(No Model.) 2 Sheets—Sheet 1.

A. J. L. LORETZ.

HYDRAULIC MOTOR REGULATING DEVICE.

No. 605,169. Patented June 7, 1898.

Fig. 1.

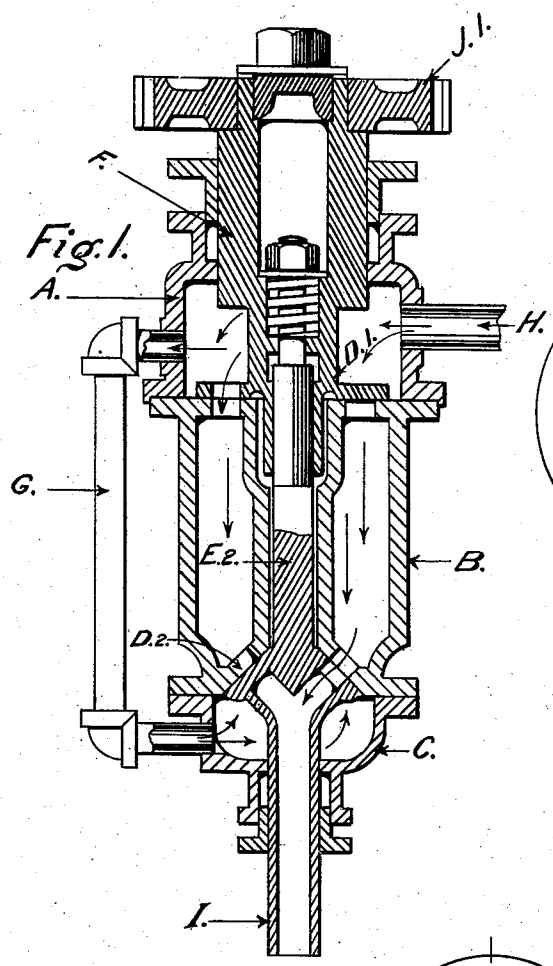


Fig. 2.

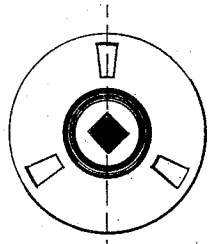


Fig. 3.

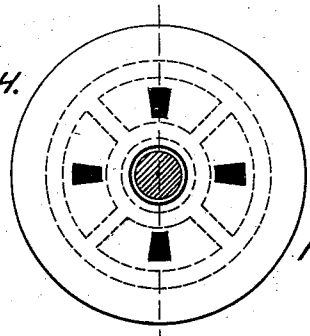


Fig. 5.

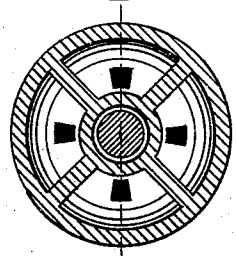


Fig. 4.

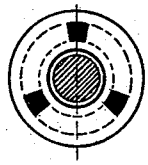
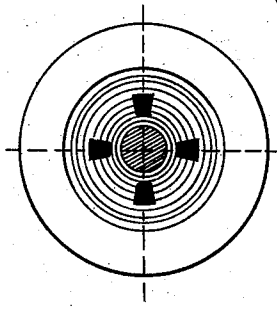


Fig. 6.



WITNESSES:

