

(No Model.)

2 Sheets—Sheet 1.

A. B. BROWN.

TELEMOTOR APPARATUS FOR STEERING MACHINERY.

No. 568,737.

Patented Oct. 6, 1896.

Fig. 3.

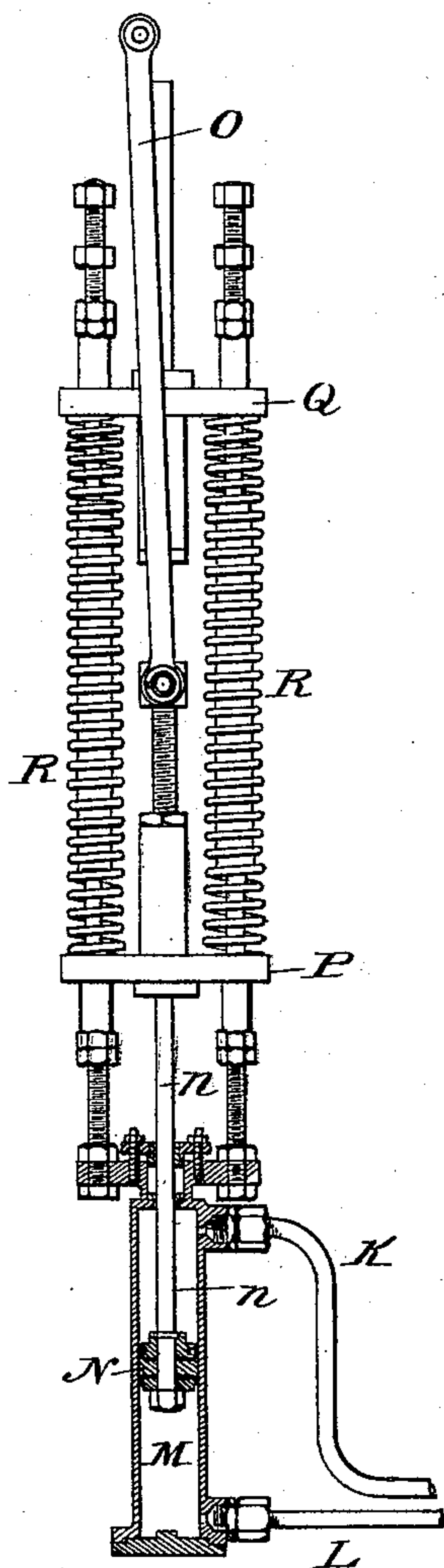
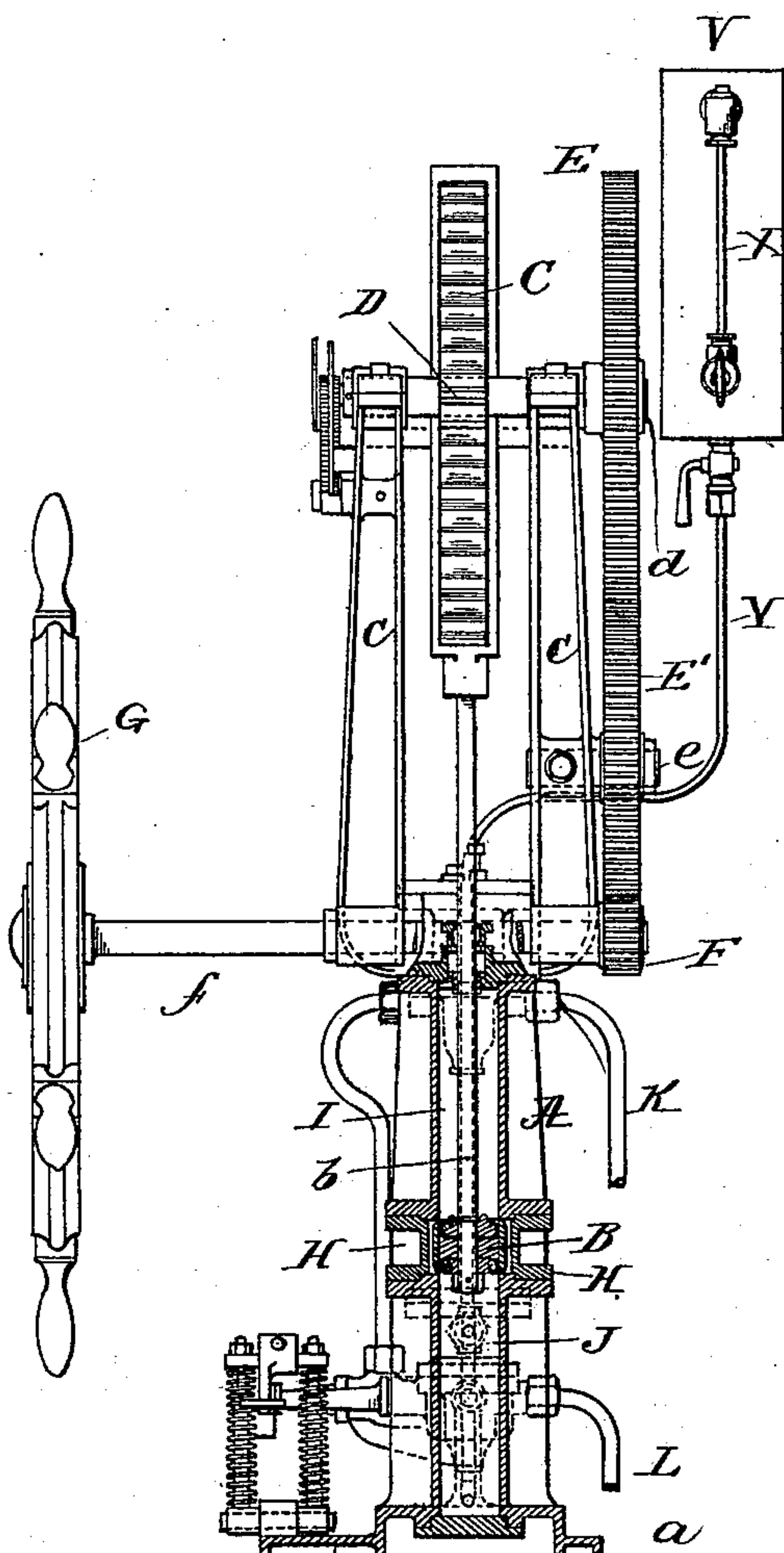


