No. 757,039. PATENTED APR. 12, 1904.

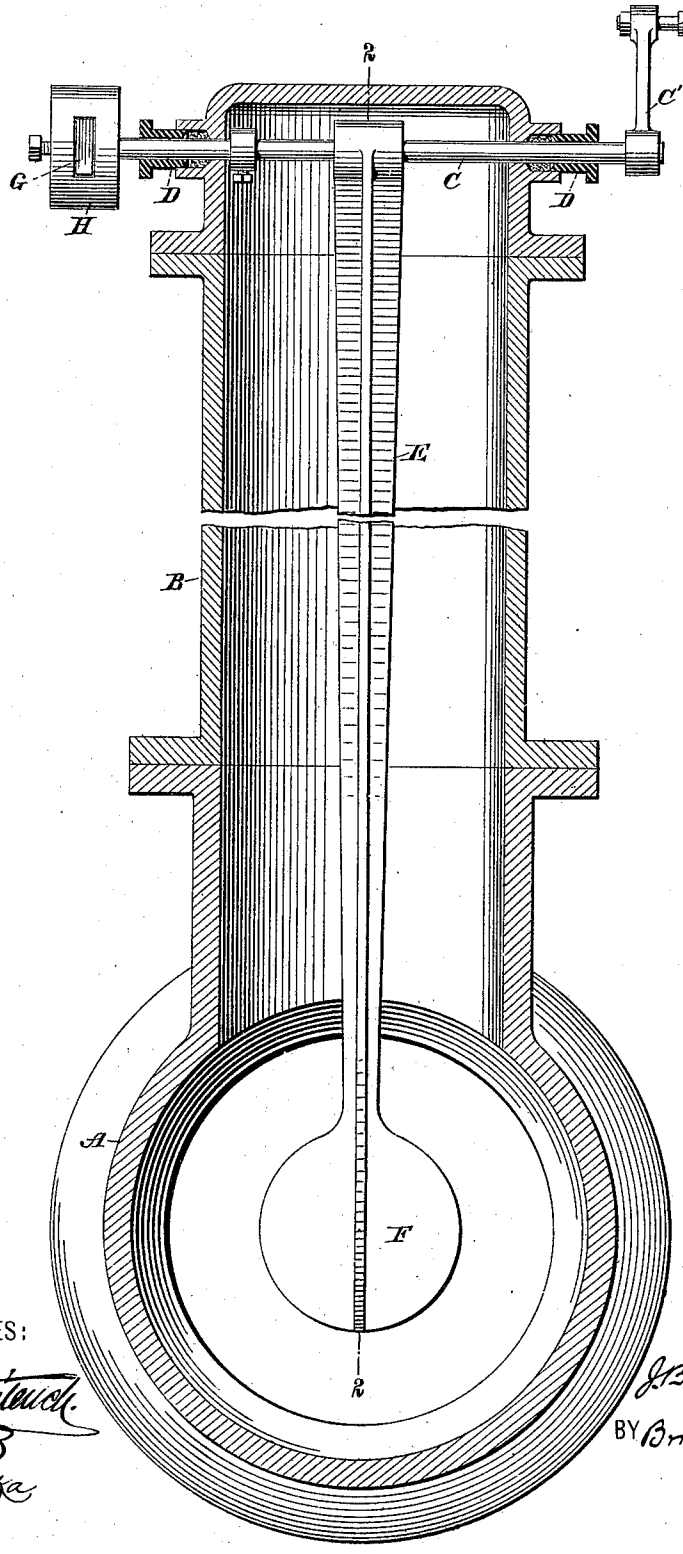
J. B. F. HERRESHOFF.

VELOCITY REGULATOR FOR FLUIDS IN MOTION.

