E. P. ROBINSON.

CONTROLLING DEVICE FOR POWER DRIVEN GEAR.

APPLICATION FILED MAY 9, 1913.

1,086,464.

Patented Feb. 10, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

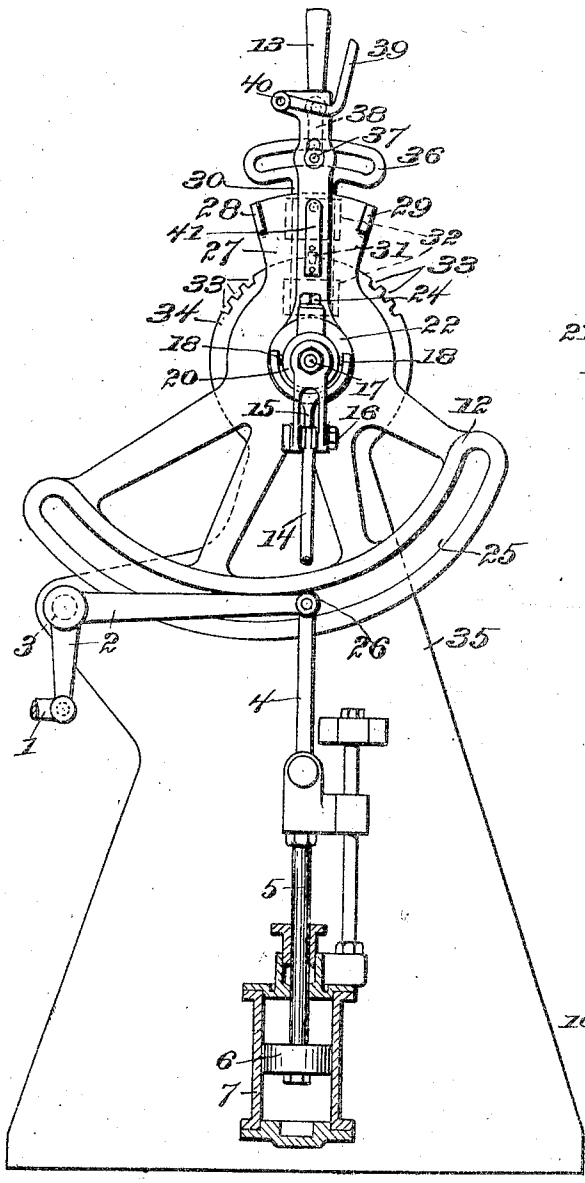
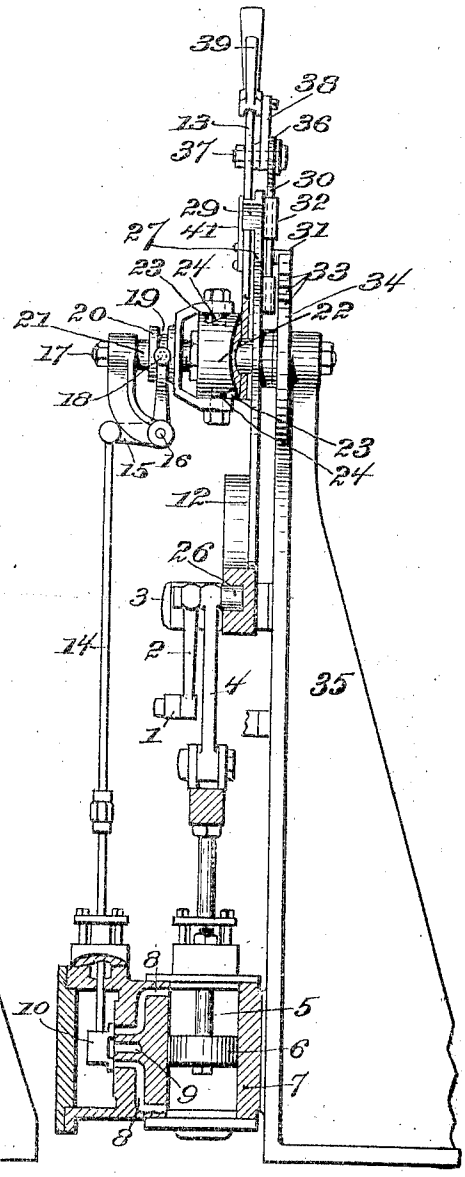


Fig. 2.