Fig. 1.



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Fig. 2.

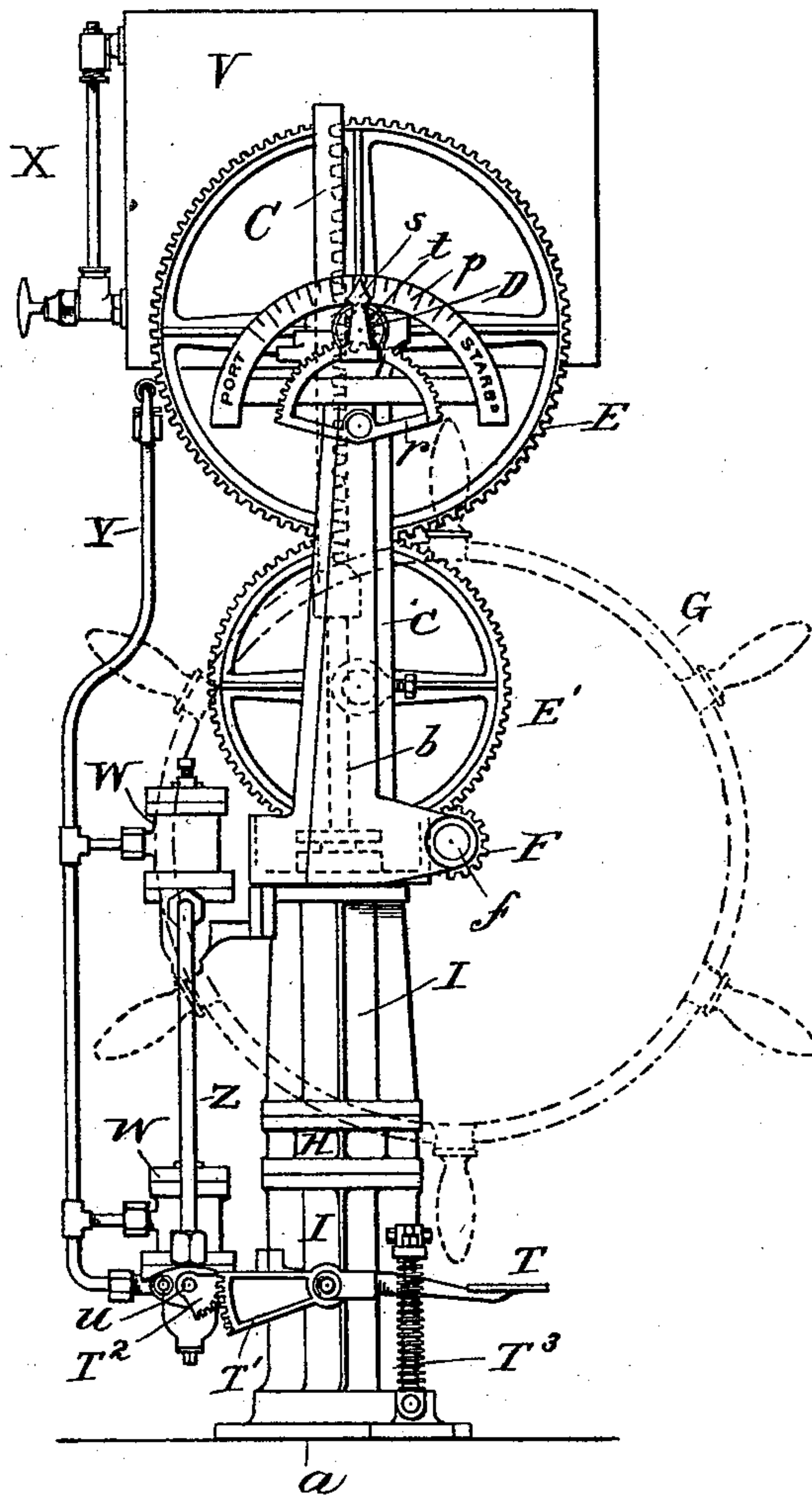
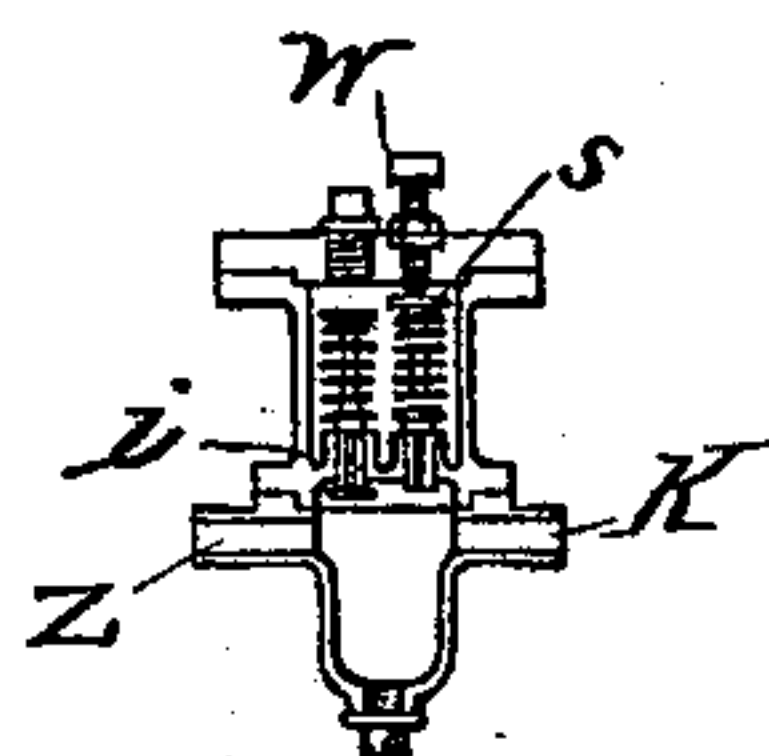


Fig. 4.



