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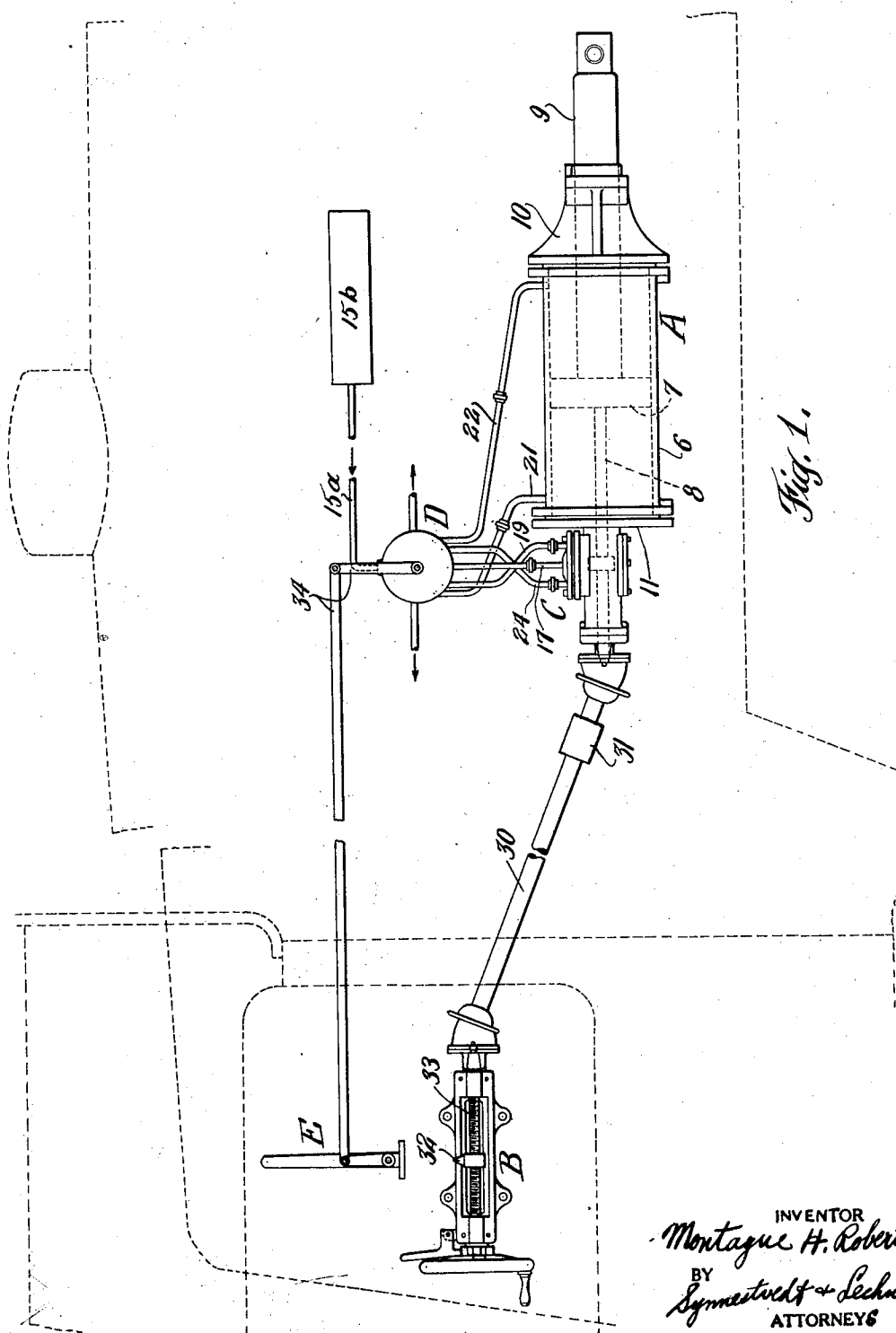
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POWER REVERSE GEAR