Witnesses:

Jas. J. Maloney.

W. E. Rowley

Inventor:

Edward P. Robinson

by A. J. Swenson

Atty.

E. P. ROBINSON.

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3 SHEETS—SHEET 2.

Fig. 3.

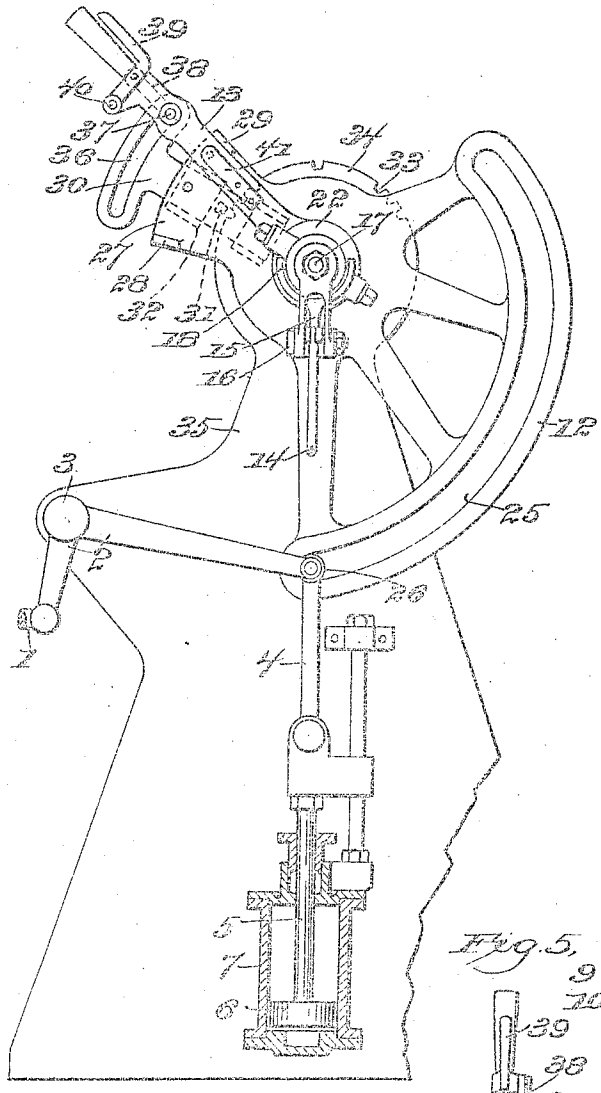


Fig. 4.

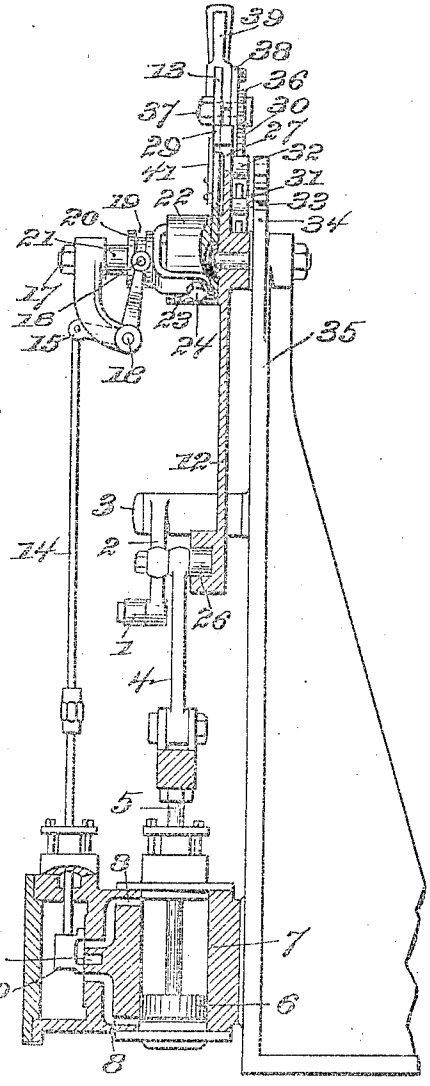
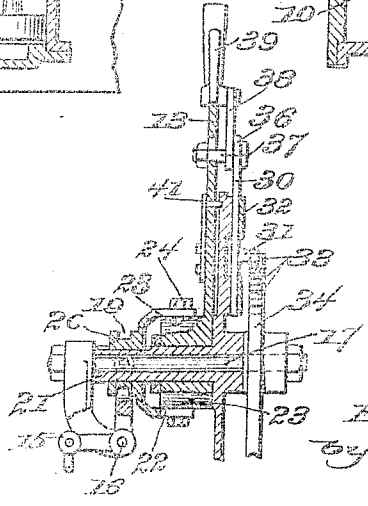


