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U-TUBE STRUCTURE

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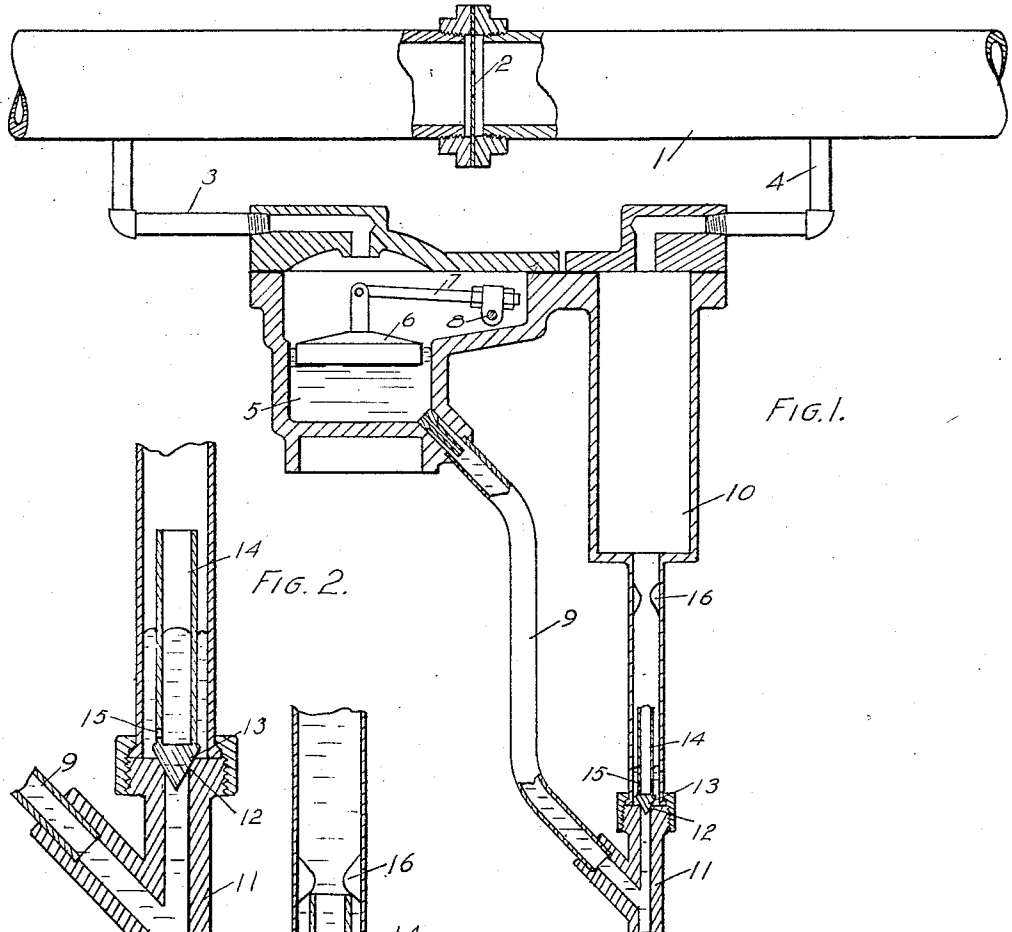


FIG. 1.

FIG. 2.

FIG. 3.

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UNITED STATES PATENT OFFICE

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U TUBE STRUCTURE

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In the use of U tubes very often conditions exist in which there is a sudden variation of pressure which tend to transfer the fluid from one leg of the tube to the other and cause injury, or difficulty with any apparatus that may be in the other leg of the tube and this is not desirable. The present invention is designed to prevent such movement and still permit of the free action of the U tube under normal conditions. Features and details of the invention will appear from the specification and claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing as follows:—

Fig. 1 shows a central section of a U tube connected with the high and low pressure sides of a conduit provided with an orifice.

Fig. 2 a section of the valve mechanism with the valve in closed position.

Fig. 3 a similar view with the valve in open position.

1 marks a conduit provided with a meter orifice 2, 3 a connection leading from the high pressure side, and 4 a connection leading from the low pressure side. A mercury well 5 is connected with the high pressure side and this contains a usual float 6 having the usual controlling lever 7 controlling a shaft 8 leading to a pen arm, or similar device, not shown. A U tube 9 leads from the mercury well 5. The opposite leg may be an enlargement 10 to provide for a greater movement in the well 5 with a given change of pressure and thus give a more accurate reading.

A valve fitting 11 is preferably in the form of a Y and forms the bottom of the tube. It has a seat 12, and a valve head 13 operating on the seat. The valve head carries a receptacle 14 extending upwardly in the low pressure leg of the tube and this receptacle has a minute leak 15 near its bottom. A stop 16 limits the upward movement of the valve head. The U tube supplied with fluid, usually mercury, operates in the usual manner so far as the U-tube is concerned. The valve head 13 by reason of its buoyancy is normally held in the position shown in Fig. 3 against the stop 16 and there is free communication between the legs of the U-tube. When, however, there is a sudden surge of backward pressure from the low side of the conduit this, operating on the low side of the U-tube forces the mercury past the valve head and this movement carries with it the valve seating it and with a continued higher pressure on the normally low pressure side the valve head will be held on its seat, due to this higher pressure. Occasionally this action may be less rapid, but continued, in which event the mercury follows down the low pressure leg until it reaches a point where the valve seats through gravity. Inasmuch as the leak 15 does not permit of the out-flow of fluid from the receptacle as rapidly as the lowering action outside of the valve at this seating moment the liquids might be in the position with the level A in the receptacle and the level B outside the receptacle. Immediately after the seating, however, these levels will balance each other and come to the position shown in Fig. 2. Thus the valve head is weighted for its initial seating and may be considerably lighter after the seating is effected so that with an ample seating surface there will be no difficulty on a reversal of the pressures with a preponderant pressure in the high pressure leg lifting the valve head from its seat. The valve head, therefore, is seated with a very large preponderance over gravity and after the transfer of fluid to the position shown in Fig. 2 gravity may be made quite effective in removing the weight of the valve head to an extent that compensates to some extent at least for the difference in area of exposed valve in the low pressure and high pressure sides of the valve. Thus the structure may be made of ordinary materials, be quite rugged and still operate in a sensitive manner.

What I claim as new is:—

1. In a U-tube structure, the combination of a U tube; and a valve in the tube comprising a seat and a valve head, said valve head being adapted to close on said seat and carrying a receptacle within and communicating with the tube, said receptacle having a leak opening in the lower part of the receptacle.

2. In a U tube structure, the combination of a conduit having high and low pressure

sides; a U tube connected with said high and low pressure sides; and a valve in the U tube comprising a seat and a valve head, the valve head closing on the seat by a movement toward the high pressure side and carrying a receptacle within and communicating with the low pressure side of the tube, said receptacle having a leak in the lower part of the receptacle.

In testimony whereof I have hereunto set my hand.

JOHN C. DIEHL.