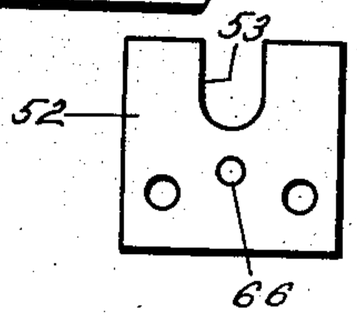


Fig. 9

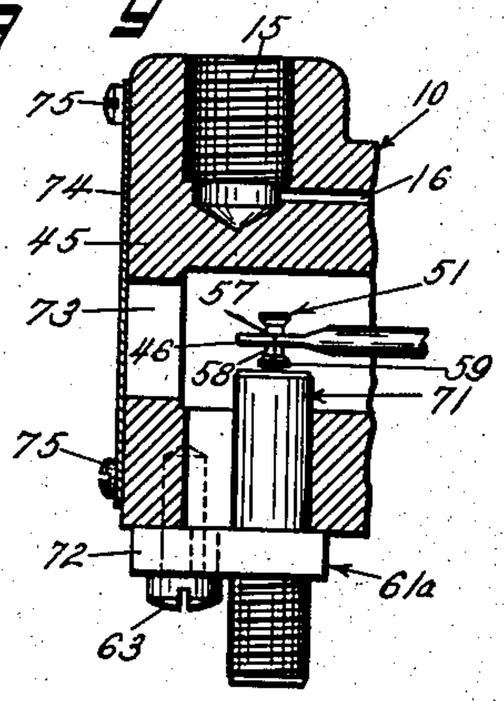


Fig. 2

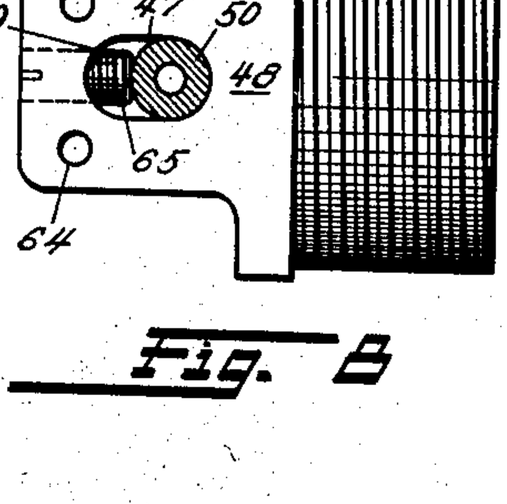


Fig. 8

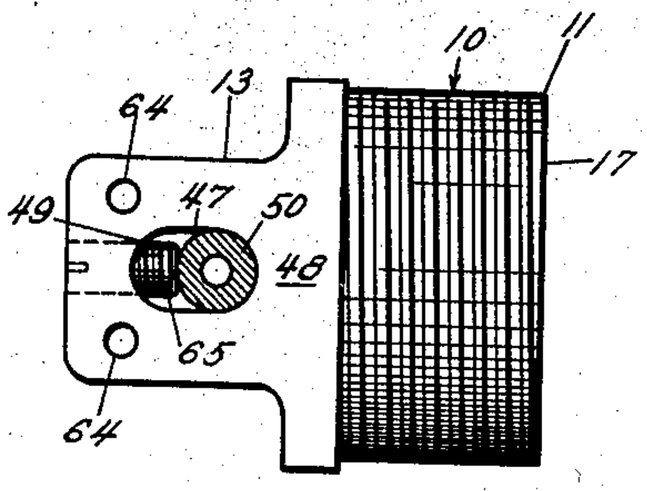
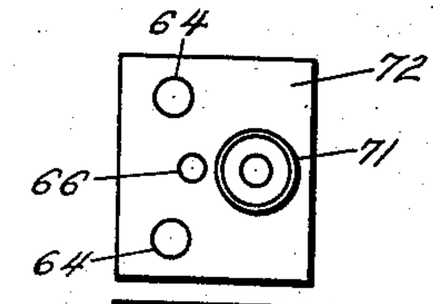