Fig. 5.



Witnesses:

Jas. J. Mahoney.

W. E. Rauber.

Inventor:

Edward P. Robinson,

By A. J. Livermore, Atty.

E. P. ROBINSON.

CONTROLLING DEVICE FOR POWER DRIVEN GEAR.

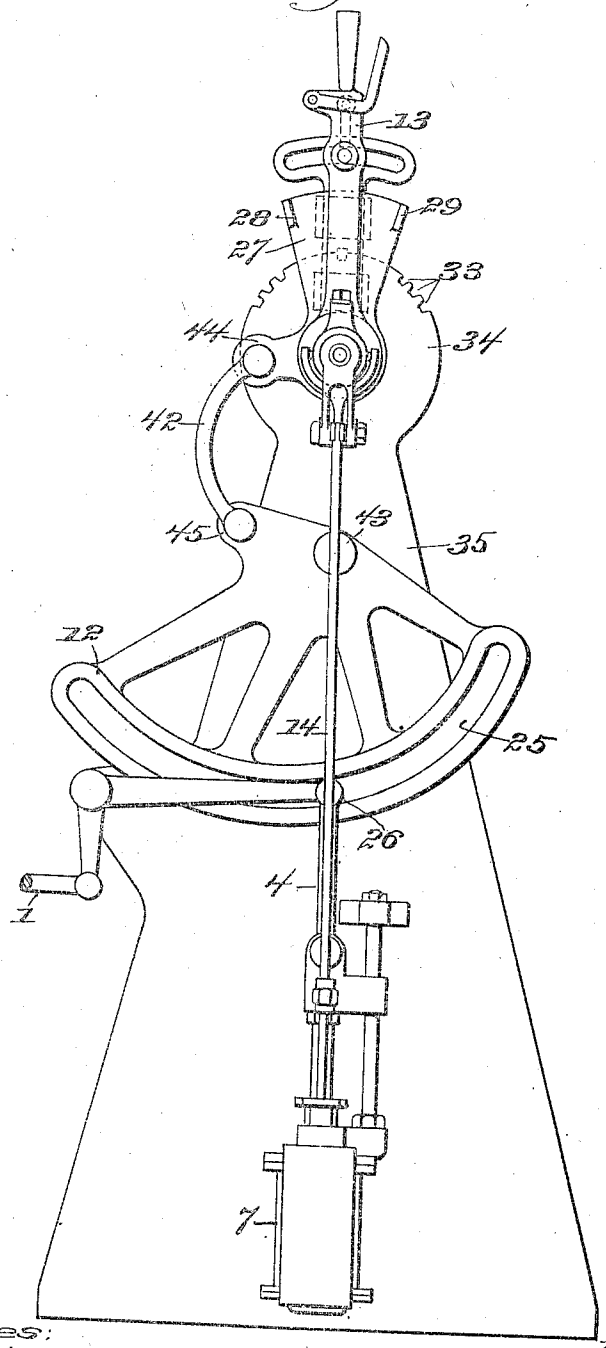
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3 SHEETS—SHEET 3.

Fig. 6.



Witnesses:
Jas. J. Malone.
W. E. Rowley

Inventor:
Edward P. Robinson
by H. G. Simmons
Atty.

