Aug. 30, 1932. D. B. DOW 1,874,932

INTERMITTENT FLOW DEVICE

Filed Oct. 20, 1928 2 Sheets-Sheet 1

Fig. 1.

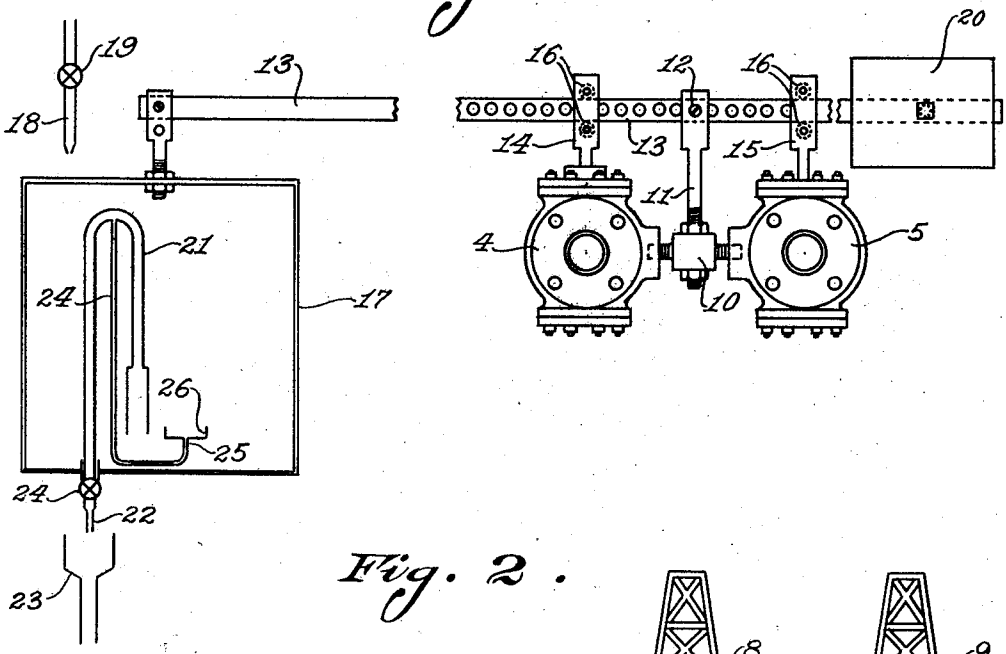
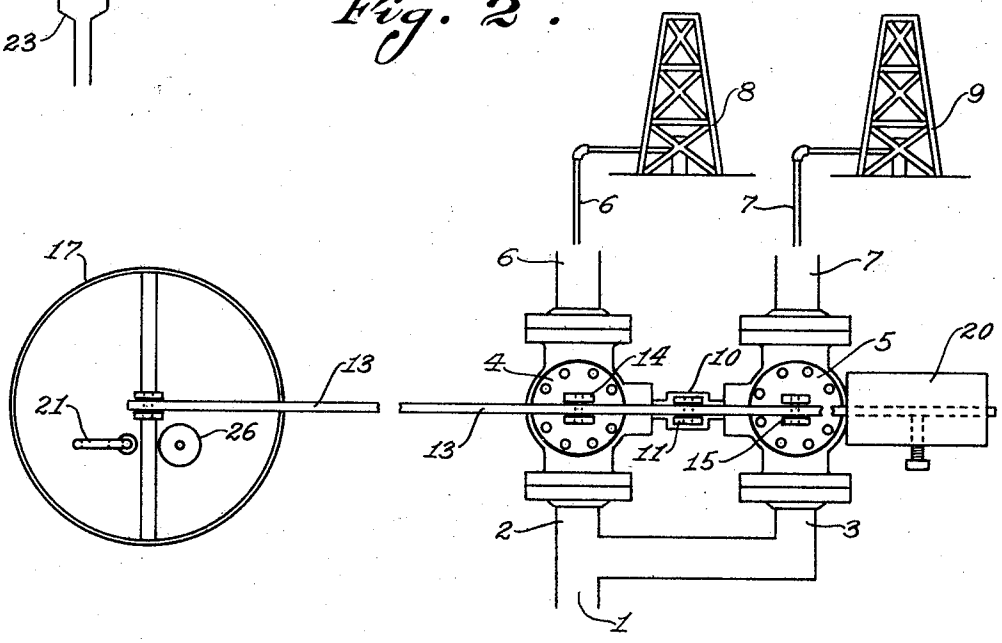


Fig. 2.



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Filed Oct. 20, 1928 2 Sheets-Sheet 2

Fig. 3.

