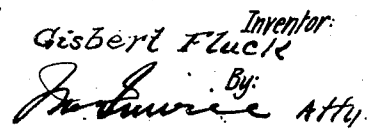


2,008,248

Filed Aug. 24, 1933



UNITED STATES PATENT OFFICE

2,008,248

MULTIDIRECTIONAL CONTROL OF LIQUID
AND GAS FLOWGisbert Fluck, Neustadt-on-the-Haardt,
GermanyApplication August 24, 1933, Serial No. 686,582
In Germany August 29, 1932

7 Claims. (Cl. 251-104)

The present invention relates to apparatus for changing the direction of flow of fluids. Apparatus in which this change of direction is extensively practised is that in which textile materials are to be dyed by dye liquor by means of a pump which passes the dye liquor in two directions alternately through the goods, with any desired steam, gas, and water treatment.

In known apparatus for the change of direction as indicated, multi-way cocks are usually employed, the valve being a rotatable body within a casing, this body having axial and radial openings to correspond with various outlets in the casing as the member is moved. This form of distributor presents disadvantages which restrict its use. In the paths for the fluids sharp bends occur, as also variations in the cross sectional areas of such paths, with loss of power and force through friction and reaction. Further the frictional surfaces are large and this with the form of valve tends to seizing. This danger is enhanced by the pressure and suction action of the pump or other fluid circulating medium, as well as by the flow of the fluid itself, which gives unequal reaction within the valve, thus increasing the difficulty of operating it; if indeed it does not cause it to seize altogether. Corrosion also occurs and, with iron valves working with acid liquids, at an early stage, with the resultant necessity of frequently disassembling and cleaning of the parts. Also the complicated form of the valve body favours the alternate expansion and contraction of the parts under the varying temperatures of boiling and cold water employed in the treatment of textile materials, with deformation of the parts and a still further addition to the danger of seizing.

A still further disadvantage with this form of distributor or valve is that on a sudden change of direction of flow of liquid therethrough the sudden closing of the opening through which the liquid has been passing under pressure causes reaction in the current with consequent "knocking" in the pipe.

The object of the present invention is to provide a multi-way valve in which all these disadvantages will be eliminated, and for this purpose the invention consists in a valve casing, openings and pipe connections in and upon such casing, and a combined plate and pipe rotatable within the casing, these two being at an angle to each other so that by their movement together given pipe connections and openings may be put into communication with each other or obturated. Such a form of valve gives the greatest simplicity

whilst affording two or more directions of flow; a minimum area of frictional surface, free flow of the liquid without sharp bends and changes of cross-sectional areas of liquid passages; and immunity from seizing as a result of changes of temperature of liquids employed.

The invention in a practical construction will now be described by way of example as shown in the drawing annexed. In this drawing:

Figure 1 is a sectional view of an apparatus for the treatment of textile materials, the valve which is the object of the invention being incorporated therewith;

Figures 2 to 5 inclusive are section views similar to that of Figure 1, with different positions of the valve;

Figure 6 is a cross section of the valve itself;

Figure 7 is a vertical section of the valve body according to Figure 6 and a side view of the sectioned rotary body.

On the container 1 of the treatment apparatus a casing 2 is cast or bolted. The valve, Figures 6 and 7, consists of a curved surface 4 and the curved pipe 5 which passes therethrough and is combined therewith. The plate is journaled in bearings 6 and 7 and a handwheel 8 is provided, which passes through a stuffing box 9. The pipe blocks and openings in the casing 2 are perpendicular to the axis and arranged in a radial plane. The opening 10 leads to the inside of the container or goods carrier as shown; the opening 11 to the outer side of this container. On the block 12 is a pump connection 13 with valve or cock 14 closing this to the fluid tank 15.

On the block 16 is secured a bent suction pipe 17, into which an overflow and additional supply pipe 18 opens and on which is a water supply pipe 20 with valve 19. The pump 21 is connected to the block 22. The block 23 serves for access of a steam, compressed air, gas and air suction pipe with the valves 24, 25, and 26, as well as a connection to an outlet 27. The overflow with valve 28, on the closable cover 29, completes the apparatus.