UNITED STATES PATENT OFFICE.

EDWARD P. ROBINSON, OF MALDEN, MASSACHUSETTS.

CONTROLLING DEVICE FOR POWER-DRIVEN GEAR.

1,086,464. Specification of Letters Patent. Patented Feb. 10, 1914.

Application filed May 9, 1913. Serial No. 766,437.

To all whom it may concern:

Be it known that I, EDWARD P. ROBINSON, a citizen of the United States, residing in Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Controlling Devices for Power-Driven Gear, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a controlling device for a power driven gear, such as reversing gear for steam or gas engines, steam steering gear, or the like, in which it is desirable or necessary to hold the gear at times in intermediate positions.

In accordance with the invention, a fluid pressure motor such as a cylinder and reciprocating piston provided with a reversing D-valve is employed, the piston being directly connected with the gear which is to be driven, and the reversing valve being under control of a primary actuating device or reversing lever, as it will be hereinafter termed. The arrangement is such that a preliminary movement of the reversing lever in one direction or the other from the mid-position fully opens the reversing valve to bring about the desired movement under full pressure, the actual movement, however, being controlled by a stop member coöperating with the parts operated by the piston. In order to control the extent of movement and the final position of the parts connected with the piston, the position of the stop member is progressively changed, so that the extent of movement of the gear depends upon the extent of movement of the stop member, while the said gear is held in the desired position by the stop member when the latter is stationary. The said stop member is adapted to be operated by a reversing lever, provision being made for lost motion in the connection between said stop member and said lever, so that the operation of the lever on the reversing valve of the motor is completed before the movement of the stop member begins.

Figure 1 is an elevation of a controller embodying my invention, partly in section; Fig. 2 is a vertical section, partly in elevation, of the same, looking toward the left of Fig. 1; Figs. 3 and 4 are views similar, respectively, to Figs. 1 and 2, showing the parts in a different position; Fig. 5 is a sectional view, similar to the upper part of Fig. 2, but being fully, instead of partly, in section; and Fig. 6 is an elevation, similar to Fig. 1, but showing a modification.

With the understanding that the invention can be adapted for use in connection with any power driven gear, such as the starting and reversing mechanism of an internal combustion engine, the link-motion of a steam engine, the operation of heavy gate valves, &c., I have shown the invention, for purposes of illustration, as arranged and adapted for use with the ordinary link motion employed in connection with steam engines.

It is not deemed necessary to show the well-known link motion itself, it being sufficient for the understanding of this invention to state that the rod 1 is connected with the shifting part of the link motion, the said rod 1 being operated by an elbow lever 2 which is adapted to be rocked on its pivot 3 through the agency of a connecting rod 4 connected with the piston rod 5 of the piston 6. The piston 6 is located in a cylinder 7 and is adapted to be reciprocated through the action of fluid pressure admitted at opposite sides through inlet ports 8, between which is an exhaust port 9, these ports being controlled by the ordinary reciprocating D-valve 10, so that the piston will tend to be moved in one direction or the other, or to remain stationary, in accordance with the position of the D-valve.

In accordance with the present invention, the extent of movement of the piston and the parts operated thereby, and the position in which they stand, are positively determined by a stop member 12, which is herein shown as a traveling cam adapted to be operated by the reversing lever 13, after the D-valve has been operated by said lever to admit pressure to the cylinder.

In the construction shown, the D-valve 10 is connected by means of a rod 14 with an elbow lever 15 pivotally supported at 16 in a hanger secured on a stationary arm or