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TELEMOTOR APPARATUS FOR STEERING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 568,737, dated October 6, 1896.

Application filed November 8, 1895. Serial No. 568,260. (No model.)

To all whom it may concern:

Be it known that I, ANDREW BETTS BROWN, a subject of the Queen of Great Britain, residing at Edinburgh, in the county of Mid-Lothian, Scotland, have invented a new and useful Telemotor Apparatus for Operating Steering Machinery and for other Purposes, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide means for transmitting movements from a distance to steering, telegraphing, indicating, and other analogous apparatus.

As the motive power for steering vessels is frequently either attached to the rudder-head or located in close proximity to the rudder it is necessary to have some connection between the valve or valves of the steering-engine and steering-wheel, which latter is often located on the bridge close to the bow of the ship. Heretofore a complicated arrangement of shafting and gearing has been used for this purpose, which was difficult to operate and uncertain in its movements. By my invention herein described a hydraulic connection is established between the steering-wheel and the steering-valve which is simple in construction and readily and certainly operated.

The invention will first be described in detail, and then particularly set forth in the claims.

In the accompanying drawings, Figure 1 shows the transmitting apparatus in sectional side elevation. Fig. 2 is an end elevation of Fig. 1. Fig. 3 shows in elevation, partly in section, the receiving apparatus used in connection with the transmitting apparatus shown in the preceding figures. Fig. 4 illustrates a certain detail of construction hereinafter described.

In said figures the several parts are respectively indicated by reference-letters, as follows:

The transmitter, which may be located on the bridge of the vessel, consists of a cylinder or pump A, formed at its bottom into a bed-plate *a*, and provided with a piston B, having a piston-rod *b*. Said piston-rod is provided at its upper portion with a rack C, which meshes with a pinion D, mounted on a suitable shaft *d*, carried in the brackets or frames

c. Mounted on said shaft also is a gear-wheel E, which meshes with a smaller gear-wheel E', mounted on a shaft *e* in the frame *c*. Suitably journaled in the frame *c* is a shaft *f*, upon one end of which is mounted a steering-wheel G, the other end of said shaft carrying a pinion F, which meshes with the gear-wheel E'. It will thus be evident that when the shaft *f* is revolved by the hand-wheel G the shaft *d* will be also revolved and the piston B moved by the pinion D in mesh with the rack C.

The cylinder A is made in two parts united at its center by means of a distance-piece H, which, when the piston B is at the position shown in Fig. 1, admits of the free passage of water above and below the piston, so that there are really two cylinders—an upper one I and a lower one J. The distance which these cylinders are kept apart by the distance-piece H is small, so that the packing on the piston B, which may be of leather or any other suitable material, will freely enter the cylinders I and J without being damaged.

A small tank V, provided with a gage-glass X at its end, is charged with a mixture of glycerin and water, preferably one part of the former to two or three of the latter, this fluid being supplied to the cylinder A by means of a pipe Y, leading into the valve-boxes W at each end of the cylinder. As it is important that the whole system of pipes and cylinders should be fully charged and that no air should be present the expansion and contraction of the fluid, due to changes of temperature, must be provided for. For this purpose the valve-boxes W (shown in section in Fig. 4) are each provided with a small inlet-valve *i* and an outlet-valve *s*, the outlet-valve being practically an ordinary safety-valve loaded above the working pressure, which is about one hundred and fifty pounds per square inch. When the temperature rises, as in the case of the sun shining on the pipes, a portion of the fluid is forced into the tank V, and when the temperature falls the fluid contracts and takes in the necessary quantity through the inlet-valve.

From the upper valve-box W, which is connected to the top of the cylinder I, there passes a pipe K, and from the lower valve-box W there passes a similar pipe L. Said

pipes K and L lead aft in the vessel to where the steering-gear is located and there connect with the receiving apparatus shown in Fig. 3. Said receiver consists of a cylinder M, into which the pipes K and L lead, one at the top of said cylinder and one at the bottom. Said cylinder is provided with a piston N, having a piston-rod *n*, connected to the connecting-link O. To the upper end of the link O may be connected any suitable lever for operating the valve of the steering-engine. (Not shown.) The piston-rod *n* is provided with two cross-heads P and Q, having between them spiral springs R R, which will cause the piston N to remain in its middle position unless moved from that position by the pressure of water upon either side of it.

