

R. S. RILEY.

TELEMOTOR.

APPLICATION FILED JULY 11, 1912.

1,092,397.

Patented Apr. 7, 1914.

2 SHEETS-SHEET 1.

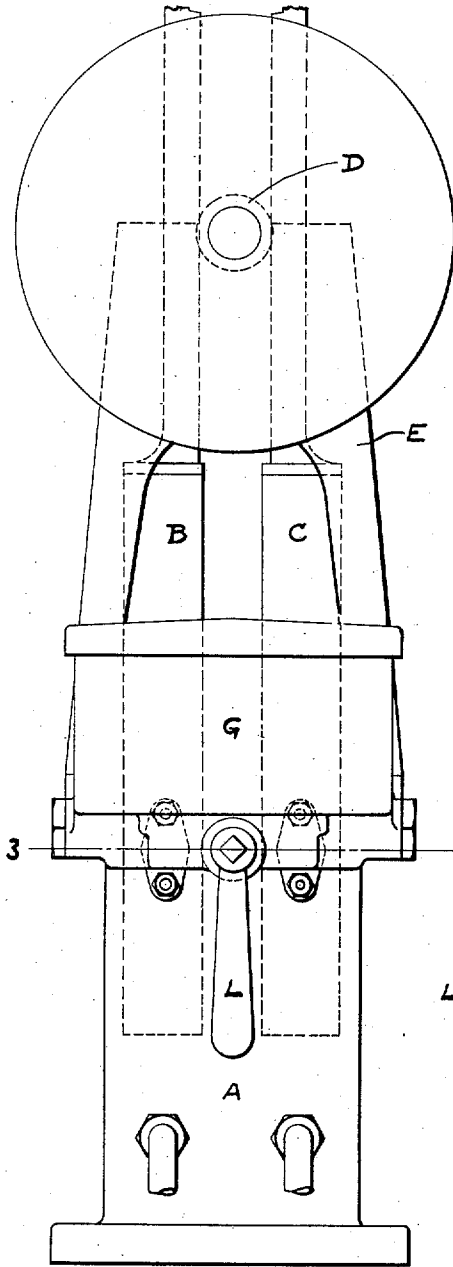


FIG. 2.

WITNESSES:

*Living A. Taylor.*  
*H. A. Riley*

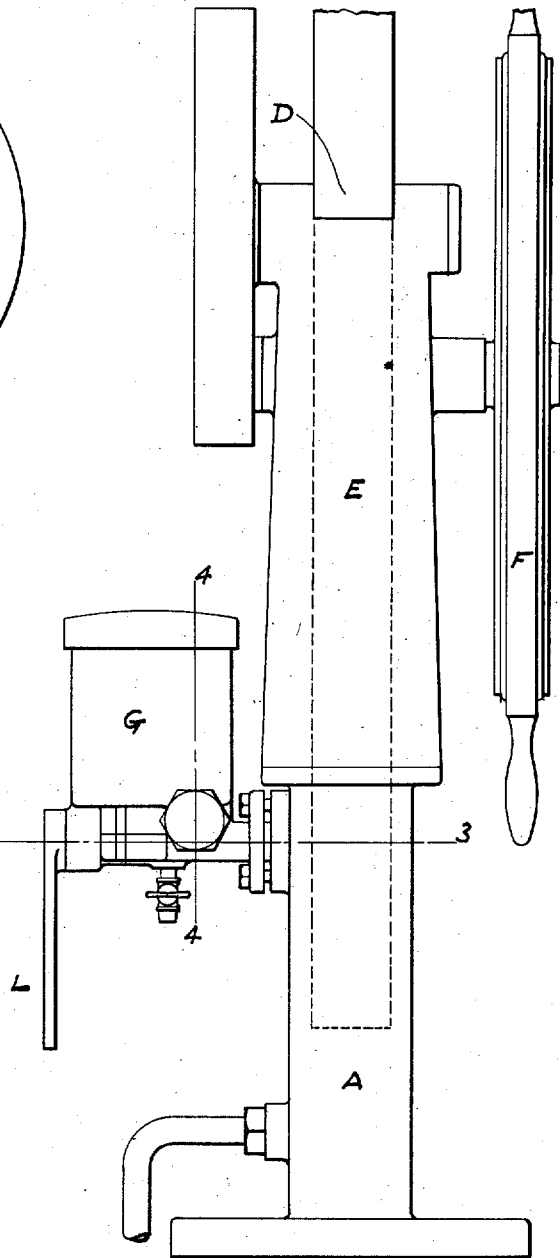


FIG. 1.