John Connell

Charles F. Loretz

INVENTOR

Arthur J. L. Loretz

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

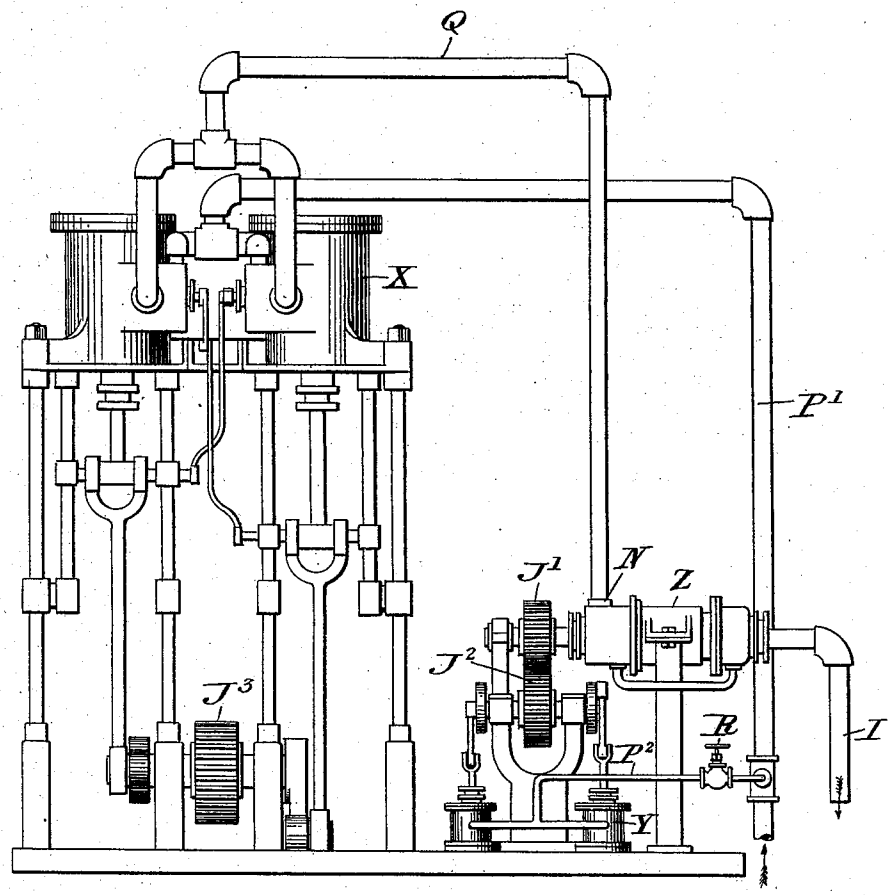
(No Model.) 2 Sheets—Sheet 2.

A. J. L. LORETZ.

HYDRAULIC MOTOR REGULATING DEVICE.

No. 605,169. Patented June 7, 1898.

Fig. 7.



Witnesses:
Charles F. Loretz
William Smith

Inventor:
Arthur J. L. Loretz

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR J. L. LORETZ, OF BROOKLYN, NEW YORK.

HYDRAULIC-MOTOR-REGULATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 605,169, dated June 7, 1898.

Application filed April 14, 1896. Serial No. 587,567. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. L. LORETZ, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Hydraulic-Motor-Regulating Devices, of which the following is a specification, reference being had to the accompanying drawings, and letters of reference marked thereon, which form part of the specification.

My invention has in view the production of an apparatus for controlling the speed of hydraulic motors—that is to say, a complete operative mechanism in itself entirely independent of the motor which it regulates.

The apparatus when set in motion at a desired speed is to control the movements of the motor with the regularity of clockwork, whether the resisting force to it be plus or minus. When I say "plus," I mean the greatest force to be overcome by the motor, and "minus," the resisting force converted into reverse action or a maximum propelling force, reversing the former conditions entirely, necessitating the converting of motor into a brake to keep its motion regular. Thus a controlling device which will maintain the movements of a motor with the regularity of clockwork under instantaneous variations, as above referred to, is the subject of my invention. Again, a pressure of one thousand pounds per square inch may be required in hydraulic engines to operate the revolving of a heavy gun-turret of a battle-ship when the rolling of the ship in a heavy sea leaves the guns at base of an incline plane with regard to deck-level, while the next moment the ship rolling into the opposite direction suddenly reverses the conditions, requiring a resisting force of nine hundred pounds per square inch to prevent the too-rapid revolving process of turret due to resisting force changed from plus to minus. When a ship is in action and the rolling conditions prevail, it is absolutely necessary that the movement under all conditions of the turrets be perfectly uniform to insure the gunners precision in directing aim.

I am aware that numerous types of governors have been applied to hydraulic machines to regulate their speed; but these devices consist invariably in the application of the throttling process of water to inlet or outlet of these machines, the usual process of opening or closing of apertures so throttled being derived by the increase or diminishing of pressures originated in motors, which means momentary increase or decrease in speed and consequent momentary irregularity.