Fig. 10



Inventor

Maximilian Klein

Reidar A Tollefsen

By Strauch & Hoffman

Attorneys

Patented July 12, 1938

2,123,652

UNITED STATES PATENT OFFICE

2,123,652

CONTROL DEVICE

Maximilian Klein and Reidar A. Tollefsen, Sellersville, Pa., assignors to United States Gauge Company, Sellersville, Pa., a corporation of Pennsylvania

Application December 2, 1935, Serial No. 52,602

13 Claims. (Cl. 137—68)

This invention relates to a control device particularly intended for maintaining a definite volume of air above a supply of water in a tank, forming a part of a water supply system. More particularly, the invention relates to improvements in the valve structure and float arm pivots of a control device for insuring the maintenance of the proper amount of air above the water in a tank, that is intended to be automatically refilled by means of a pump, when the water level drops a predetermined amount, the control device of the present invention governing the volume of air above the water by permitting said pump to draw air and supply it to the tank with the water whenever the volume of the air within the tank is less than a definite amount.

Devices of this character have now gone into relatively wide use, particularly devices of this type in which a float and float arm are mechanically connected to a valve that controls the flow of air to a snifter valve of the pump. Such devices are disclosed in Patent No. 1,972,815 issued to Rolf E. Anneren on September 24, 1934 and in a co-pending application of Reidar A. Tollefsen, Serial No. 633,503 filed September 16, 1932, now Patent No. 2,041,579 issued May 19, 1936.

The primary purpose of the present invention is to provide a simplified improvement upon an arrangement such as illustrated in the application just referred to, by constructing the device of parts that may be very conveniently assembled and serviced, and that, when assembled, result in a control apparatus that functions with certainty under all conditions for an indefinite period, and in which the device is so assembled that the only elements thereof that will deteriorate, because of inherent characteristics of the material from which they are manufactured, may be conveniently and expeditiously replaced.

A further object of the present invention is to provide an air volume control device with a novel cup-shaped bearing member which is utilized to pivotally support the float arm in an enlarged sealed aperture in the fitting.

Another object of the present invention is to provide an air volume control device with a bridge member which guides the movement of the float and float arm and also retains the novel bearing structure in assembled relation within the enlarged aperture of the fitting.

Still another object of the present invention resides in providing an air volume control device with an air valve which may be expeditiously removed and replaced without removing the fitting from the tank or disturbing the float and diaphragm structure or the conduit connections.

Still another object of the present invention is to provide an unitary connector and closure plate the air valve of which may be serviced while maintaining the connector threadedly engaged with the conduit leading to the snifter valve.

A further object of the present invention resides in providing the fitting of an air volume control device with a removable plate which permits the service man to inspect the connection between the valve stem and the float arm in order to insure the proper engagement of said connection when the valve is being replaced.

Still further objects of the present invention will appear as a description thereof proceeds with reference to the accompanying drawing wherein:

Figure 1 is a vertical sectional view through one of the preferred forms of control device including the present invention.

Figure 2 is an end view of such device as seen from the left of Figure 1.

Figure 3 is a fragmentary sectional view on an enlarged scale showing the float arm pivoting mechanism, diaphragm and the unitary means for guiding the float arm and securing said pivoting mechanism in assembled relation in the enlarged opening of said fitting.

Figure 4 is a view showing the details of the pivot mechanism of the present invention.

Figures 5 and 6 are respectively, plan and side elevational views of the novel float arm guide and pivot securing means of the present invention.

Figure 7 is a plan view showing the novel valve supporting plate used in the form of invention illustrated in Figure 1.

Figure 8 is a bottom view of the control device of the present invention showing the elongated aperture provided for reception of the connector and valve.

Figure 9 is a fragmentary sectional view of a control device like that of Figure 1 showing a modified form of valve support and the removable plate closing the inspection opening.

Figure 10 is a view similar to Figure 7 showing the valve supporting means used in the modification illustrated in Figure 9.

Like reference characters are used to indicate the same parts throughout the several figures.

Referring now to Figures 1–8, the control device illustrated in the drawing comprises a fitting 10 having an externally threaded cylindrical portion 11 designed to be screwed into a tank forming part of a water supply system. Fitting 10

is also provided with a body portion 13 and a threaded opening 15 which is placed in communication with the interior of the tank by means of passage 16. A pressure gauge (not shown) is adapted to be threaded in aperture 15 and is designed to indicate the pressure in the tank.

