No. 863,264. PATENTED AUG. 13, 1907.

F. N. CONNET.

RATE REGULATING DEVICE FOR FLUIDS.

APPLICATION FILED JUNE 5, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

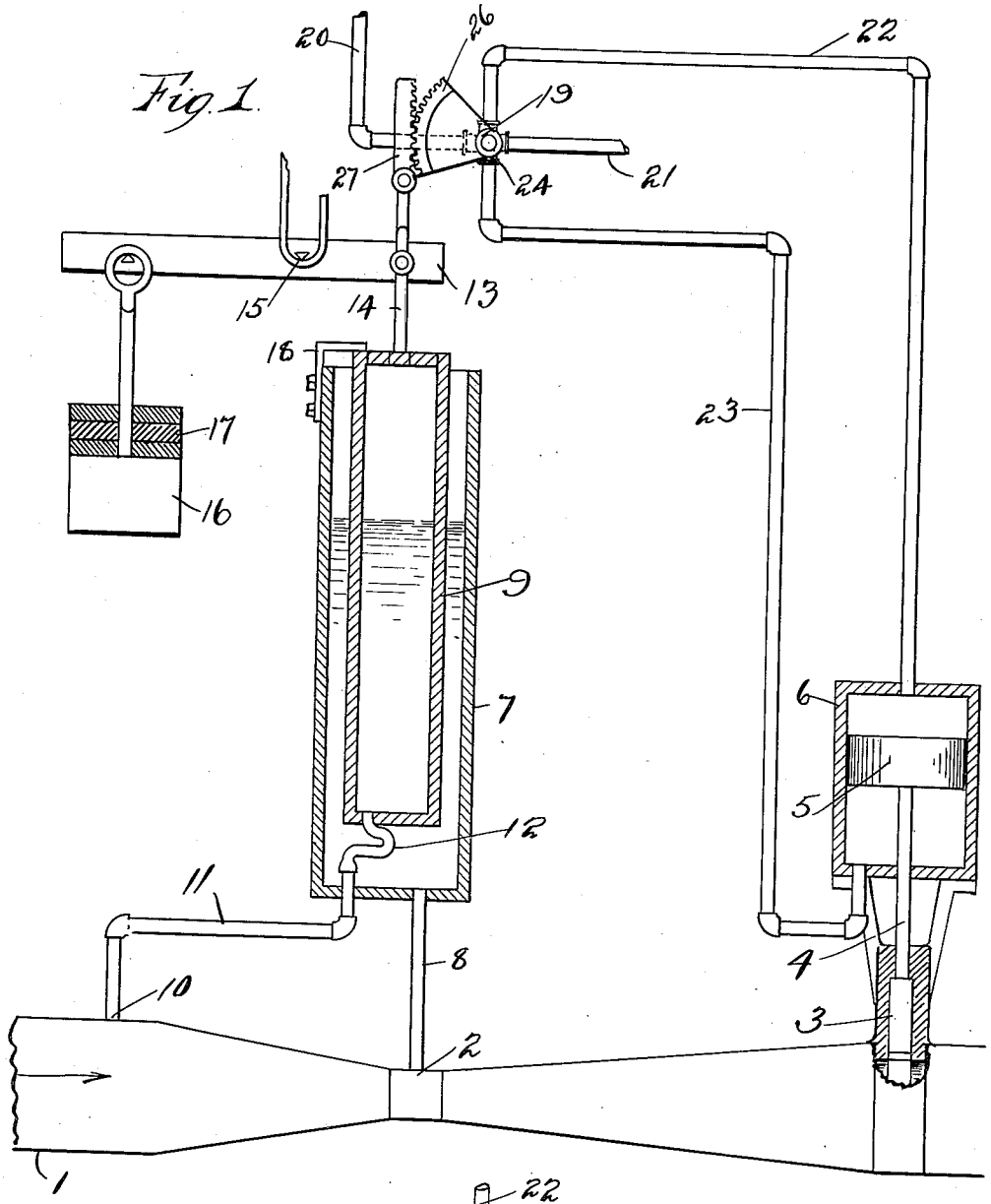
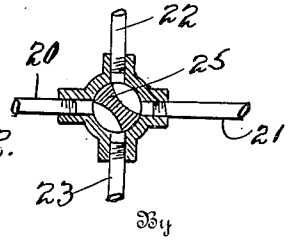


Fig. 2.