The transmitting apparatus shown in Figs. 1 and 2 is provided with a device for showing the actual position of the helm. This device consists of a quadrant index-plate *p*, secured to the frame of the apparatus and having degrees marked thereon to indicate the angles of the rudder. To the frame of the apparatus is also secured a toothed sector *r*, which carries an index pointer or arm *s*, adapted to move in front of the quadrant *p*, said toothed sector *r* being in mesh with a pinion *t*, secured to the shaft *d*.

From the above description the operation of the apparatus will be evident. If the hand-wheel G of the transmitting apparatus be revolved in the direction of the arrow by the helmsman on the bridge, said movement of said wheel will, through the instrumentality of the pinion F, gear-wheels E E', pinion D, and rack C, elevate the piston B in the cylinder A. As said piston rises it will expel, through the pipe K, the fluid contained above it in the cylinder A. Said fluid will then rush through said pipe to the receiving apparatus located near the steering-engine and will enter the cylinder M of said receiver above the piston N. Said piston will thus be depressed, carrying with it the piston-rod *n* and connecting-rod O and compressing the springs R. The movement of the rod O will impart to the valve-rod to which it is connected the necessary motion to cause the engine to move the rudder the desired distance, said movement of the rudder being indicated to the operator by the pointer *s*, operated by the mechanism hereinbefore described, attached to the transmitting apparatus. If the hand-wheel G be moved in the opposite direction, it is obvious that the operations of the several parts will be the reverse of those just described.

If the packing of the piston B should become worn so as to cause leakage in the cylinder A, it might happen that the piston B would work entirely in the upper half I of said cylinder and the ship be steered on a straight course with the indicator pointing at, say, twenty degrees. This, however, could continue until the indicator passed the degrees marked on the index-quadrant without

injuring the apparatus, for the reason that the capacity of the cylinder A of the transmitter is nearly double the capacity of the cylinder M of the receiver. To readjust the indicator and the position of the helm, it is only necessary to move the wheel G until the indicator is brought to zero. The piston B then enters the distance-piece II, and the compressed springs R on the receiver will immediately bring all the parts into correspondence. As, however, in steering a ship the piston B is always passing the distance-piece II in porting or starboarding even to the smallest extent, the piston N of the receiver tends to its middle position while the operation of the transmitting apparatus tends to disturb said piston and move it in either direction from the center of the cylinder M. It may be sometimes necessary to set the apparatus so that this central position does not actually represent the rudder as true fore and aft, but a certain amount of permanent helm is given to counteract the action of the propeller in steering, and this is done by making the connecting-links O longer or shorter as the case may require.

In some cases where it might be inconvenient to adjust the apparatus by moving the indicator into its mid-position by means of the steering-wheel, thus moving the rudder and momentarily affecting the straight course of the ship, the apparatus may be provided with a foot-lever T, connected by means of toothed sectors T' T² to a cock or valve U, which is kept closed by means of springs T³. When the lever T is depressed, the said cock is opened and free communication established through the valve-boxes W, between the two ends I and J of the cylinder A, by means of the pipe Z, thus slowly centering the piston B in said cylinder and allowing the indicator to be brought to zero without disturbing the piston in the receiving-cylinder or moving the rudder.

Having thus fully described my invention, I claim—

1. In a telemotor apparatus the combination of the following-named parts: a double-acting transmitting-cylinder; a piston, within said cylinder, provided with a piston-rod; a rack-bar formed upon or secured to said piston-rod; a housing or frame; a pinion mounted upon a shaft and meshing with said rack-bar; a hand-wheel mounted upon a second shaft; gearing connecting said pinion with said hand-wheel shaft; a receiving-cylinder provided with a piston; pipes connecting said transmitting and receiving cylinders; and means for centering the piston of said receiving-cylinder.