INVENTOR

*Robert Sanford Riley*

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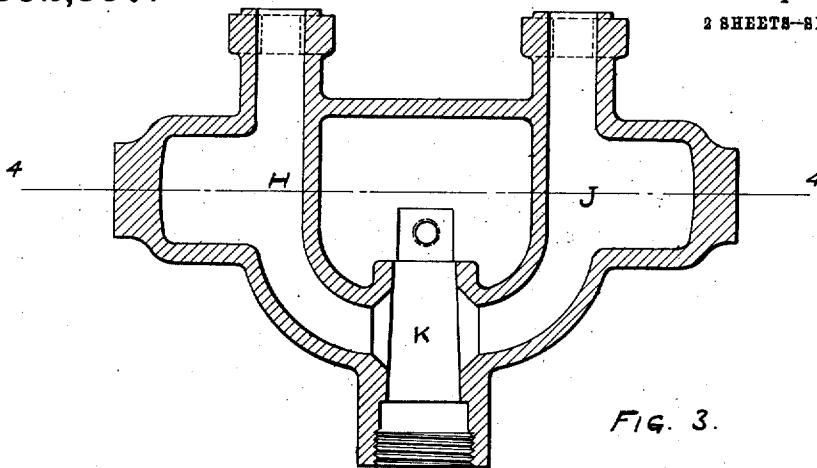


FIG. 3.

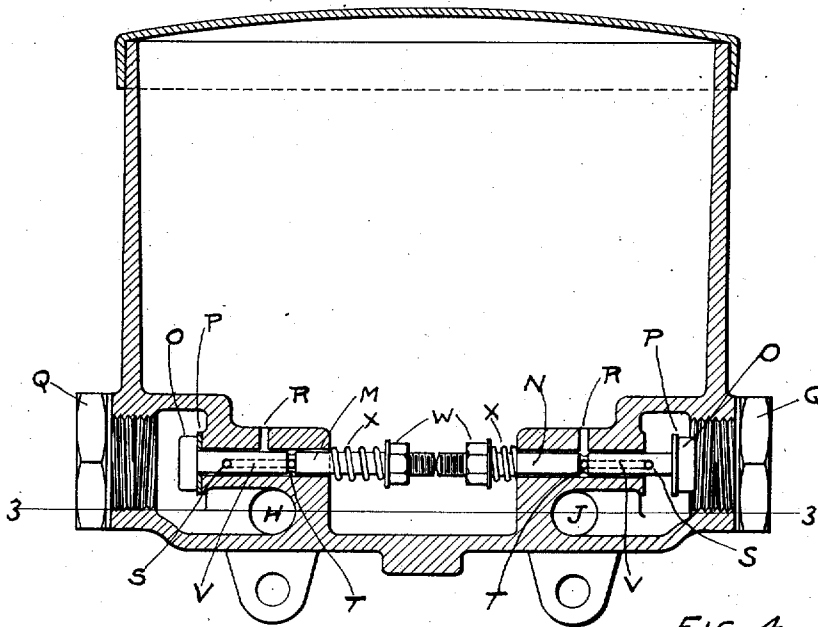


FIG. 4.

WITNESSES:  
Living A. Taylor.  
H. H. Riley

INVENTOR  
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# UNITED STATES PATENT OFFICE.

ROBERT SANFORD RILEY, OF PROVIDENCE, RHODE ISLAND.

## TELEMOTOR.

1,092,397.

Specification of Letters Patent.

Patented Apr. 7, 1914.

Application filed July 11, 1912. Serial No. 708,871.

*To all whom it may concern:*

Be it known that I, ROBERT SANFORD RILEY, a citizen of the United States, and a resident of Providence, Providence county, Rhode Island, have invented certain Improvements in Telemotors, of which the following is a specification.

My invention relates preferably to hydraulic telemotors used on ships, or elsewhere, for transmitting motion through a pair of connecting pipes so that motion imparted to the piston or plungers at one end of the system shall be reproduced as accurately as possible at the piston or plungers at the other end of the system.

The object of my invention is to equip such a hydraulic telemotor with a simple and novel means for accomplishing three purposes:—First, to relieve any abnormal pressure which may exist in the idle side of the system without limiting the pressure which can be put in the working side of the system. Second, to make up any deficiency of pressure, or partial vacuum, which may occur in the idle side of the system. Third, to allow air or gases at normal pressure in the idle side of the system to escape and be replaced by solid liquid.