APPLICATION FILED JAN. 13, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

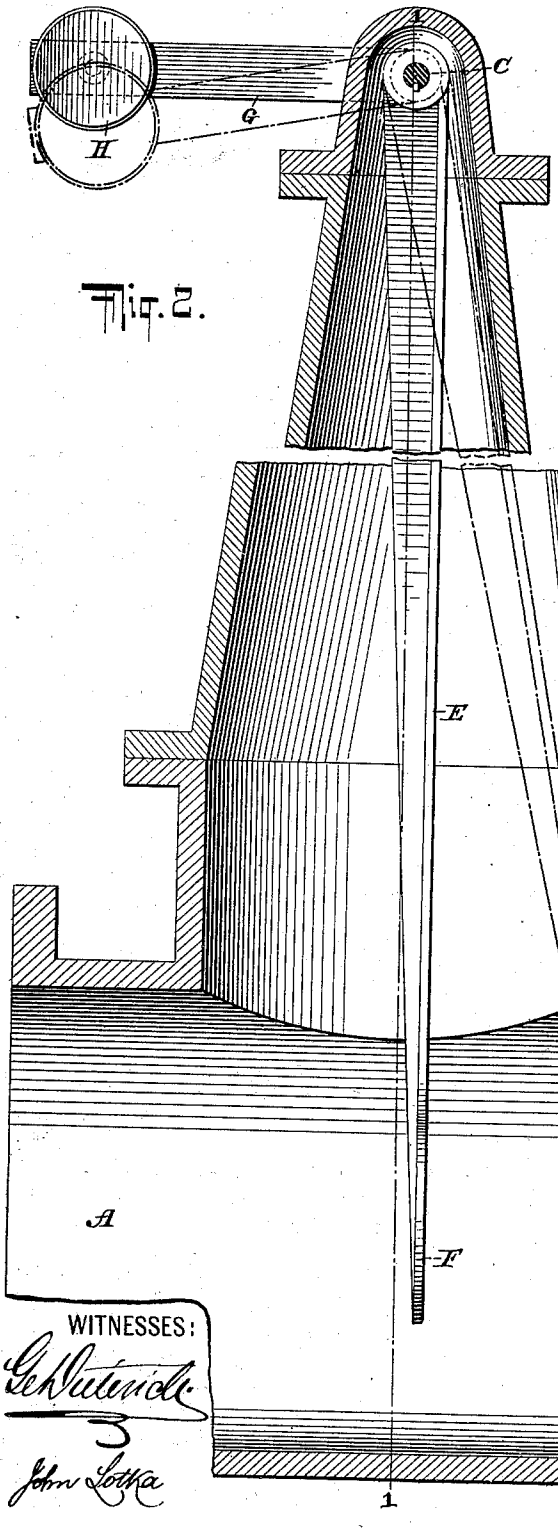


Fig. 3.

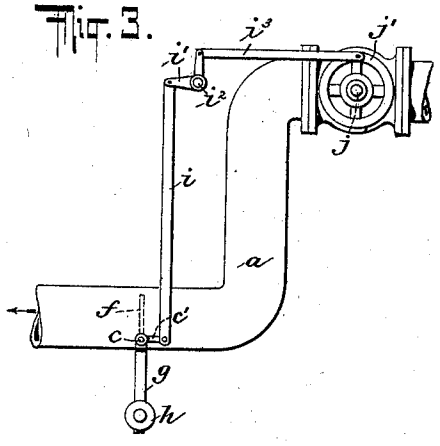
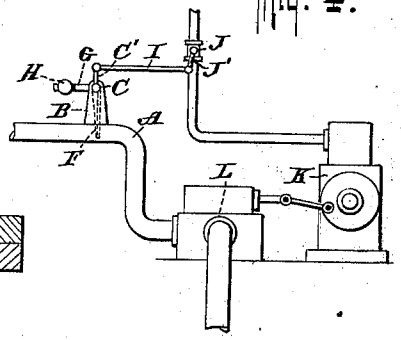


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN B. FRANCIS HERRESHOFF, OF BROOKLYN, NEW YORK.

VELOCITY-REGULATOR FOR FLUIDS IN MOTION.

SPECIFICATION forming part of Letters Patent No. 757,039, dated April 12, 1904.

Application filed January 13, 1902. Serial No. 89,424. (No model.)

To all whom it may concern:

Be it known that I, JOHN BROWN FRANCIS HERRESHOFF, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Velocity-Regulators for Fluids in Motion, of which the following is a specification.

My invention relates to mechanism for governing the supply of fluid, such as water, to a place of consumption, with the object of always feeding the same amount of the substance per unit of time. For instance, in pumping water for boilers from a river or other body of water the level of which is subject to variations an ordinary pump will supply less water when the level of the water sinks for the reason that the water is to be lifted to a greater height, and therefore the load on the pump is greater and its speed will fall below its normal speed.

It is the object of my invention to provide a simple device in which the velocity of the flowing medium itself is utilized for the purpose of regulating the flow of the water or other medium. To accomplish this result, I interpose in the path of the medium a movable resistance device which has an operative connection governing the flow of the fluid, either directly by means of a valve which controls the passage of the fluid or indirectly by governing the speed of the pump or equivalent mechanism which imparts motion to the fluid.

The particular novel features and combinations which constitute my invention will be pointed out in the appended claims.

To better illustrate my invention, I have hereunto appended two sheets of drawings, in which—

Figure 1 is a cross-sectional elevation on line 1 1 of Fig. 2, showing one form of a regulator constructed according to my invention. Fig. 2 is a longitudinal section thereof on line 2 2 of Fig. 1. Fig. 3 is an elevation of another form of my invention, and Fig. 4 is an elevation showing how the apparatus illustrated by Figs. 1 and 2 may be connected with a pump operated by a steam-engine.

I desire it to be distinctly understood that these two constructions are only given as examples and that my invention is not limited to the details shown herein.