axle 17 which projects outward from the face of the main frame and constitutes the support for the several controlling devices employed. One arm of said elbow lever is forked and provided with inwardly projecting pins 18 which enter an annular groove 19 in a longitudinally movable member 20 splined on the hub 21 of the stop member 12. The longitudinal movement of the said member 20 which, through the elbow lever 15, operates the D-valve, is brought about by a preliminary movement of the reversing lever 13 which takes place before any movement is imparted to the stop member. To provide for such preliminary movement, and at the same time to utilize such movement for the operation of the D-valve, the reversing lever 13 has a hub 22 mounted on the hub 21 of the stop member 12, so as to be free to rotate thereon, and this hub 22 is provided with inclined cam grooves 23 which receive projections 24 shown as formed in the members of a fork connected with the movable member 20. Since the said member 20 is splined on the hub 21 of the stop member 12, which stop member during this preliminary movement is stationary, it is obvious that the independent movement of the reversing lever 13 through the action of the cam grooves 23 will throw the elbow lever 15 in one direction or the other, thereby opening the D-valve. The groove and pin connection between the movable member 20 and the elbow lever 15, allows the said movable member to rotate with the stop-member 12 after the reversing lever has been actuated without producing any change in the position of the elbow lever.

In response to the preliminary movement of the reversing lever, as above described, pressure is admitted to one end or the other of the cylinder 7, and tends to produce a movement of the piston 6 and the connecting rod 4 in one direction or the other. The movements of these parts, however, are mechanically limited and controlled by the movable stop member 12 above mentioned, which is herein shown as rotatable on an axis concentric with that of the reversing lever 13, and as having a cam groove 25 engaged by a projection 26 from the connecting rod 4. The arrangement is such that after the D-valve has been opened by the reversing lever, the said lever will become connected or engaged with the movable stop member 12, so that a further movement of the said lever will produce a movement of the stop member which changes the position thereof with relation to the rod 4. Such change of position obviously admits of a movement of the said rod in response to the pressure, this movement being limited by the stop member, while the position of the gear relative to the position of the reversing lever is determined by the shape of the cam groove.

As best shown in Fig. 1, the stop member 12 is provided with a radial projection 27 which has shoulders 28 and 29 lying in the path of the reversing lever 13, and being sufficiently far from the middle position of said lever to admit of the preliminary independent movement which controls the D-valve. At the end of the preliminary movement, one or the other of the shoulders is engaged by the reversing lever, so that a further movement of said lever in the same direction will carry the stop member with it.

In the position of the stop member 12, shown in Fig. 3, for example, the shoulder 28 has been engaged by the reverse lever 13, and the stop member 12 has been moved to its full extent in the direction to carry the link motion to the full gear ahead position; but the reverse lever 13 is shown as in the position it will be moved to when the engine is to be linked up, stopped, or reversed, the said lever being in contact with the shoulder 29 so that its further movement will carry the stop member 12 back toward the position shown in Fig. 1. During such movement, the rod 4 will be caused by the pressure in the cylinder 7 to move so far as the stop member will allow, and it will be held in whatever position it may be in when the movement of the reversing lever is stopped.

In order to lock the stop member in such running positions as are most commonly used, a latch 30 carrying a latching projection 31 is mounted in guides 32 on the part 27, the said latching projection being adapted to engage with notches 33 formed in a segment 34 suitably connected to and forming a part of the frame 35. In order that the said latch 30 may be conveniently operated in connection with the operation of the reversing lever 13 without, however, interfering with the preliminary movement thereof between the shoulders 28 and 29, the said latch is provided at its upper end with a grooved segment 36 in which engages a projection 37 secured to the actuating lever, and connected by a link 38 with a grip handle 39 pivoted at 40. In the preliminary movement of the reversing lever which controls the D-valve, the projection 37 slides in the groove of the segment 36, remaining, however, in operative engagement with the latch. When, therefore, the movement is to be continued for the purpose of operating the stop member 12, the latch 30 can be lifted by pressing the grip 39, as shown in Fig. 3, thus unlocking the said stop member. At the end of such movement as may be desired, the grip 39 may be released, allowing the latching projection 31 to engage any of the notches 33, and the reversing lever may then be left where it is, or returned to its mid-position, as desired. In practice, it is bet-

ter to restore the handle to mid-position, thus causing the D-valve to close both of the steam inlets to the cylinder 7, the reversing gear, in any event, being held in the position desired through the agency of the stop member 12. In view of this practice, the reversing lever is provided with a yielding spring catch 41 to hold it in mid-position.