Briefly, my invention consists in a valve, or pair of valves, so connected that the unbalanced pressure in one side of the system, caused by operating the telemotor, automatically places the other side in positive and free communication with a reservoir. This connection continues only during the maintenance of said unbalanced pressure and is independent of the maximum force to be transmitted.

The construction and operation of my invention is set forth in the accompanying drawings, in which,

Figure 1 is a side elevation of a double plunger type of telemotor, showing my invention attached to the forward side of the cylinders. Fig. 2 is a front elevation of the same telemotor and attachment. Fig. 3 is a horizontal section of my invention through the line 33. Fig. 4 is a vertical section of my invention through the line 44.

In the above drawings, wherein the same letters and figures always refer to the same parts, "A" represents the base, consisting of a pair of cylinders into which the plungers B and C operate through stuffing boxes which may be packed from the outside. These plungers, which constitute the dis-

placing means of the system, from the respectively opposite sides of which lead the conduits for conducting the displaced working fluid to the motor at another part of the system, carry rack extensions at their upper ends, and the pinion D meshes between these racks and is supported in the superstructure E in such a manner that the movement of one plunger is accompanied by an equal and opposite movement in the other plunger. The pinion D is connected through suitable reduction gearing to the hand wheel F by which motion may be given to the plungers.

My invention, as described herein, is incorporated in the tank-like structure G which constitutes a reservoir and contains also the working parts of my invention. This reservoir G, in this instance, is shown fastened near the top of each cylinder through suitable flanges which are bolted to pads on the cylinders. The sectional view in Fig. 3 shows passages H and J through these connecting flanges which afford a communication between the two sides of the system through the plug cock K operated by the handle L, shown in Figs. 1 and 2.

Fig. 4 shows a vertical cross section through the center line of the valve rods M and N. One continuous rod would be equally satisfactory for my purpose, but two rods are used for convenience in construction and installation. These rods have heads or valves, O, O, which carry washers P for insuring a watertight seal when the valves are seated on the faces shown. The valves are inserted through threaded openings which are normally closed by the plugs Q, Q, respectively. The spaces surrounding each valve head O communicate directly with the respective passages H and J, as shown, but do not communicate directly with each other, or with the reservoir, except through the rods M and N, as described later.

In the metal surrounding the rods M and N are drilled holes R, R, equi-distant from the valve seats, which serve as a communication between the liquid in the reservoir and the body of the rods M and N. These rods have holes S, S near the heads, and shallow annular grooves T, T far enough from the holes S, S, so that when the annular grooves are opposite the holes R, R, the holes S, S, will stand clear, as when in the position shown by the rod N in Fig. 4. These grooves T, T are connected with the

holes S, S through passages V, V, as shown. The inner ends of the rods M and N are threaded and carry adjusting nuts W, W, and spiral springs X, X, as shown. The valve rods M and N fit loosely enough in their boxes so they may be moved easily and yet allow no appreciable leakage along the rod. The length of the rods M and N is such that when one valve head is seated, the other valve is pushed from its seat far enough to bring the annular grooves T, T, opposite the holes R, R, and thus allow the holes S, S, to stand clear and communicate with the passages H and J.

The operation of these valves is as follows: The nuts W, W, are set up so as to give equal compression on springs X, X, and thus hold the valves normally an equal distance clear of their seats. If, now, the plunger B be moved so as to cause a pressure in the passage H, Fig. 4, the valve head O, on the rod M, will be acted upon so as to push the other rod N in such a manner that the spring X on N will be compressed, and the hole S, near the valve head, will communicate with chamber J. At the same time, the annular groove T, in the rod N, will stand opposite the hole R, and thus allow communication from the reservoir G through the hole R, the groove T, the port V and the hole S to the passage J. Thus if the passage J, connecting to one side of the system, has a pressure in excess of that in the reservoir, it will be automatically relieved, and vice versa, if the passage J has a less pressure than the liquid in the reservoir G it will be automatically balanced. In a similar manner it will be seen that if pressure applied by means of the plunger C, through the chamber J, then the valve rod N will be acted upon so as to move the valve rod M and thus place the ports in M in such a position that pressure, or lack of pressure, in passage H will be automatically equalized with that in reservoir G.

In addition to the equalization of pressure with that in the reservoir G, it is obvious that in case air or gas should accumulate in the passages H and J, the air or gas is perfectly free to rise and be replaced by solid liquid each time the connection is made as described. For this reason, it is desirable to locate my apparatus as near the upper level of the system as possible. This may be at the controlling cylinders, as shown, as elsewhere in the system.