As shown in Figs. 1 and 2, A is the pipe through which the fluid—for instance, water—is conveyed, said pipe being, for instance, connected with the delivery-port of a piston-pump. At a suitable point of said pipe is provided a laterally-disposed casing B, which, as shown, receives at its top a shaft C, extending through stuffing-boxes D. To this shaft is secured a pendent arm E, the lower end of which is widened to form a plate F, which constitutes the movable resistance device hereinbefore mentioned. It will be seen that this resistance device is in the path of the water flowing through the pipe A and that the water will have a tendency to swing this resistance device about the shaft C as a pivot in the direction of the flow of the water. It will further be obvious that the greater the velocity of the water is the farther the resistance device will be swung out of its normal position. While the mere weight of the arm E and plate F is sufficient in some cases to accomplish the desired result, I prefer to weight the arm E, arranging the weight in such a manner that instead of having a vertical position when the liquid is not flowing through the pipe A the said arm will move to an extreme position toward that side from which the water or other medium arrives. For this purpose I secure upon the shaft C, and preferably externally of the casing B, an arm G at an angle to the arm E and carrying a weight H. This arm G extends toward the other end of the pipe A, so that the weight H will act to throw the arm F in a direction contrary to the flow of the water. Therefore as long as no water flows through the pipe A the plate F would take the position indicated in dotted lines in Fig. 2, and when water passes through the pipe A it will, according to its greater or smaller velocity, swing the plate F more or less to the left. The weight H is preferably adjustable lengthwise of the arm G, so that the amount of resistance opposed by the plate F may be regulated. The shaft C is operatively connected in any suitable manner with a mechanism which governs the velocity of the fluid passing through the pipe A. This may be done

indirectly by a connection from the shaft C to the steam-valve of the pump, which forces water into the pipe A when a steam-pump is employed for this purpose. If an electric pump is used, the shaft C will have an operative connection to a switch or controller, which regulates the speed of the pump-motor in any approved manner. In Figs. 1 and 4 I have shown a crank-arm C′ on the shaft C, from which crank-arm a link I leads to an arm J′ on the steam-valve J of the pump-engine K. This engine drives the pump L. It will be obvious that it is merely a matter of mechanical skill to so connect the parts that in case the velocity of the fluid in motion in the pipe A increases the steam-admission valve will be so affected as to admit less steam, thus reducing the speed of the pump, and therefore supplying a constant amount of fluid to the boiler or other apparatus with which the pipe A is connected. Of course in case the velocity of the fluid should fall below its proper rate the steam-admission valve will be opened more fully and the speed of the pump, as well as that of the fluid, will be increased correspondingly.

In the form of my invention so far described the regulation of the fluid velocity is effected in an indirect manner by regulating the speed of the pump-motor. In Fig. 3 I have illustrated another form of my invention, which is applicable particularly to cases in which the flow of the liquid is due to a pressure thereof and not necessarily to the action of a pump; but this second form of my invention is also applicable to constructions in which a pump is employed. In said Fig. 3, *a* designates the pipe through which the fluid is conveyed, and *c* is the shaft, carrying the resistance device or resistance-plate *f* and also carrying an arm *g*, provided with an adjustable weight *h*. On the shaft *c* is further provided a crank-arm *c′*, connected by a link *i* with an elbow-lever *i′*, fulcrumed at i^2 upon a stationary support. This elbow-lever is further connected, as by a link i^3, with a wheel or crank portion *j′* of a valve *j*. This valve is in the present case located directly in the pipe *a*. The operation will be similar to that described with reference to the Figs. 1, 2, and 4—that is, the position of the plate *f* will vary according to the greater or smaller velocity of the fluid passing through the pipe *a*, and any change in the position of the plate *f* will effect a corresponding change in the position of the valve *j*, so that in case the velocity rises above the normal rate the valve will be closed sufficiently to bring the amount of fluid supplied during one unit of time down to the same constant figure.

It will be seen that my invention provides simple and readily-regulated means for governing the velocity of any fluid conveyed through a pipe in such a manner as to keep the amount or volume of fluid conveyed during a predetermined time practically constant, the only variation being due to the unavoidable loss of time which will elapse before a change of position of the resistance device will affect the valve or corresponding regulating device.

I claim as my invention and desire to secure by Letters Patent—

1. The combination with a conduit through which a fluid is adapted to pass, a propelling device for imparting motion to said fluid, a motor for said propelling device, a regulating device for controlling said motor, a movable resistance device located in the path of the fluid, and an operative connection from the said resistance device to the regulating device, so that the action of the motor will be governed according to the speed of the propelled fluid.

2. The combination with a conduit through which a fluid is adapted to pass, of a pivoted resistance device arranged in the path of the fluid, to be moved by the fluid to different positions according to the velocity of the fluid, and means, controlled by the movement of said resistance device, for governing the velocity of the fluid in said conduit.

3. The combination with a conduit through which a fluid is adapted to pass, of a pump for propelling said fluid through the conduit, a motor for driving said pump, a regulating device controlling the supply of the active agent to said motor, a movable resistance device arranged in the path of the fluid, and an operative connection from said resistance device to the regulating device.

4. The combination with a pipe or conduit through which a fluid is adapted to pass, of a casing arranged laterally of said conduit and communicating therewith, a resistance device pivoted inside of the casing and extending into the path of the fluid, and means, controlled by the movement of said resistance device, for governing the velocity of the fluid in the conduit.

5. The combination with a conduit through which a fluid is adapted to pass, of a pivoted resistance device extending into the path of the fluid, a weight connected with said resistance device and adjustable toward and from the pivot thereof, so as to have a tendency to throw the resistance device with greater or less force in a direction opposite to the flow of the fluid, and means, controlled by the movement of said resistance device, for governing the velocity of the fluid in the conduit.

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