The fitting 10 is hollowed out from its side 17 to form an enlarged chamber 18 within the fitting. An annular shoulder 19 is formed in chamber 18 by reducing the width of the chamber at a point remote from the end of the fitting. Shoulder 19 constitutes a seat against which a diaphragm 21, closing the open end of the chamber thus formed and having a float arm 22 carrying a float 23, secured thereto in any suitable manner, may be seated in a manner to be presently described.

The structure so far described forms no part of the present invention and is shown and described in detail in the above mentioned co-pending application, to which reference may be made for a more complete disclosure.

In order to facilitate the assembly of float 23 and float arm 22 with respect to fitting 10, diaphragm 21 constituting the means for sealing the open end of chamber 18, and a means for pivotally mounting the float in the fitting, are provided and assembled with respect to float arm 22 prior to the application thereof to fitting 10. To this end, a sleeve 24 is fixedly secured in any approved manner upon float arm 22 and a cup-shaped bearing member 25 having notches 26 therein is telescoped over arm 22 and sleeve 24. Diaphragm 21 and pivot means 27 are secured to said sleeve between an enlarged head 28 provided on sleeve 24 and a washer 29 by means of a nut 31 threaded on an externally threaded portion 32 of sleeve 24, so that all of the parts referred to are fixedly held on float arm 22. Pivot means 27 preferably comprises a hub 33 having diametrically disposed pivot pins 34 formed thereon (Figure 3). A washer 29 is provided to protect diaphragm 21 from injury in a manner well-known in the art.

An externally threaded cylindrical member 35 serves to clamp the diaphragm 21 between shoulder 19 and a ring 36 by causing the threads thereof to engage threads formed in the wall of the hollowed-out part of fitting 10, adjacent the open end 17 thereof. Ring 36 is preferably of sufficient width to extend inwardly from cylindrical member 35 to a point between diaphragm 21 and the pivot arms 34 formed on pivot means 27. Cup-shaped member 25 is disposed with its peripheral wall in intimate contact with a face of ring 36, with arms 34 disposed in notches 26. The walls of notches 26 and the face of ring 36 form the bearing surfaces for pivot arms 34.

A bridge member 37 having a slot 38 therein designed to receive arm 22 and guide it in its movement is secured to fitting 10 adjacent the open end of chamber 18 in any suitable manner. Member 37 has a pair of axially extending legs 39 formed thereon which are designed to extend into chamber 18 and through a polygonal opening 41 formed in ring 35 into engagement with notches 42 formed in cup-shaped member 25. It will be apparent, therefore, that bridge member 37 accomplishes the dual function of guiding arm 22 in its movement and securing bearing member 25 in assembled relation with pivot arms 34 disposed in notches 26.

The free end 43 of arm 22 extends through sleeve 24 into the closed end 44 of chamber 18 and terminates a substantial distance from the wall 45, which closes the end of chamber 18. End 43 is preferably provided with a forked terminus 46 for a purpose to be presently pointed out.

An elongated aperture 47 vertically aligned with arm 22 is provided in fitting 10 and extends from closed end 44 of chamber 18 to the bottom surface 48 of the fitting (Figures 1 and 8). Aperture 47 is positioned with one end 49 thereof substantially in alignment with wall 45 and the other end disposed directly below and centrally of fork 46 provided on the end of arm 22.

A connector 50 of a size approximately equal to the width of aperture 47 and having a sleeve valve 51 of the type used in the valve stems of pneumatic tires, screwed therein, is secured to a plate 52. To this end, plate 52 is provided with a slot 53 which is designed to receive a reduced portion 54 formed on connector 50. A nut 55 threaded on the threaded end 56 of connector 50 secures the plate and connector together. The valve stem 57 of sleeve valve 51 extends beyond the end of connector 50 and is provided with a collar 58 having a pair of spaced disk-like shoulders 59 formed thereon. Connector 50, valve 51, plate 52 and valve stem 57 and its associated parts due to the above described construction are secured together to form a unit 61 which constitutes the air valve assembly of the present invention.