Witnesses

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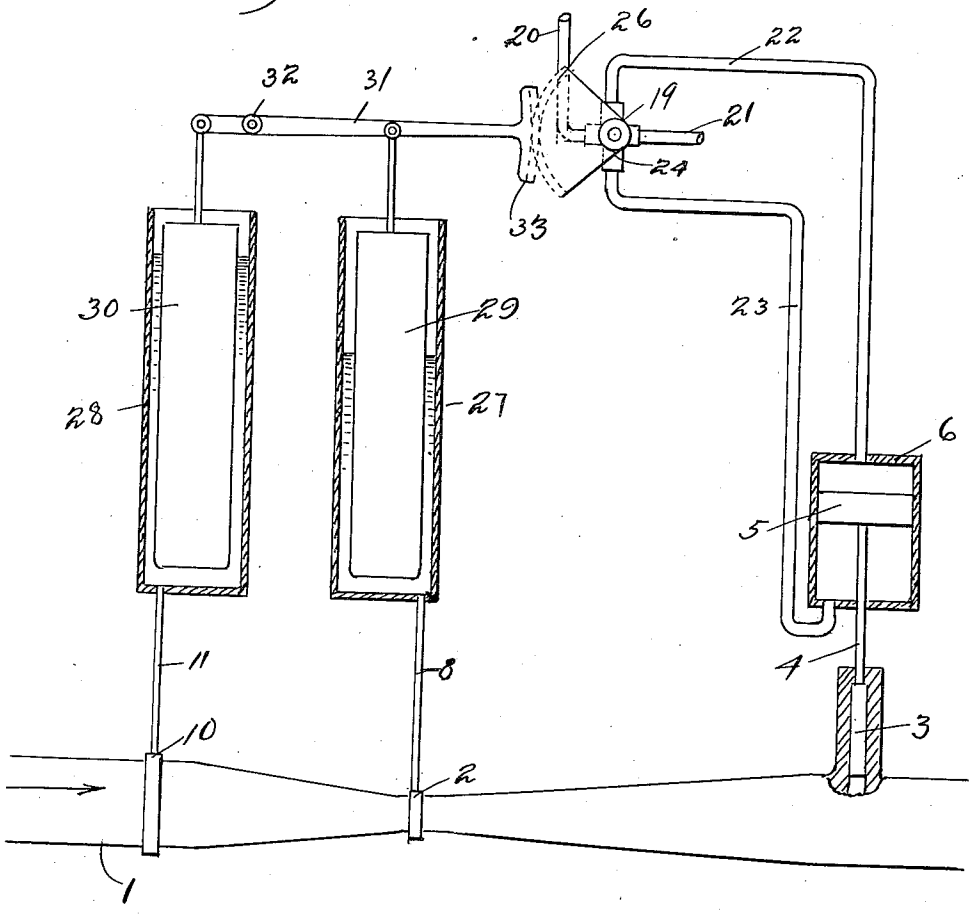
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Fig. 3.



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RATE-REGULATING DEVICE FOR FLUIDS.

No. 863,264. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed June 5, 1907. Serial No. 377,475.

To all whom it may concern:

Be it known that I, FREDERICK N. CONNET, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Rate-Regulating Devices for Fluids, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a rate regulating device for fluids and has for its object to provide a simple and effective device for automatically controlling the rate of flow of liquids or gases through a given aperture.

This device may be used for any desired purpose but the same is more particularly designed for use in controlling the rate of flow from a reservoir or the like where large quantities of water are used. On account of the constantly changing condition of the filter beds, as well as from other causes, the pressure or rate of flow of the effluent is continually varying and it is found necessary in order to maintain a constant delivery to provide a gate valve in the effluent pipe and automatically control the opening through the same through mechanism actuated by the differential pressure at two points in said pipe.