It is obvious that by any suitable connecting means, the reversing lever and mechanism operated thereby can be located at a distance from the reversing gear, or other device which is operated thereby, and, in some cases, it may be desirable to slightly modify the rate of movement of the stop member 12 with relation to that of the reversing lever.

In the construction shown in Fig. 6, for example, the part 27, which is provided with the shoulders 28 and 29, instead of being directly connected with and forming a part of the stop member 12, is connected with the said stop member through a link 42, the said stop member being separately pivoted at 43. This link 42 is shown as connecting radial projections 44 and 45 formed, respectively, on the part 27 and the stop member 12, so that by duly proportioning these radial projections, a modified movement of the stop member may be produced. Furthermore, it may be desirable in some cases to locate the power cylinder and stop member, which are directly associated with each other, at some distance from the reverse-lever and reversing valve which are directly associated with each other. It is obvious that this may be accomplished by using suitable pipe connections for the fluid pressure, and suitable connecting mechanism for transmitting the movement of the reversing lever to the stop member.

Since the position of the gear is pivotally controlled by the stop member, it is obvious that the gear can be actuated by the stop member in case the power fails. The parts are always interconnected and under control of the reversing lever whether the power is available or not. The surface of the stop member is preferably so gradually inclined that the power-actuated piston will not of itself impart motion to the said member. If, however, the stop member should overtravel the reversing lever, *i. e.*, continue to move through the action of the pressure after the reversing lever has been stopped at the position desired, the movement of the stop-member relative to the reversing lever would close the reversing D-valve and shut off the power.

What I claim is:

1. A controller for a power-driven gear, such as a reversing gear which has a fluid pressure motor directly connected therewith, the said controller consisting of means for controlling the admission of pressure to the motor, combined with a traveling stop member coöperating with the gear when acted upon by the pressure, to limit the movement thereof.

2. A controller for a power-driven gear, such as a reversing gear, directly connected with a fluid-pressure motor, said controller comprising a valve to control the motor; means for fully opening said valve; and means operating after said valve has been fully opened for mechanically controlling the extent and speed of movement of the power-actuated device, without changing the position of the valve.

3. A controller for a power-driven gear, such as a reversing gear which is directly connected with a fluid pressure motor, said controller comprising a valve to control the motor; a reversing lever coöperating with said valve; a traveling cam for mechanically controlling the extent of movement of the piston when acted upon by the motor; and means for connecting said cam with said reversing lever after said valve has been opened, whereby the position of the cam is determined by the position of the lever.

4. The combination with a power-driven gear, such as a reversing gear; of a fluid-pressure motor directly connected therewith; a controlling valve for said motor; a reversing lever; a stop member for the power-driven gear, said stop member being coaxial with said reversing lever; and having shoulders adapted to be engaged by said lever after a predetermined movement thereof in either direction from mid-position; and a cam coöperating with said longitudinally movable member and operated by the reversing lever in the movement thereof between the said shoulders, said cam producing the longitudinal movement of the actuating device for the motor controlling valve.

5. In a controlling mechanism for reversing gear and the like, the combination with a reversing lever; of a stop-member operated by said reversing lever to determine the position of the reversing gear; and means for applying power to the reversing gear to assist in the movement thereof, the extent of which movement is determined by the position of the stop-member.

6. In a controlling mechanism for reversing gear and the like, the combination with a reversing lever; of a stop-member operated by said reversing lever to determine the position of the reversing gear; and means for applying power to the reversing gear to assist in the movement thereof, the extent of which movement is determined by the position of the stop-member; a fluid-pressure motor adapted to act directly on the gear; a reversing valve for said motor; and means for operating said reversing valve prior to the movement of the stop-member.

7. In a controlling mechanism for reversing gear and the like, the combination with a fluid-pressure motor directly connected to the gear; of a reversing valve for said motor; a reversing lever adapted to operate said valve; a stop-member comprising a traveling cam coöperating with the gear to control the movement of the gear in either direction; and means for operating said stop-member by the reversing lever in response to a continued movement thereof after the reversing valve has been operated.

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

EDWARD P. ROBINSON.

Witnesses:
JAS. J. MALONEY,
M. E. COVENLY.