Unit 61 is connected to arm 22 and fitting 10 by inserting connector 50 in end 49 of aperture 47 with valve stem 57 and collar 58 disposed in the end 44 of chamber 18 in alignment with forked end 46 of arm 22 and moving unit 61 toward the other end of aperture 47. As unit 61 is moved in the above described manner, the collar 58 passes into the forked end 46 of arm 22 with the shoulders 59 disposed above and below fork 46 to thereby effect an operative connection between float 23 and valve 51. Unit 61 is secured in this assembled relation by means of screws 63 which are threaded into suitably tapped bores 64 provided in fitting 10. If desired, a set screw 65 may be threaded through a suitable aperture provided in the front wall of fitting 10 into abutting engagement with the side of connector 50 to retain it against the end of aperture 47. A suitable passage 66 is provided in plate 52 to insure the free admission of atmospheric air to end 44 of chamber 18.

After unit 61 is secured to fitting 10 as described above the threaded end 56 of connector 50 is connected in fluid tight relation to a conduit 67 by means of an internally threaded coupling nut 68. Conduit 67 is preferably formed of copper or other readily bendable material and is connected in any suitable manner to the snifter valve of a pump supplying water and/or air to the tank, to which the control device is applied in a manner now well-known in the art.

If for any reason valve 51 should have to be replaced or serviced, all that the service man need do is remove screws 63 and loosen set screw 65 sufficiently to permit unit 61 to be slid forwardly until connector 50 is disposed in end 49 of aperture 47. This operation will cause forked end 46 of arm 22 to be uncoupled from collar 58 and permit removal of unit 61. Unit 61 is then moved perpendicularly away from face 48 of fitting 10 thereby removing unit 61 from fitting 10. After unit 61 is removed, valve 51 may be reached by use of any of the well-known valve removal instruments, and a new valve inserted. The unit 61 is reassembled by reversing the above described steps. It is to be understood that the copper or like conduit 67 permits sufficient move-

ment of unit 61, while connected thereto, in order that the above operations may be effected.

Since the operation of the control unit forms no part of the present invention and is identical to that described in the above mentioned co-pending application, a detailed description thereof will not be attempted here.

A modified form of valve assembly unit is disclosed in Figures 9 and 10. In this form of the invention the float, float arm and fitting 10 are constructed in the same manner as that previously described. Valve assembly 61a of this form of the invention comprises a connector 71 having an integral securing plate 72 formed thereon. Connector 71 is designed to receive a sleeve valve 51 like that illustrated in the previously described form of invention and is assembled in fitting 10 in the manner previously described. Connector 71 is secured to fitting 10 by screws 63 which pass through plate 72 into threaded engagement with the fitting.

Fitting 10 of this modified form of the invention is provided with an additional passage 73, which extends through wall 45 and is closed by a removable name plate 74. Name plate 74 is secured to fitting 10 by means of screws 75. By removing plate 74 the interior of chamber 18 which houses valve stem 57 and forked end 46 of arm 22 is exposed to view in order that a service man may observe the parts as they are being assembled to assure the proper connection of the valve stem and float arm.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In a control device having a fitting designed to be screwed into an opening in a tank, and a float arm secured to a float and passing through an enlarged sealed aperture in said fitting, the combination of a pair of pivot pins secured to said arm, a member providing bearings for said pins disposed in said aperture, and means in the form of a bracket secured to the end of said fitting adjacent said aperture and including elements extending within said aperture to retain said member in position.

2. The combination defined in claim 1 wherein said means comprises a guide member designed to guide the movements of said float arm in a definite path.

3. In a control device having a float and an arm secured to said float and pivoted in an aperture formed in a fitting, the combination of a bearing member designed to provide the pivot for said arm, a bridge member spanning said aperture and having a slot designed to receive said arm and guide it and the float in their movement, and legs on said bridge member designed to position and retain said bearing member in place.

4. In a control device designed to be screwed into an opening in a tank and having a float, an arm secured to said float and pivoted in an aperture in said control device, the combination of a pair of radially extending pivot pins secured to said arm, a member designed to receive said pins and to form bearings therefor, means designed to guide said arm for movement in a predetermined path and extensions on said means designed to engage said member and retain it in cooperative association with said part.