The gist of my invention consists of constructing what I call a "controller" in the form of a water-measuring machine or meter, by way of illustration, and is placed at the outlet of the hydraulic engines. It is operated by a water-motor, the speed of which depends upon the amount of opening given to its individual inlet-valve, and is not controlled or acted upon in any manner by the main engines.

As the controller in the form of a meter will be balanced and is so constructed that the water-pressure passing through it will be neutralized, its motor will not be subjected to variations due to variable frictional resistance, and consequently move at all times with the precision of an hour-glass, since under all conditions of velocity of water entering the meter its inlet and outlet valves will be left open and closed alternately a sufficient length of time to thoroughly fill and empty the measuring compartments or cells of the meter.

The controller being connected on the outlet of the engines, it naturally follows that they cannot move faster than the controller measures off the water at a speed equal to that given to the controller-motor.

The drawings herewith submitted on two sheets, with Figures 1 to 7 and letters of reference thereon, will, with the following specification, describe this invention more fully, similar letters of reference indicating similar parts.

Referring to drawings, Sheet 1 represents details of controller apparatus. Fig. 1 is a longitudinal section of my controller apparatus. Fig. 2 is a plan of the revolving inlet-valve of controller. Fig. 3 is a plan showing the inlet-port to each cell or measuring-chamber, valve being removed. Fig. 4 is a plan of the revolving outlet-valve of controller apparatus. Fig. 5 is a cross-section of controller apparatus, showing the four measuring-compartments and corresponding outlet-ports viewed from the interior. Fig. 6 is a plan showing the exterior of outlet-ports from the

four measuring compartments or cells, valve being removed. Sheet 2, Fig. 7, represents an elevation of my complete invention, showing the controller with its hydraulic motor on the right connected to a duplex hydraulic turret-motor on the left. Sheet 2, Fig. 7, represents a duplex hydraulic engine with motive cylinders X and driving-pinion J^3, by which the power is transmitted to the resisting force when plus and through which it is transmitted back to cylinders X when minus.

Y represents an auxiliary duplex motor, which by means of its pinion J^2 revolves wheel J', revolving the water-controller Z. The water-controlling measuring apparatus Z is connected at its inlet N by the outlet-pipe of main hydraulic-engine cylinders X.

I is the outlet of controller Z, and P' is the main supply from an accumulator or other source which leads to main hydraulic-engine cylinders X.

P^2 is the supply to auxiliary or water-controller motor Y, derived from the same accumulator and pipe P'.

The valve R regulates the supply to auxiliary motor Y and is the means by which the speed of the controller is regulated and upon which depends the speed by which the water is relieved or drawn off from the hydraulic engines at equal intervals whether pressure be plus or minus, and consequently the uniform speed maintained of engines.

Sheet 1, Fig. 1, represents an enlarged section lengthwise through the water-controlling apparatus Z, hereinbefore referred to, and represented on Sheet 2, Fig. 7. This apparatus, as represented by longitudinal sectional view, Fig. 1, consists of a central chamber B, inlet-chamber A, and balancing-chamber C, with equilibrium-pipe G connecting the two latter together.

D' and D^2 are two valve-plates connected together by stem E^2, constructed with square-slip connection, spring, and nut, so as to revolve together when rotated by wheel J'.

F is the revolving stem of double valve D' D^2 and is increased in diameter, so as to counterbalance the pressure on valve-face of D', admitted through inlet H, through which the water to be measured from the hydraulic motor enters, either under a pressure from one thousand pounds to zero per square inch, according to resistance to motive engines, or increased from zero to nineteen hundred pounds per square inch, if the resisting force be minus, as in the case of the hydraulic engines being driven instead of driving to the limit of nine hundred pounds per square inch, as hereinbefore referred to, and which, added to the accumulator-pressure on the motive side of piston, will amount to, as before said, nineteen hundred pounds per square inch.

Fig. 5 represents a cross-section through central chamber B of controller apparatus Z, showing its subdivision of four compartments and its respective outlet-ports at bottom. Fig. 3 shows the top or valve-face of chamber B with its four inlet-ports, one for each chamber, respectively. Fig. 6 is a similar face, showing the outside valve-face of eduction-ports of each of the four compartments.

