R. JANNEY.

PRESSURE CONTROLLED GOVERNING APPARATUS.

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1,187,738. Patented June 20, 1916.

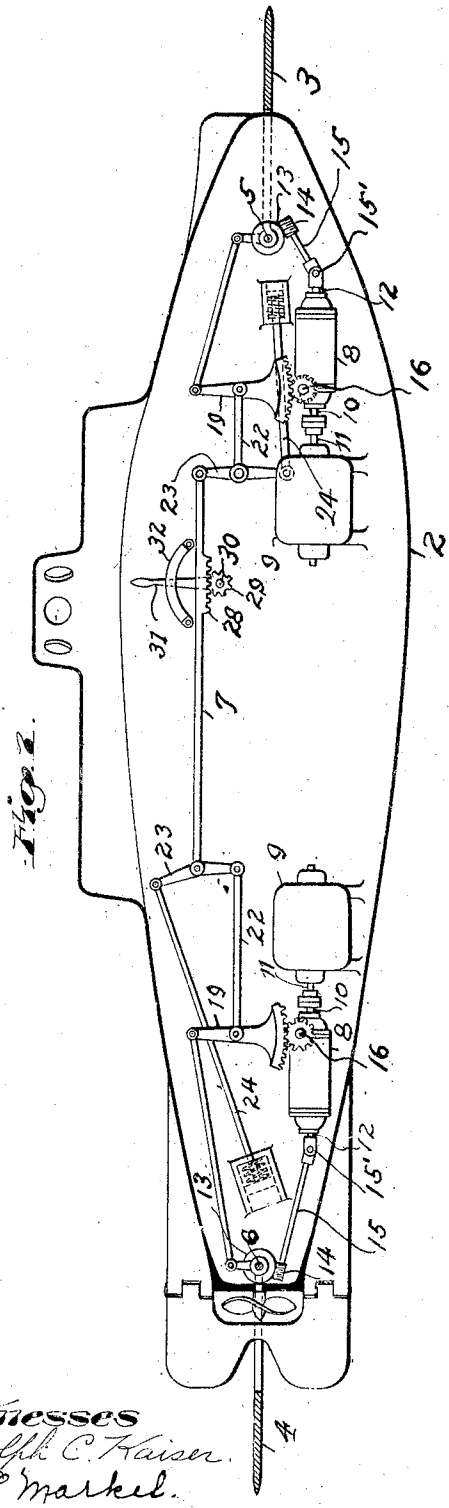


Fig. 2.

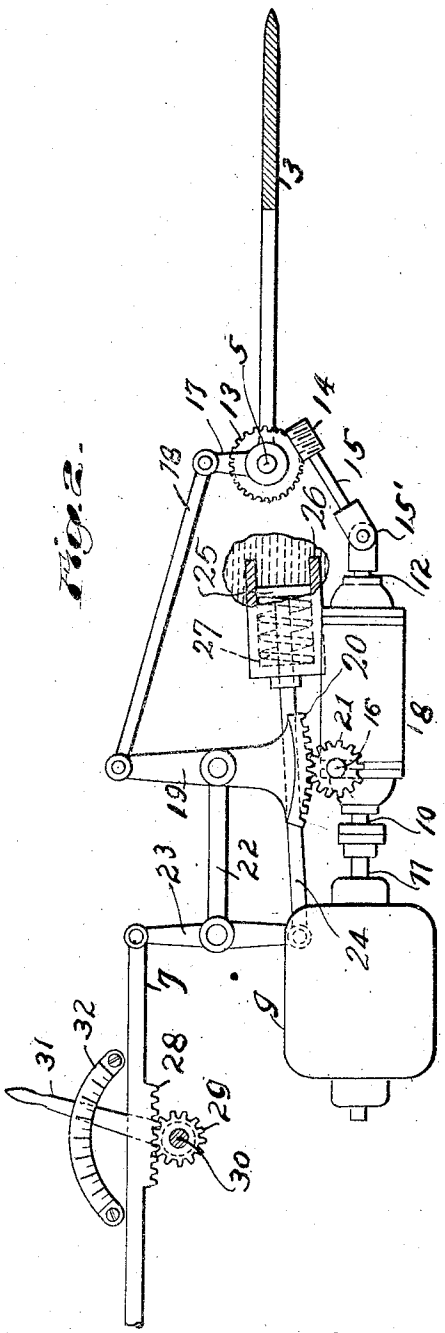


Fig. 3.

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UNITED STATES PATENT OFFICE.

REYNOLD JANNEY, OF NEW YORK, N. Y., ASSIGNOR TO THE WATERBURY TOOL COMPANY, OF NEW BRITAIN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

PRESSURE-CONTROLLED GOVERNING APPARATUS.