5. Mechanism to pivotally secure the arm of a control device in an aperture in a fitting in a manner to seal said aperture and permit relatively free swinging movement of said arm comprising an annular abutment surrounding said aperture, a flexible diaphragm fixedly secured to said arm and lapping said abutment, a ring engaging said diaphragm at the side thereof opposite said abutment, means securing said ring and said diaphragm against said abutment, means disposed inwardly of said last-mentioned means and having notches therein designed to cooperate with said ring to form a pivotal connection for said arm and means designed to retain said notched means in cooperative relation to said ring.

6. Mechanism designed to pivotally secure the float arm of a control device in an aperture in a fitting in a manner to seal said aperture and permit relatively free swinging movement of said arm, comprising a pair of pivot pins secured to said arm, a flexible diaphragm fixedly secured to said arm, a ring engaging adjacent the periphery of said diaphragm, said ring being extended inwardly to a point between said pivot pins and said diaphragm, means for securing said ring and said diaphragm in fluid sealing relation in said aperture, a member having notches in its peripheral wall designed to receive the ends of said pins and means designed to engage said member and retain said peripheral wall in contact with a face of said ring whereby the walls of said notches and the face of said ring form bearings for said pivot pins.

7. The combination defined in claim 6 wherein said last-mentioned means comprises a bridge member having a slot designed to guide the movement of said arm in a predetermined path and legs extending into engagement with said member whereby said member is retained in operative position.

8. A valve assembly designed for use in a fluid control device having a float; a fitting; and an arm secured to said float and pivoted in an aperture in said fitting; comprising an elongated passage opening in said fitting; a sleeve valve including a valve stem extending beyond said valve; means on said arm designed to receive said valve stem; a support in the form of a plate, free of projections extending in said passage, and carrying said sleeve valve so as to permit the insertion of said sleeve valve in one end of said elongated passage with said valve stem in alignment with said receiving means whereby said valve stem may be advanced into association with said receiving means by movement thereof toward the other end of said passage; and means for securing said support against said fitting.

9. A valve and valve support for use in a control device of the type wherein an arm secured to a float and pivotally mounted in a fitting is designed to operate said valve, comprising an internally threaded connector loosely mounted in said fitting, a sleeve valve bodily threaded into said connector, a valve stem extending beyond said valve and said connector and operatively connected to said arm, and a plate secured to the exterior of said fitting and holding said connector in assembled relation to said fitting.

10. The combination defined in claim 9 wherein said plate is provided with a slot designed to slidably receive said connector and wherein said connector is provided with a threaded extension designed to receive a nut which clamps said connector in said slot.

11. A valve and valve support for use in a control device of the type wherein an arm secured to a float and pivotally mounted in a fitting is designed to operate said valve comprising an internally threaded connector, a sleeve valve bodily threaded into said connector, a valve stem extending beyond said valve and said connector and operatively connected to said arm, and a plate designed to support said connector and be secured to said fitting, said plate and said connector comprising an unitary structure.

12. An air volume control, comprising a fitting, a float arm extending into said fitting and having a forked end, a valve assembly including a cylindrical casing and having a removable valve threaded therein and a stem protruding from said casing and having spaced shoulders formed thereon to receive said forked end between them, a plate carrying said valve assembly, means to secure said plate to said fitting accessible from the outside thereof, and a slot in said fitting permitting lateral shifting of said assembly to engage and disengage the valve stem from said forked end.

13. An air volume control, comprising a fitting, a float arm extending into said fitting and having a forked end, a valve assembly including a cylindrical casing and having a removable valve threaded therein and a stem protruding from said casing and having spaced shoulders formed thereon to receive said forked end between them, a plate carrying said valve assembly and provided with an air passage, screws securing said plate to the outside of said fitting, a slot in said fitting permitting lateral shifting of said assembly to engage and disengage the valve stem from said forked end, said slot being normally covered by said plate.

MAXIMILIAN KLEIN.
REIDAR A. TOLLEFSEN.