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FLUID DISTRIBUTION SYSTEM

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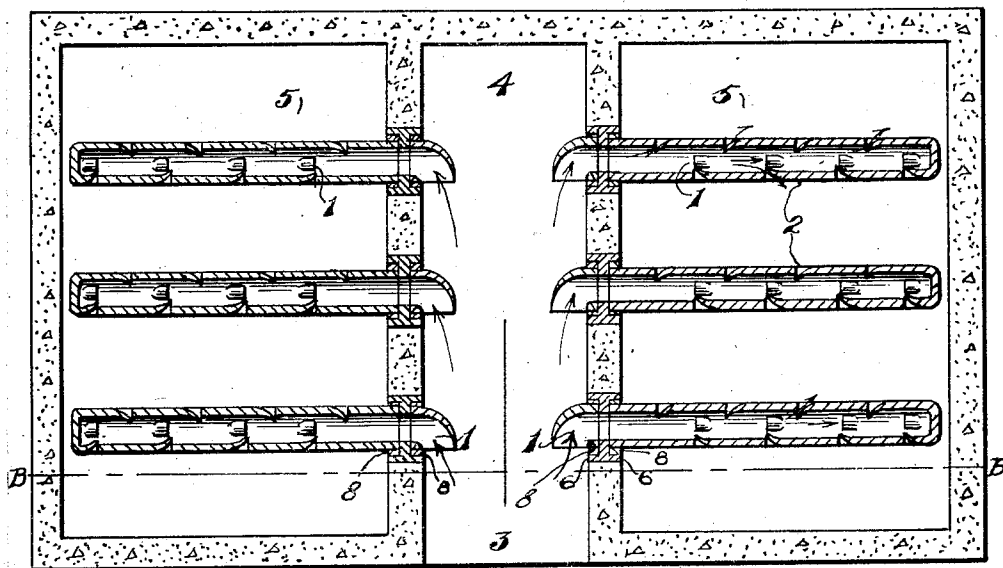


Fig. 1.

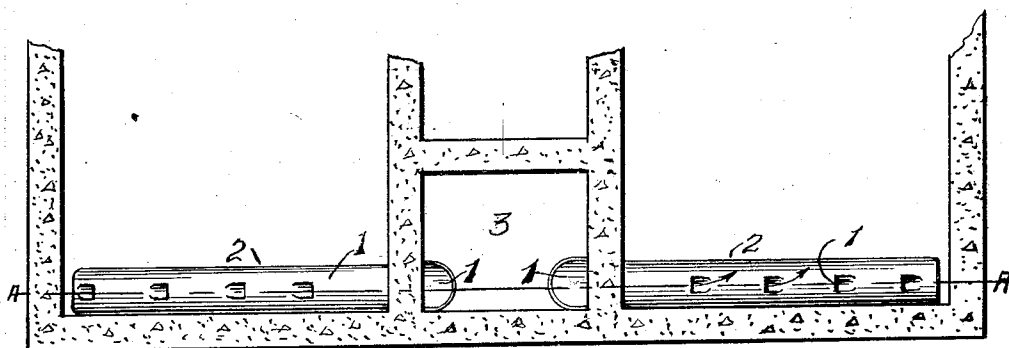


Fig. 2

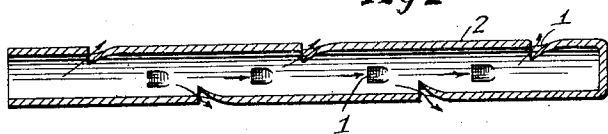


Fig. 3.

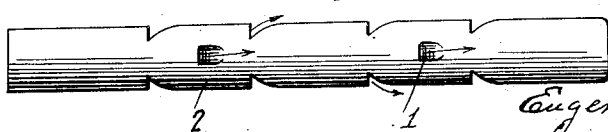


Fig. 4.

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FLUID-DISTRIBUTION SYSTEM.

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This invention relates to means for regulating the distribution of fluids in pipe systems, filters, drainage and irrigation channels, steam, and gas systems and like applications.

The principal object of the invention is to provide means whereby the loss of energy between connecting branches of a distribution system is reduced to a minimum, by making the energy of distribution from a channel to the one to which it is discharging substantially equal to the static head plus the velocity head in the first channel at the point of distribution, by providing an impingement nozzle in the case of entering fluid and a discharge nozzle, in the direction of the velocity, in the case of discharge (drainage system).

In the case of an entering fluid this means an equal distribution of energy to all branches fed by a main channel, as in the case of a filter.

The invention consists in means whereby the velocity head (energy) is maintained in intersecting channels. It also consists in the several combinations and parts defined in the appended claims, particularly set forth in the ensuing description and illustrated in the accompanying drawings.

In the drawings, wherein like reference characters indicate like parts throughout the several views,

Figure 1 is a horizontal section through the distributing system of a filter, on the plane A—A Figure 2, with nozzles extending into the main supply channel.

Figure 2 is a vertical section of the same filter on the line B—B of Fig. 1.

Figure 3 is a section through a filter distributor pipe.

Figure 4 is a vertical elevation of Figure 3.