1,187,738. Specification of Letters Patent. **Patented June 20, 1916.**

Application filed March 13, 1915. Serial No. 14,297.

To all whom it may concern:

Be it known that I, REYNOLD JANNEY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Pressure-Controlled Governing Apparatus, of which the following is a specification.

This invention relates to what I shall for convenience term a pressure-controlled governing-apparatus, the object of the invention being to provide means of this character which is comparatively simple in construction and effective, positive and certain in action. An apparatus of this nature can be employed with utility in many different connections. As one illustration of a number it may be incorporated in or form part of a submarine, and in this particular case acts to automatically control the submergence of the vessel.

In the drawings accompanying and forming part of the present specification, I show in detail one of the several convenient forms of embodiment of the invention, which I will set forth in the following description to enable those skilled in the art to practise the invention. I do not limit myself to this disclosure; I may depart therefrom in radical respects within the scope of the invention defined by the claims following said description. As a matter of fact while the apparatus is of prime utility when used in conjunction with or forming part of a submarine, it can be employed with equal advantage in other connections.

Referring to said drawings: Figure 1 is a sectional view of a submarine combined with pressure-controlled governing-apparatus involving the invention. Fig. 2 is a detail view of a portion of the apparatus with the parts in different positions from those shown in Fig. 1 and on a scale larger than that of said Fig. 1.

Like characters refer to like parts in both views.

Certain of the elements of the apparatus as will hereinafter appear are duplicated which is advantageous in the particular use shown to which said apparatus is put. This duplication may not always be necessary.

In Fig. 1, I have shown a submarine 2 at the stem or bow and stern of which respectively are represented as mounted the depth-governing planes 3 and 4 which are horizontally disposed when in the neutral position as shown in said view. As illustrated said planes are fastened respectively to suitably mounted shafts 5 and 6. In the hull of the submarine 2 is mounted a suitable primary controlling member such as the longitudinally movable rod or bar 7 which coöperates with duplicate control mechanisms, one of which for example that on the right in Fig. 1, will be described in detail, this description applying as will be inferred, precisely to the other. One of the control mechanisms is preferably located at or near the bow of the vessel and the other at or near the stern.

Referring now in detail to Fig. 2 the control mechanism there shown comprises an actuating device such as the hydraulic variable speed gear 8 and suitable operating means therefor such as the electric motor 9. The shaft 10 of the A-end of said hydraulic variable speed gear is connected with the armature shaft 11 of the motor, the B or driven shaft 12 thereof being operatively connected in some suitable manner with the plane 3. As shown the shaft 5 to which the plane 3 is rigidly connected has fastened to it the worm gear 13 in mesh with the worm 14 on the shaft 15 connected by a universal joint 15′ with the B or driven shaft of the hydraulic variable speed gear 8. The hydraulic variable speed gear 8 is provided with the rotary control shaft 16 which operates the regulator in the A-end. When said shaft 16 and regulator are in their neutral positions as shown in Fig. 1, the shaft 12 will be stationary. The control shaft 16 through suitable means, moves this regulator oppositely from its neutral position, the speed of the shaft 12 progressively increasing as the parts in question move from their neutral positions and the rotation of the shaft 12 corresponding with the direction of movement of said regulator and control shaft. The shaft 11 and hence the shaft 10 are continuously driven. The hydraulic variable speed gear briefly described together with its operating motor are both in themselves old, being like the corresponding parts shown in Letters Patent No. 924,787 granted to me June 15, 1909, and to which reference may be had.

Rigid with the shaft 5 is the crank arm 17 to the outer end of which one end of a follow up link as 18 is pivoted, the oppo-

site end of said link being likewise connected to one end of the floating lever 19. The opposite end of this floating lever 19 is provided with a segmental rack 20 in mesh with the pinion 21 rigid with the control shaft 16. One end of the link 22 is pivoted to the floating lever 19 between the ends thereof, the other end of said link 22 being connected to one end of the floating lever 23. The primary controlling member, rod or bar 7 to which I have already referred is pivoted at its ends to the complemental floating levers 23 between the ends thereof.

To the upper ends of the floating levers 23 are connected rods 24 extending from pistons 25 reciprocatory in cylinders 26 rigid with the hull of the submarine 2 opening into the sea preferably near the bow and stern of the vessel. The pistons 25 occupy positions which differ in accordance with the pressure of the water thereagainst, the greater the pressure the greater will be the amount of inward movement of the pistons. This pressure as will be obvious increases with the increase in submergence of the submarine. The pistons 25 constitute suitable pressure-controlled devices. As may be inferred they are movable inward by the pressure of the water and outward by springs 27 backing the same.

Any desirable means may be provided for operating the rod or bar 7 longitudinally. The means shown for this purpose will now be set forth.