2. In a telemotor apparatus, the combination of the following-named parts: a double-acting transmitting-cylinder; a piston, within said cylinder, provided with a piston-rod; a rack-bar formed upon or secured to said piston-rod; a housing or frame, as *c*; a pinion, as D, mounted upon a shaft, as *d*, and mesh-

ing with said rack-bar; a gear-wheel, as E, mounted upon said shaft and meshing with a second gear-wheel, as E', secured to a second shaft, as *e*; a hand-wheel shaft, as *f*, carrying at one end a pinion, as F, in mesh with said second gear-wheel, and at the other end a hand-wheel, as G; a receiving-cylinder provided with a piston; pipes connecting said transmitting and receiving cylinders; and means for centering the piston of said receiving-cylinder.

3. In a telemotor apparatus, a transmitting-cylinder constructed of two cylinders or parts united by a distance-piece, so as to form a single cylinder for the purposes set forth.

4. In a telemotor apparatus, the combination of a transmitting-cylinder constructed of two cylinders or parts united by a distance-piece so as to form a single cylinder and provided with a piston; pipes for supplying and discharging fluid to and from each end of said cylinder; and mechanism for reciprocating said piston.

5. In a telemotor apparatus the combination of a transmitting-cylinder; a receiving-cylinder; pipes connecting said cylinders; and a valve-box in communication with each end of said transmitting-cylinder and containing an inlet and an outlet valve, for the purposes set forth.

6. In a telemotor apparatus, the combination of a transmitting-cylinder; a receiving-cylinder; pipes connecting said cylinders; valve-boxes connected to the ends of said transmitting-cylinder and containing each an inlet and an outlet valve; a supply tank or chamber; and a pipe connecting said tank with said valve-boxes.

7. In a telemotor apparatus, the combination of a receiving-cylinder provided with a piston having a piston-rod; a connecting-link and cross-heads secured to said piston-rod; and springs secured to said cross-heads for automatically centering said piston.

8. In a telemotor apparatus, the combination of a receiving-cylinder provided with a piston having a piston-rod; a connecting-link and cross-heads secured to said piston-rod; springs secured to said cross-heads for automatically centering said piston; a transmitting-cylinder provided with a piston; and pipes connecting said transmitting and receiving cylinders.

9. In a telemotor apparatus, the combination of a transmitting-cylinder; a piston,

within said cylinder, provided with a piston-rod; a rack-bar formed upon or secured to said piston-rod; a pinion mounted upon a shaft and meshing with said rack; a hand-wheel mounted upon a shaft; gearing connecting said pinion with said hand-wheel shaft; a receiving-cylinder provided with a piston having a piston-rod; springs connected to said piston-rod; and pipes connecting said transmitting and receiving cylinders.

10. In a telemotor apparatus, the combination of a transmitting-cylinder constructed of two parts united by a distance-piece and provided with a piston; mechanism for reciprocating said piston; a receiving-cylinder provided with a piston; springs for automatically centering said piston; and pipes connecting said transmitting and receiving cylinders.

11. In a telemotor apparatus, the combination of a transmitting-cylinder provided with a piston having a piston-rod provided with a rack-bar; a pinion mounted upon a shaft for operating said rack-bar; a second pinion mounted upon the same shaft; and an indicating apparatus operated by said second pinion.

12. In a telemotor apparatus, the combination of a transmitting-cylinder provided with a piston having a piston-rod provided with a rack-bar; a pinion as D mounted upon a shaft as *d* for operating said rack-bar; a second pinion as *t* mounted upon the same shaft and meshing with a toothed sector as *r* carrying an index-pointer as *s*; and a graduated quadrant index-plate as *p*.

13. In a telemotor apparatus, the combination with a transmitting-cylinder provided with a piston and piston-rod, of a pipe connecting the ends of said cylinder on both sides of said piston and provided with a cock or valve, and a lever connected to said cock for operating the same for the purposes set forth.

14. In a telemotor apparatus, the combination of the following-named parts: a transmitting-cylinder provided with a piston-rod; a pipe, connecting the ends of said cylinder on both sides of said piston, and provided with a cock or valve; and a toothed sector connected to said cock and meshing with a second sector connected to an operating-lever.

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Witnesses:

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