After the goods have been charged in the container and the cover 29 closed, valve 14 is opened and liquid enters the container from tank 15. If the latter is under the floor, the pump 21 draws it as seen in the position of Figure 1 through the pipe 13, the opened valve 14, block 12 and suction pipe 17 and forces it through the block 22 round the circular bent pipe 5 the cross sectional surface on both sides of the pipe being approximately the same as the cross sectional surface of the block 22. The liquid is forced through

opening 10 into the interior of the goods carrier, and passes from the inside to the outside of the same. This continues until it is seen that full overflow is taking place through 28. Valve 14 is then closed and the valve adjusted according to Figure 2. The liquid is now pressed through the material from the outside to the inside thereof, as indicated by the arrows. After a determined period the valve is adjusted either by hand or by any known automatic means, according to Figure 3. The duration of pressure in either direction can be so arranged that the treatment from inside to outside of the goods, and vice versa, is equal. As a result of the formation of the valve 4—5 with a very narrow frictional edge there is no blocking of liquid or knocking; the stream of liquid from the block 22 finds no resistance in its path and is smooth and even without loss of force, as the cross sectional area of the path of flow is equal at all times. After treatment as described is completed the liquid is run off to storage tank or pumped to a tank as seen in Figure 4 wherein, as indicated by the arrows, the liquid is drawn from the interior and the exterior of the goods simultaneously, with simultaneous sinking of the liquor levels.

After this textile goods are generally treated by suction to remove superfluous liquid therefrom. For this purpose the valve stands in the position indicated in Figure 5. Through opening of the valve 26 air passes to force by cover 30 the liquid from outside to inside of the material.

The valve is in a similar position if the goods before the beginning of liquid treatment are to be wetted out or moistened by steam, or treated with compressed air or gas for the purpose for example of oxidation. The directions of flow for these purposes are exactly reversed as indicated. After the removal of the superfluous liquid for the purpose of re-use the rest is rinsed out. The valve for this purpose is in the same position as in Figure 1. Rinsing water valve 19 and outlet valve 27 are opened and the pump forces water from the interior through 10 and through the material, the water passing through block 12 to 24 and through the outlet 27 into drain.

After rinsing further suction will generally take place. The position according to Figure 1 permits also that with developing dyestuffs the developing fluid may be supplied by suction and passed speedily by the pump through the material by pressure, whereby the free colloidal compounds of this with the overplus of the dyeing liquor is passed through 27 to drain. When it is seen by the outrunning liquid that these are nearly all run out, the valve is quickly adjusted to supply dye liquor from inside to outside and the valve 27 closed.

Only one example is hereinbefore described, but it will be obvious that the principle can be carried out in other ways. The number of connections served by the valve can be more, or less, than that given. Also, by the combination of two valves with appropriate combinations, it will be seen that very many different directions of flow can be obtained.

I claim:—

1. A device for controlling fluid flow through a plurality of distinctive conduits, including a casing formed with a series of openings communicating with the respective conduits, a control means within the casing including a plate mounted for rotation and serving in different positions to control flow within the casing, said plate having edge contact with the casing of insufficient

thickness to directly control any one of said openings in the casing, and a tube carried by and movable with the plate and serving in the movement of the plate to control flow through others of the conduits.

2. A control device of the character described, comprising a casing formed with fluid openings, a curved plate mounted for rotation within the casing, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, and a tube projecting through and supported solely by the plate.

3. A control device of the character described, comprising a casing formed with fluid openings, a curved plate mounted for rotation within the casing, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, and a tube projecting through and supported solely by the plate, the respective ends of the tube being out of axial alignment.

4. In a control device of the character described, a casing formed with fluid openings, said casing including spaced parallel sides and an annular wall connecting the sides, a plate mounted for rotative movement within the casing and having a length corresponding to the diameter of the annular wall and a width corresponding to the space between the side walls, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, and a tube carried by and movable with the plate, the length of the tube corresponding to the diameter of the annular wall of the casing.

5. In a control device of the character described, a casing formed with fluid openings, said casing including spaced parallel sides and an annular wall connecting the sides, a plate mounted for rotative movement within the casing, and having a length corresponding to the diameter of the annular wall and a width corresponding to the space between the side walls, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, and a tube carried by and movable with the plate, the length of the tube corresponding to the diameter of the annular wall of the casing, the diameter of the tube being less than the space between the side walls of the casing.

6. A control device of the character described, comprising a casing having spaced parallel side walls and an annular edge wall connecting the side walls, the edge wall being formed with fluid openings, a plate rotatably supported in the axial line of the casing, with the width corresponding to the space between the side walls and the length corresponding to the diameter of the annular wall, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, the plate being curved longitudinally, and a tube passing through and supported solely by the plate, said tube having a diameter less than the space between the side walls and a length corresponding to the diameter of the annular wall.

7. A control device of the character described, comprising a casing having spaced parallel side walls and an annular edge wall connecting the side walls, the edge wall being formed with fluid openings, a plate rotatably supported in the axial line of the casing, with the width corresponding to the space between the side walls and the length

corresponding to the diameter of the annular wall, said plate having edge contact with the casing of insufficient thickness to directly control any one of said openings in the casing, the plate being curved longitudinally, and a tube passing through and supported solely by the plate, said tube having a diameter less than the space between the side walls and a length corresponding to the diameter of the annular wall, the respective ends of the tube being out of axial alignment.

GISBERT FLUCK.