The rod has between its ends rack teeth 28 in mesh with the pinion 29 fastened to the shaft 30 furnished with an operating hand lever 31 equipped with a suitable pointer to traverse the scale 32. The scale 32 in the case of a submarine is a depth-scale.

In Fig. 1 all the parts are shown as occupying their normal or neutral positions. It will be assumed that the submarine is moving on the surface and that it is desired to submerge the same. In this event the hand lever 30 is swung over until the pointer thereon is opposite the predetermined depth on the scale 32. Referring now to Fig. 2 it will be clear that when the hand lever 31 is thus operated the primary controlling member 7 is moved from its neutral position toward the right, thus causing the floating lever 23 to swing to the right on its pivot with the end of the rod 24 as a center. The link 22, therefore, thrusts the floating lever 19 to the right so that the segment 20 thereof acting on the pinion 21, will turn the control shaft and therefore the regulator or tilting box in the A-end of the hydraulic variable speed gear 8 to effect the rotation of the shaft 12 and therefore of the shaft 15, the worm 14 rotating the worm gear 13 and therefore the crank or plane shaft 5, and therefore, the plane 3, the latter being tipped or swung downward and the degree of angular movement of the plane 3 corresponding with the degree of movement of the controlling member or rod 7 and the lever 31. The plane, therefore, will be moved through an angle to secure the submergence of the submarine 2 toward a depth corresponding to the number on the scale 32. In Fig. 2 the parts are shown in the positions they occupy just after the lever 31 has been thrown over. It will be understood that when the lever 31 is operated in such manner that the plane 3 is immediately tipped downward so that the submarine can descend in the direction of the desired depth. As the plane 3 begins to swing downward the crank arm 17 is moved to the right carrying in a corresponding direction the follow up link 18 which acting upon the floating lever 19 returns the latter and hence the segment 20 forming a part thereof to the initial positions. This brings the control shaft 16 to its neutral position and stops the shaft 12 and the parts 15, 14 and 5 connected therewith and holds the plane 3 in an inclined position proportional to its position indicated by the hand lever 31.

Thus far two factors have governed the hydraulic variable speed gear, one being set into action by the primary controlling element 7 and the other by the plane 3. By the duplicate apparatus at the other end of the vessel, the plane 4 is tipped upward by the same movement of the lever 31. A movement of the hand lever 31 to the left would cause the plane 3 to tip upward and the plane 4 to tip downward. As the vessel changes its depth a third and pressure governed element acts upon the control shaft 16 to modify the direction and speed of the shaft 12 and parts connected therewith. As the vessel approaches the predetermined depth, the increased pressure of the water will thrust the pistons 25 inward, thereby correspondingly moving the rods 24 thereof and compressing the springs 27, the upper branches of the levers 23 being moved inward and the lower branches thereof being moved outward, thus causing through the intermediate links 22 the movement of the floating levers 19 to reversing positions and acting on the hydraulic gear 8 and intermediate parts in turn upon the planes 3 and 4 to restore said planes to horizontal positions or to reversed positions if the prescribed depth should have been exceeded.

It is evident that the interaction of the several parts will result in bringing the planes 3 and 4 to their horizontal positions and the control shafts 16 to their central or neutral positions when the vessel reaches the depth indicated by the lever 31 on the scale 32. The description of the operation has thus far referred chiefly to the downward

movement of the vessel; but it is evident that the movements of the hand lever 31 will cause the vessel to move upward or downward according to the direction of movement of the vessel forward or backward and according as the lever 31 is moved to the right or left.

It is evident that the rod 7 or its equivalent may be in sections and another lever 31 or analogous means provided so as to make the two sets of apparatus at each end of the vessel independently operable. Moreover, the two parts of the rod 7 or the like may be adjustably united so as to produce any desired relative effects on the sets of apparatus, these effects being controlled by the combined movements of the lever 31 and the adjustable connection.

The operation of the combined arrangements as shown in the drawings keeps the vessel on even keel during changes of depth.

What I claim is:

1. An apparatus of the class described comprising a hydraulic variable speed gear including a controlling device, a governing member operatively connected with the hydraulic variable speed gear, means for operating said controlling device at will to cause the hydraulic variable speed gear to move the governing member from its neutral position, and pressure controlled means acting upon said controlling device for returning said governing member to its neutral position.

2. An apparatus of the class described comprising a governing member, a hydraulic variable speed gear connected with said governing member and including a controlling device, means for moving said controlling device to cause the hydraulic variable speed gear to move the governing member oppositely from its neutral position, and pressure controlled means acting on said controlling device for returning said governing member to its neutral position from either of its shifted positions.