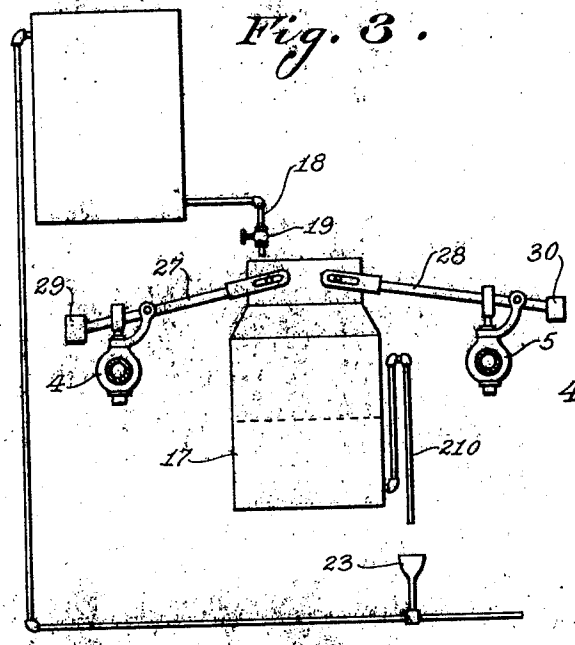


Fig. 4.

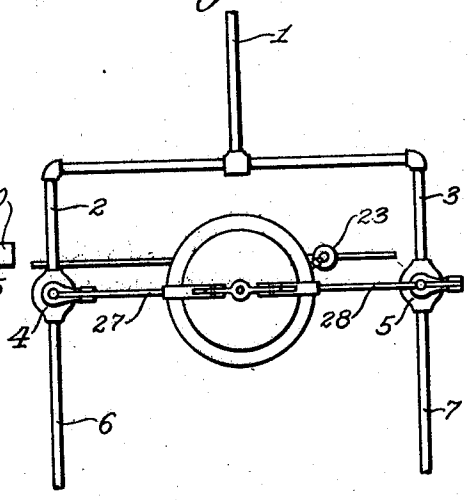
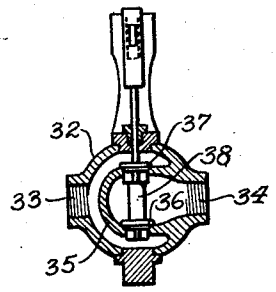


Fig. 5.



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UNITED STATES PATENT OFFICE

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INTERMITTENT FLOW DEVICE

Application filed October 20, 1928. Serial No. 313,833.

This invention pertains to apparatus for directing the flow of fluids and more particularly to automatic apparatus which will direct the flow into different passages at different times.

In certain operations of deep wells, such as oil wells, certain methods of pumping or flowing oil from the well involve the use of compressed air or gas, the same being delivered to the well intermittently. On account of such intermittent operation, it is more economical to supply two or more wells from the same source of air or gas and to divert the flow alternately from one well to the other than to entirely shut off the flow at intervals.

One of the objects of this invention, therefore, is to provide means for controlling the flow of air, gas or like fluid so that the same will automatically be directed to different passages or channels at predetermined intervals of time.

Another object is to provide such automatic means which may derive its source of power from a source of flowing water or the like.

Another object is to provide improved means for regulating the operation of such a device so as to render the same positive in its action.

Further objects will appear from the following description, taken in connection with the accompanying drawings, in which:—

Figure 1 is a view in elevation with parts in section of controlling mechanism embodying this invention;

Figure 2 is a plan view of the same illustrated as applied to a pair of wells;

Figure 3 is a view in elevation of another embodiment of this invention;

Figure 4 is a plan view of Figure 3; and

Figure 5 is a sectional detail of one of the valves.

Referring to the drawings, 1 designates a source of fluid supply, which may be connected with a compressed air tank or gas tank or other source, preferably under pressure. The supply conduit 1 has branches 2 and 3 leading to a pair of valves 4 and 5. Outlet conduits 6 and 7 lead from the valves 4 and 5 to the point where the fluid is to be utilized; as, for instance, the wells 8 and 9.

In the embodiment shown in Figures 1 and 2, a support 10 has adjustably mounted thereon an upright 11 having pivoted thereto at 12 a beam 13. The beam 13 is arranged to co-operate with the valve stems 14 and 15 of the valves 4 and 5, respectively, said stems being provided with roller bearings 16 engaging the beam so that as the latter rocks on its pivot 12, one of the valves will be opened as the other is closed.

Suspended in any suitable manner from the beam 13 is a container 17 adapted to receive water from a source of supply 18, which may be regulated by a valve 19. On the other side of the pivot 12 from the container 17 is mounted a counter-weight 20, adjustable along the beam in order to counterbalance any portion of the weight of the container 17 and the water contained therein.

In order to empty the container 17 at intervals, a siphon 21 is mounted therein, having an outlet 22 adapted to discharge into a suitable drain 23. A valve 24 may be provided to regulate the rate of flow through the siphon. This siphon is so placed that when the level of the liquid in the container rises to the top of the siphon, the latter will become filled and begin to siphon off the water so as to empty the container.