In carrying out my invention I have provided a pair of receptacles of different diameters, one being arranged to work vertically within the other, the larger receptacle being connected to the throat or reduced portion of the effluent pipe and the small receptacle being flexibly connected within the larger receptacle to the up-stream side of said pipe. When there is no flow through the main the height of the water in both of these receptacles are equal, the weight of the inner receptacle being counterbalanced so that the same will float at a given level. As soon as the flow begins the pressure is reduced at the throat and increased at the up-stream side so that the quantity of water is increased in the internal receptacle and at the same time decreased in the external receptacle causing the former to drop a distance in proportion to the rate of flow. The movement of this internal cylinder down and up is arranged to open and close the gate valve through suitable means to automatically control the rate of flow, making the same practically constant.

With these objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1—shows a diagrammatic view of the apparatus partly in section, illustrating the operation of the same. Fig. 2—is an enlarged sectional view of the pilot valve which is operated by the action of the internal receptacle. Fig. 3—is a modification showing two cylinders each containing a float by which the gate valve is operated.

Referring to the drawings at 1 is the main pipe provided with a contracted throat 2. Located on the down-stream side of this throat is a gate valve 3 which is connected through the valve stem 4 to the piston 5 which works vertically in the cylinder 6. The large receptacle 7 is connected to the throat 2 through the pipe 8. A small receptacle 9 is adapted to float within the larger one, both of said receptacles being open at their upper end. The inner receptacle is connected at 10 to the up-stream side of the throat through the pipe 11 which pipe extends through the outer receptacle and is connected to the inner one by the flexible portion 12. This inner receptacle is connected to the scale beam 13 through the connection 14, which scale beam is balanced on the knife edge 15. The weight of the receptacle when immersed to a given depth is counterbalanced by the counterweight 16 which is supported at the opposite end of said beam, and the action of this receptacle may be controlled by the shifting weights 17. At 18 is a stop which engages the upper edge of the receptacle 9 at the end of its extreme upward stroke. At 19 is an auxiliary or pilot valve which is best illustrated in section in Fig. 2. The pressure is led to this valve from any convenient source through the pipe 20, and the waste is delivered through the pipe 21. The pipe 22 leads to the upper end of cylinder 6, while pipe 23 leads to the lower end of the same cylinder. Connected to the stem 24 of the rotating plug cock 25 is the segment gear 26 which meshes with the rack 27 on the end of the connection 14 to the internal receptacle 9.

The operation of the apparatus may be more clearly described as follows: When there is no water flowing through the main pipe 1 the water in the receptacles 7 and 9 will naturally stand on a level, the inner receptacle being in its extreme up position against the stop 18, the gate valve wide open and the pilot valve open to the underside of the piston in the cylinder 6, in the position shown in Fig. 2. As soon as the flow begins, in the direction of the arrow, through the main pipe, the pressure at the point 10 is increased over that at the point 2, causing a difference in the relative levels of the water in the two receptacles, and when the rate has increased a predetermined amount the volume of water in the internal receptacle will counterbalance the weights 16 and 17 so that said receptacle will drop and close the pilot valve 19. As the flow through this main again increases the inner receptacle drops still more opening the pressure to the upper end of the cylinder 6 partially closing the gate valve 3, thereby checking the flow to the desired rate whereby the pressure in the throat will be slightly increased again raising the inner receptacle to close the pilot valve. When the flow through the main now drops below the required rate the differential pressures cause the inner receptacle to rise and operate the pilot valve to cause the pressure to enter the lower side of the piston 5 and raise the gate valve the desired amount. Any desired

number of weights 17 may be placed on the counterbalance, whereby the exact rate at which the water shall flow through the main may be readily controlled.