The plug cock E, which normally prevents communication between the passages H and J, as shown in Fig. 3, may be used as follows: If one side of the system should leak more than the other, so as to cause the telemotor to be out of truth with its corresponding cylinders at the other end of the system, then communication may be established between the two sides of the system

while the plungers B and C are brought into the same relation as the plungers of the telemotor at the other end of the system. Closing the cock E will then maintain the proper relation of the two telemotors until again deranged by unequal leakage.

I wish it to be understood that I do not restrict either the form or the location of my device to that shown herewith. The reservoir, which is here shown as a part of the automatic apparatus, may be located at a distance from the automatic valves and communicating passages. It is here shown of rectangular form, surrounding the valves in such a manner that the adjusting nuts are easily accessible by putting the hands down into the reservoir G. It is obvious that the reservoir with the valve incorporated, as shown, may be located any place that may be more convenient than the direct attachment to the telemotor. It is obvious, also, that the passages H and J may be dispensed with and pipe connections to each side of the system may be substituted for the plugs Q, Q.

I claim:

1. In a telemotor system, a reservoir containing liquid and means for putting said reservoir into free communication with the idle side of the system in consequence of unbalanced pressure in the active side of the system.

2. In a telemotor system, a container holding a quantity of liquid at a height above any other point in the system, and means operated by excess pressure in either side of the system for establishing free communication between the container and the other side of the system.

3. In a telemotor system, a container holding a quantity of liquid at a height above any other point in the system, channels of communication between said container and both sides of the system, valve means normally closing said channels, and actuating means arranged for operation by pressure in the high-pressure side of the system to open the channel from the container to the low-pressure side.

4. In a telemotor system having an actuating fluid-displacing means and conduits distinct from one another leading from either side of said means, adapted to conduct the flow of liquid caused by movement of said means, a container for a supply of liquid, normally closed connections between said container and each conduit, and movable actuating means exposed to the liquid in the conduits arranged to be so moved by unbalanced pressure in either as to open the connection between the other and the container.

5. In a telemotor system having a displacing means and conduits leading from opposite sides thereof, a means operated by unbalanced pressure in one of said conduits for

establishing external communication with the other conduit, whereby excess pressure in the latter may be relieved, or a deficiency in the quantity of liquid therein may be supplied, or an accumulation of gas may escape and be replaced by liquid.

6. In a telemotor system having a displacing means and conduits leading from opposite sides thereof, a means for relieving excess pressure and supplying deficiencies in the quantity of fluid in the inactive or idle conduit independent of the pressure therein.

7. In a telemotor system having a displacing means and conduits extending from opposite sides of said means, a container for working fluid, independent connections from said container to each conduit, a valve movable in each of said connections constructed to open such connection when in one position and to close the connection when in another position, said valves having enlarged heads exposed to the pressure of the fluid in respective conduits and being engaged with one another in such manner that movement of either in response to unbalanced pressure causes the other to open the connection which it controls.

8. In a telemotor system a reservoir having separate aligned passages opening in its interior, connections from said passages to the opposite sides of the telemotor system, a piston valve in each passage normally obstructing the same and having ports arranged to permit flow of fluid from the reservoir when in one position, each valve having an enlarged head adjacent to the outer end of its containing passage and arranged to be closed against such end by increase of pressure in the adjacent conduit, and said valves being interengaged in such manner that when either is thus closed the other is placed in open position.

9. In a telemotor system a container for a supply of the working fluid, connections between said container and each side of the

system, a valve controlling each of said connections, and means arranged for operation by unbalanced pressure in either side of the system for opening the valve in the connection leading from the reservoir to the other side of the system.

10. In a telemotor system a reservoir for a supply of working fluid, independent connections from said reservoir to each side of the system, a valve in each of said connections, yielding means normally holding each of said valves closed and in an intermediate position in their total range of movement, means associated with each valve and operated by pressure in the side of the system to which the valve controls communication for moving such valve to the limit of its closing movement, said valves having interengagement whereby such movement of one valve positively moves the other into the opening position.

11. The combination with a telemotor system of a reservoir, connections between said reservoir and each side of the system independently, said connections including passages or valve chambers, piston valves located in each of said passages having ports so arranged that the valves close their respective passages except when each is in one extreme position, springs normally holding both valves in an intermediate position, said valves having portions exposed to the pressure of the system, whereby they are movable in response to an unbalanced pressure in either side of the system, and connecting means between the valves whereby such movement of one moves the other into open position.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT SANFORD RILEY.

Witnesses:

IRVING A. TAYLOR,  
K. H. RILEY.