In order to insure prompt interruption of the operation of the siphon when the liquid level falls to a determined point, a tube 24, communicating with the crest of the siphon 21, extends downwardly to the bottom of the container and has its lower end opening upwardly, as shown at 25. The tube 24 is adapted to admit air to the crest of the siphon when the water level falls to the mouth 25 of the tube. In order to insure a more positive action, a cup 26 is attached to the mouth 25 of the tube and is set to open upwardly. When the water level falls to the rim of the cup 26, said cup isolates a certain quantity of water, which can be drained only through the tube 24 and the long leg of the siphon. The arrangement is such that this quantity of water passes out rapidly so that the water level in the cup 26 falls faster than

the water level in the container 17. Accordingly, when the water has all been drained from the cup 26, the suction in the siphon rapidly draws a quantity of air through the tube 24 to the crest of the siphon. The siphonic action is thus positively broken and the draining of the water from the container 17 ceases.

In the operation of this device, the rate of flow of water from the source 18 is suitably regulated by means of the valve 19. The counter-weight 20 is adjusted to the desired point and thereafter the apparatus may be left to itself. As the container 17 fills up with water, its weight increases and at a certain point overbalances the counterweight 20 so that the container 17 sinks, rocking the beam 13 on its pivot 12 and operating the valve stems 14 and 15 so as to close the valve 4 and open the valve 5. This operates to shut off the flow of fluid from the conduit 6 so that the supply of the well 8 is interrupted and at the same time the flow is directed to the conduit 7 so as to supply the well 9. As the water continues to rise in the container 17, after a certain interval has elapsed, it will reach the crest of the siphon 21, whereupon the water will begin to drain out of the container 17. The arrangement is such that the water drains out through the siphon faster than it runs in from the supply 18. Accordingly, after another interval, the water level in the container 17 will have fallen to the rim of the cup 26. After this point is reached, the above described action of the cup 26 and the tube 24 takes place and the siphonic action is interrupted. The water thereupon ceases to drain from the container 17 and the latter begins again to fill up. Thereafter the same cycle is repeated at regular time intervals, and the air or gas is supplied alternately to the wells 8 and 9.

In the embodiment of Figures 3 and 4, the container 17 has its siphon 210 mounted on the outside thereof. In this case also, the container is suspended on the ends of two beams having counter-weights 29 and 30. The valves 4 and 5 in this case are arranged to work oppositely—that is, one of them closes as its stem descends, and the other one opens by a similar movement. The arrangement of the tube 24 may be applied to the siphon in this case also.

Figure 6 illustrates a construction of the valves 4 and 5, such as to be balanced by the pressure of the air or gas. The body 32 has an inlet 33 and an outlet 34. An internal wall 35 provides a chamber communicating with the outlet 34. Two valve seats are formed in the wall 35 to accommodate valves 36 and 37. The valve 37 is acted upon by the inlet pressure within the body of the valve and surrounding the wall 35, such pressure acting to close the valve. The valve 36, on the other hand, is acted upon by the same pressure in a direction tending to open the valve. The valves are connected by a bar 38 so as to have the same movement for opening and closing. Accordingly, the pressure of the supply is balanced so that the effort necessary to open or close the valve will be independent of the pressure of the gas.

It will be seen that this invention provides simple and effective means for directing a fluid periodically to different passages. The uniform rate of flow of the water operates to weight the container which periodically empties itself by means of the siphon, as described. The device is entirely automatic and will supply a pair of wells with intermittent air or gas pressure as long as it is permitted to operate. A greater number of wells can, of course, be supplied from the same source by additional sets of apparatus.

It is understood, of course, that certain features of the device may be useful without reference to other features thereof, and the use of such sub-combinations is contemplated by this invention. It is further obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention. It is, therefore, to be understood that this invention is not to be limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. A device for directing a flow of fluid alternately to different passages, comprising, a plurality of valves controlling the different passages, a container adapted to receive water, counterweighted means for pivotally supporting said container, a siphon in said container adapted to empty the same after a determined interval, a tube in said container communicating with the crest of said siphon and whose lower end opens upwardly above the inlet to said siphon, and connections actuated by movement of said container adapted alternately to open and close said valves.

2. A device for directing a flow of fluid alternately to different passages, comprising, a plurality of valves controlling the different passages, a container adapted to receive water, counterweighted means for pivotally supporting said container, a siphon in said container adapted to empty the same after a determined interval, a tube in said container communicating with the crest of said siphon and whose lower end communicates with a cup opening upwardly above the inlet to said siphon, and connections actuated by movement of said container adapted alternately to open and close said valves.

3. A device for directing a flow of fluid alternately to different passages, comprising, a plurality of valves controlling the different passages, a container adapted to receive

water, counterweighted means for pivotally supporting said container, a siphon in said container adapted to empty the same after a determined interval, a tube in said container communicating with the crest of said siphon, means communicating with said tube adapted to isolate a small quantity from the body of water in said container to be drained off rapidly through said tube and said siphon, and connections actuated by movement of said container adapted alternately to open and close said valves.

In testimony whereof I affix my signature this 11 day of September, 1928.

DONALD B. DOW.