My invention is not confined to one receptacle working within another as two independent receptacles 27 and 28 may be employed one being connected to the throat portion 2 while the other is connected to the up-stream portion at 10. Floats 29 and 30 are located in these receptacles and are connected at their upper ends to the beam 31, which beam is pivoted at 32. The opposite end of the beam is provided with a rack 33 which meshes with a circular rack 26 on the pilot valve 19. The object of this construction is that the difference in the pressures between the points 10 and 2 will actuate the rack 33 through the movements of the floats 29 and 30 to operate the gate 3 through the pilot valve and so control the rate of flow through the main pipe.

I have herein shown a hydraulically operated pilot valve for controlling the main gate, but the controlling of this gate may be accomplished either electrically or by any other convenient means.

My invention is not restricted to the construction and arrangement of parts herein shown and described nor to the various details thereof as the same may be modified or re-arranged in various particulars without departing from the spirit and scope of my invention, one practical embodiment of which has been herein illustrated and described without attempting to show all of the various forms and modifications in which my invention might be embodied.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a device of the character described, a main pipe having a reduced portion or throat, a valve in said pipe, and means whereby the difference between the pressure at two distinct points in said main is caused to control the opening through said valve to regulate the rate of flow through said main.

2. In a device of the character described, a main pipe provided with a contracted opening, a valve in said main, two receptacles each containing a quantity of water proportional to the head at two distinct points in the main pipe, and means whereby the difference between said quantities will control the opening through said valve.

3. In a device of the character described, a main pipe provided with a contracted opening, a valve in said main, an auxiliary controlling device for said valve, two receptacles each containing a quantity of water proportional to the head at two distinct points in the main pipe, and means whereby the difference between said quantities will actuate said auxiliary device to regulate the opening through said valve.

4. In a device of the character described, a main pipe having a contracted portion, a valve in said main, an outer receptacle, a receptacle within said outer receptacle, and means whereby the differential pressures in said main will cause the excess quantity in one of the receptacles to automatically control the opening through said valve.

5. In a device of the character described, a main pipe provided with a contracted portion, a gate valve in said main, an outer receptacle communicating with said main, an inner receptacle also connected to said main and arranged to float within said outer receptacle, and means whereby the differential pressures in said main will cause the movement of the inner receptacle to control the opening through said gate valve.

6. In a device of the character described, a main pipe having a contracted portion, a valve in said main, an auxiliary controlling device for said valve, an outer receptacle communicating with said main, an inner receptacle connected to said main and arranged to float within said outer receptacle, and means whereby the differential pressures in said main will cause the movement of the inner receptacle to actuate said controlling device to regulate the opening through said valve.

7. In a device of the character described, a main pipe, having a contracted opening, a valve in said pipe, an outer receptacle, a counterbalance receptacle arranged to float within said outer receptacle, and means whereby the differential pressures in said pipe will give said latter receptacle a vertical movement to open and close said valve.

8. In a device of the character described, a main pipe having a contracted opening, a valve in said pipe, an outer receptacle, a counterbalance receptacle arranged to float within said outer receptacle, means whereby the differential pressures in said pipe will give said latter receptacle a vertical movement to open and close said valve, and means whereby the weight of said counterbalance may be regulated to determine the rate of flow through said pipe.

9. In a device of the character described, a main pipe having a contracted portion, a valve in said main, a controlling device for said valve, an outer receptacle communicating with said main, an inner counterbalanced receptacle flexibly connected to said main and arranged to float within said outer receptacle, and means whereby the differential pressures in said main will cause the movement of the inner receptacle to actuate said controlling device to regulate the opening through said valve.

10. In a device of the character described, a main pipe having a contracted portion, a gate valve in said main, an outer receptacle communicating with said main, an inner receptacle also connected to said main and arranged to float within said outer receptacle, a pilot valve, and means whereby the differential pressures in said main will cause the movement of the inner receptacle to actuate said pilot valve to control the opening through said gate valve.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK N. CONNET.

Witnesses:
WM. R. TILLINGHAST,
HOWARD E. BARLOW.