3. The combination in a submarine of a hydroplane, a hydraulic variable speed gear operatively connected with the hydroplane and comprising a controlling member operable to cause the hydraulic variable speed gear to move the hydroplane from its neutral to a shifted position, connections between the hydroplane and the controlling member for returning the controlling member to neutral position on the movement of the hydroplane from neutral position, and pressure controlled means for returning the hydroplane to neutral position when the submarine reaches a predetermined depth.

4. An apparatus of the class described comprising a governing member, a hydraulic variable speed gear operatively connected with the governing member and including a controlling member operable to cause the hydraulic variable speed gear to move the governing member from neutral position when said controlling member is moved from neutral position, means for returning said controlling member to neutral position on the movement of the governing member from neutral position, and pressure controlled means for returning the governing member to neutral position.

5. An apparatus of the class described comprising a governing member, a hydraulic variable speed gear operatively connected with the governing member and including a controlling member operable to cause the hydraulic variable speed gear to move the governing member from neutral position in opposite directions in accordance with the movement of the controlling member from neutral position, means for returning said controlling member to neutral position on the movement of the governing member from neutral position in either direction, and automatically operative means for returning the governing member to neutral position.

6. An apparatus of the class described comprising a governing member, a hydraulic variable speed gear operatively connected with the governing member and including a controlling member operable to cause the hydraulic variable speed gear to move the governing member from neutral position when said controlling member is moved from neutral position, means for returning said controlling member to neutral position on the movement of the governing member from neutral position, a device movable by pressure in one direction, for returning the governing member to neutral position, and spring means active against said device in opposition to the pressure.

7. An apparatus of the class described comprising a governing member, a hydraulic variable speed gear operatively connected with the governing member and including a controlling member operable to cause the hydraulic variable speed gear to move the governing member from neutral position when said controlling member is moved from neutral position, means for returning said controlling member to neutral position on the movement of the governing member from neutral position, and pressure controlled means acting against said controlling member to cause the controlling member to effect the return of the governing member to neutral position at a predetermined point.

8. The combination of a submarine, a swinging hydroplane, a hydraulic variable speed gear operatively connected with the hydroplane including a controlling member operable to cause the hydraulic variable speed gear to move the hydroplane from neutral position when said controlling member is moved from neutral position, a

manually operable member having a gear connection with said controlling member and also operatively connected with the hydroplane, and pressure controlled means acting against said manually operable member.

9. An apparatus of the class described comprising a hydroplane, a hydraulic variable speed gear operatively connected with said hydroplane and including a control shaft provided with a pinion, a floating lever provided at one end with gear teeth in mesh with said pinion, a connection between the other end of the floating lever and the hydroplane, a second floating lever, an endwise movable manually operable rod connected with the second lever between the ends thereof, a link connected with one end of said second floating lever and with the first floating lever between the ends thereof, a rod connected with the other end of the second floating lever, a piston connected with said rod, and pressure operable in one direction, and spring means acting against the piston in opposition to the pressure.

10. In a submarine, the combination of a depth directing member, a hydraulic variable speed gear involving a controlling member, said hydraulic variable speed gear being operatively connected with the depth directing member and said controlling member being adapted when moved from neutral position to cause the depth directing member to move from neutral position, manually operable means for moving said controlling member from neutral position, means operable with the depth directing member and adapted on the movement of the latter from neutral position to return said controlling member to neutral position, and means operative by the pressure of the water in which the submarine is submerged for acting on said controlling member to cause said variable speed gear to return said depth directing member to neutral position.

11. The combination in a submarine of a hydraulic variable speed gear, a depth directing member operatively connected with said hydraulic variable speed gear, the latter including a controlling member, means operable at will for causing the action of the controlling member to effect through the said gear the operation of said depth directing member, pressure operated means, and means governed by the pressure operated means and the depth controlling member for oppositely moving said controlling member.

12. The combination in a submarine of a hydroplane, driving means operatively connected with the hydroplane and comprising a controlling member operable to cause the driving means to move the hydroplane from its neutral to a shifted position, connections between the hydroplane and the controlling member for returning the controlling member to neutral position on the movement of the hydroplane from neutral position, and pressure controlled means for returning the hydroplane to neutral position when the submarine reaches a predetermined depth.

13. The combination in a submarine of a hydroplane, driving means, operatively connected with the hydroplane and comprising a manually operable controlling member settable to cause the driving means to move the hydroplane from a neutral to a shifted position, connections between the hydroplane and the controlling member for returning the controlling member to neutral position on the movement of the hydroplane from neutral position, and pressure controlled means acting against the controlling member to cause the driving means to effect the return of the hydroplane to neutral position when the submarine reaches a predetermined depth.

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

REYNOLD JANNEY.

Witnesses:
MARGARET H. SMITH,
ADELLA SEELYE.