The invention is shown embodied in filter and pipe distributing systems, but it is to be understood that the invention is to be equally applicable to drainage and irrigation systems, and is not to be limited by the particular embodiments herein disclosed for the purpose of illustrating the practical applications thereof. In the drawings as the impingement nozzle is the most important part it is everywhere indicated as 1.

The invention will first be described from the standpoint of an entering distribution system as this is its most important function. Referring to Figure 1. The fluid en-

ters at 3 in the direction indicated by the arrows, with a total energy equal to the static head plus the velocity head at entrance. Now as the fluid flows toward 4 it loses velocity until at 4 it must come to a full stop hence has no more velocity, hence no velocity head, in this direction. But as (neglecting side friction in the passage) there has been no energy lost it follows that this velocity head has been transformed into static head at this point.

Now as fluid passing an opening at right angles to it gives a pressure equal to the total head less the velocity head it follows, as shown by actual experiment that with right angle openings the pressure causing flow into the last branch pipe where there is no velocity in the main channel is much greater than that at the branch nearest the entrance by an amount equal to the velocity head, from which it follows that if as the velocity progressively slows down and is converted into static head we could add the respective velocity heads to the static heads acting on their respective branches we would get at each branch a total energy substantially equal to the sum of the pressure and velocity heads at entrance to the main channel hence equal distributing pressures causing flow in each branch. This applies equally to the distributors from the branches with relation to the main branches. I propose to provide means whereby advantage can be taken of this important point, a thing which does not appear to have been up to the present done and I accomplish it by a very simple device.

It is well known that in the Pitot impact tube advantage is taken of the fact that the tube bent and pointed upstream (the impact tube) registers the sum of the velocity and pressure heads, whereas the tube at right angles to the direction of flow (the pressure tube) measures the pressure and the difference is equal to the head due to velocity.

I propose to place on each branch line 2, an impact nozzle pointing in the direction of flow in the main channel so that the flow is into it, and in the branches 2 to place subsidiary impact nozzles 1 also pointed toward the incoming fluid as shown by the arrows in Figures 1 and 2, from which the fluid is distributed uniformly to the filter 5 in the case of Figures 1 and 2, and to such point as may be chosen in the case of Figures 5 and 6.

It will be noted that though the details vary, in all systems shown the important feature is the entrance impact nozzle to the branch channels or pipes.

5 In Figure 1, an impact nozzle made as a bent tube protruding in the passage 3—4 is shown, but it is immaterial so far as this invention is concerned, whether it projects into the passage 3—4 or not. The particular
10 shape of the nozzle has often been proven as of no consequence by experimenters on the Pitot tube, but as the particular shape of the nozzle is not the main point of this invention, these are shown merely in order to
15 indicate some arrangements, which are possible.

It is here desired to call attention to the construction of the branch channels 2 shown in the filter layouts of Figures 1 and 2. In
20 these the impact nozzles 1 are formed by merely shearing a lip into the part 2 where a nozzle 1 is wanted. The construction is simply but clearly shown in Figures 1, 2, 3, and 4. Nozzle 1 in Figure 1, is set within
25 the passage 3—4 and caulked in 6, at 8.

The method of operation is as follows: The fluid enters at 3 flowing toward 4, impinges on the mouths of the several branches 2, then on the subsidiary nozzles 1 within
30 the branches 2 passing thence to the chambers 5, with substantially no velocity head loss. In the case of a drainage system the process would be reversed.

I do not claim that the impact tube is new,
35 but I do claim that its use to maintain the total energy of the fluid in a distributing system is new and useful and has never heretofore been put to service hence I claim:

40 1. In wash-water systems for filters and the like, a main channel of substantially uniform cross section discharging through impact nozzles to branch passages of substantially

uniform cross section, provided with lip-like impact nozzles inwardly depressed in the walls of the branch passage and registering
45 with the filter bed.

2. The combination with a conduit for fluid, of an expansion chamber into which the fluid discharges, the conduit being of substantially uniform cross section through-
50 out and closed at one end, of a plurality of nozzles depressed in the walls of the conduit, the opening of the nozzles facing toward the open end of the conduit.

3. The combination with a conduit for
55 fluid, of an expansion chamber, the conduit being closed at one end, of a plurality of nozzles inwardly depressed in the walls of the conduit, the opening of nozzles facing toward the open end of the conduit and regis-
60 tering between the conduit and the expansion chamber.

4. A fluid conduit in combination with an expansion chamber, the conduit being of substantially uniform cross section, and
65 closed at one end, a plurality of nozzles inwardly depressed in the walls of the conduit, the openings of the nozzles facing the open end of the conduit, and discharging into the expansion chamber.
70

5. A fluid conduit in combination with an expansion chamber, the conduit being closed at one end, and adapted to register with the expansion chamber through a plu-
75 rality of uniformly sized and spaced nozzles depressed in the walls of the conduit, the opening of the nozzles facing toward the open end of the conduit.

6. A fluid conduit closed at one end, an expansion chamber in combination there-
80 with, nozzles in series depressed in the walls of the conduit, the openings of the nozzles facing toward the open end of the conduit.

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