Fig. 2 shows a plan of the upper disk-plate of inlet-valve D'. This plate is arranged with three ports equally divided on the circle and when revolving upon the face (shown by Fig. 3) are constructed of such a width that as soon as one chamber's supply is cut off, after being filled, another opens to be filled. the period of revolving being such as to always leave a port open a sufficient length of time under extreme conditions of velocity of water to completely fill each chamber.

Fig. 4 shows a similar arrangement as Fig. 2 in combination with its four chamber-ports, with the exception that while one chamber is filling, as above stated, the opposite one is emptying, while the remaining two chambers are awaiting to be filled and emptied, respectively, at their proper rotative turn.

The valve portion D^2, Fig. 1, is constructed as a hollow valve, whose revolving shaft acts as waste-pipe and at the same time acts as counterbalance to keep the valve on its seat while exposed at times to internal pressure from either chamber while filling.

I do not wish to confine myself to any particular type of controller measuring apparatus. A rotary meter with concentric wings, so as not to be effected by pressure, and passing inlet and outlet ports in its revolution may answer fully as well if the revolving wings are perfectly water-tight, the controller here described being merely introduced to show and complete the combination of elements in this invention, as shown for a practical apparatus.

Referring now to Sheet 2, Fig. 7, and letters X Y Z, we notice a water-supply pipe P' leading to supply main motors X; also, branch supply-pipe P^2 to auxiliary meter-motor Y and controlling-valve R. The exhaust or waste pipe Q from main water-motors X leads to inlet H of controller Z, from which the water is measured off through its four compartments and finally allowed to waste at *l*.

We will now suppose that the entire pressure of one thousand pounds per square inch is admitted to the motor X through supply-pipe P', which is always wide open when the apparatus is to be in operation, and the exhaust Q, leaving the motors X, connecting to controller supply-pipe H, enters compartment A of controller Z, where it will fill one of the chambers; but after such chamber is filled the flow is stopped, and the outlet of motor X being closed the machine necessarily stops, its motive pistons being fairly water-locked between the one-thousand-pound-per-square-inch pressure on inlet and a total closure of outlet. Now if the valve R of the supply P^2 to auxiliary controller-motor Y be opened and it begins to turn pinion J^2 and spur-wheel J' the valves in meter will begin to revolve, allowing the compartments to fill and empty

themselves, respectively, according to the speed of the auxiliary controller-motor Y, which depends upon the amount of opening the valve R is given, and the valves in controller Z being balanced the speed will be uniform. Again, as the controller fills and empties its cells, according to the speed of its motor, the large or main motor will be relieved to that extent and the pressure of one thousand pounds per square inch on the pressure side of its pistons will cause it to revolve its driving-pinion J^3, through which it applies its power to the resisting force. As the motive pistons cannot move any faster than they are relieved on their opposite sides by the controller, their speed, no matter what pressure or resistance there be offered to the pinion J^3, even the pressure of one thousand pounds, cannot move them faster than the controller will relieve by measurement and time their exhaust or outlet.

It will be noticed that the enlarged stem F of the upper section D′ of revolving valve acts as a counterbalance for the pressure upon its working face and that the by-pass G, admitting the pressure in compartment C, acts as a counterbalance on the lower section D^2 and prevents the pressure when it enters a compartment in B to drive section D^2 off its seat.

Having explained my invention, what I desire to secure by Letters Patent is—

1. In combination with a controller apparatus Z composed of a central chamber B divided into compartments, and arranged with inlet and outlet ports; a double revolving valve, consisting of an inlet disk valve D′ and outlet disk valve D^2, all provided with their respective inlet and outlet ports, and located in their respective balancing-chambers A and C, when all constructed for the purpose herein described.

2. The combination with a hydraulic motor, of a controller which regulates the discharge therefrom at a uniform rate, and means for operating said controller independent of said motor or of the fluid passing therethrough, as herein described.

3. The combination with a hydraulic motor and controller which regulates the discharge therefrom at a uniform rate, and the means for operating said controller independent of said motor or of the fluid passing therethrough; of a valve R whereby the speed of the controller with its operating means is regulated, as herein set forth.

ARTHUR J. L. LORETZ.

Witnesses:
CHAS. F. LORETZ,
WALTER NICHOLS.