Filed May 23, 1925

3 Sheets-Sheet 1



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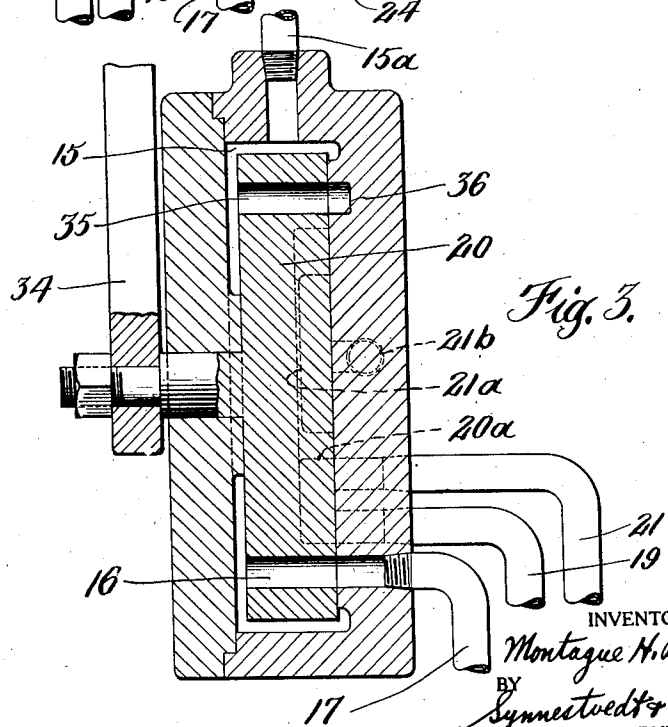
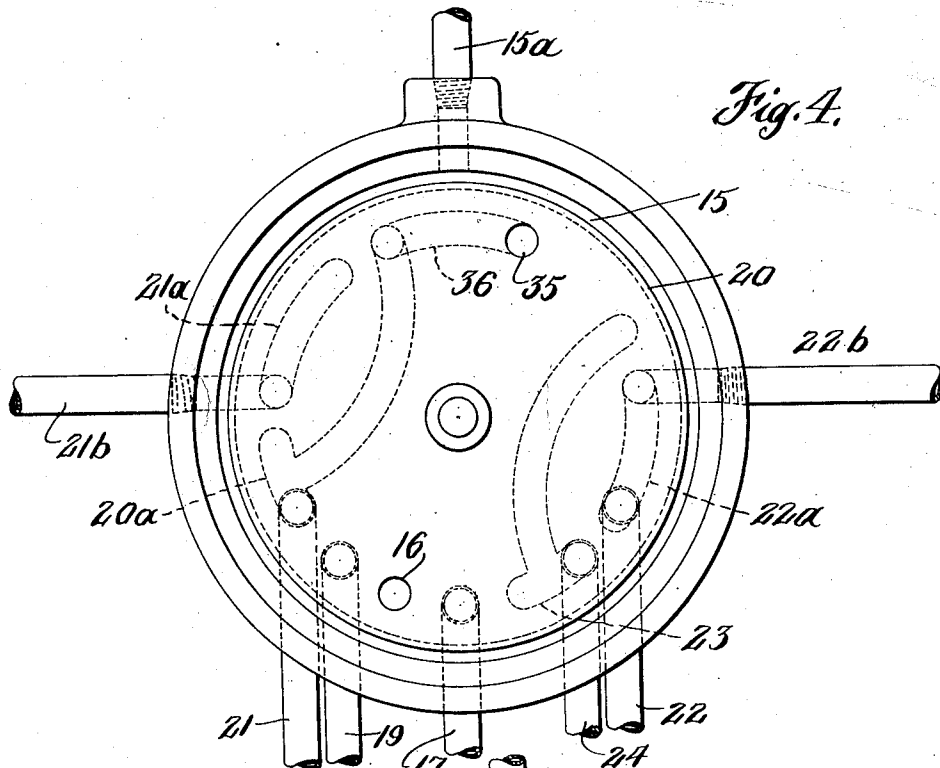
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

MONTAGUE H. ROBERTS, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO FRANKLIN RAILWAY SUPPLY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

POWER REVERSE GEAR.

Application filed May 23, 1925. Serial No. 32,307.

This invention relates to improvements in power reverse gear control and is especially useful in connection with gears of the type commercially known as "precision gears", although the advantages derived through my invention may also be had in other types of gears.

One of the primary objects of my invention is the provision of a gear having a double control, one being for normal running operation and the other for rapid operation to corner positions, as would be necessitated where considerable switching is done and in freight service where cars are to be frequently set out.

Another object of my invention is the provision of an auxiliary control for power reverse gears independently operable from the usual servo-governor control valve therefor.

A further object of my invention is the provision of an indicator for showing the position of cut-off effected by either control means.

How the foregoing together with such other objects and advantages as may hereinafter appear or are incident to my invention are realized, is illustrated in preferred form in the accompanying drawings, wherein

Fig. 1 is a fragmentary diagrammatic side elevation of a locomotive equipped with my improvements;

Fig. 2 is a fragmentary sectional view of a portion of a power reverse gear showing the auxiliary valve of my improvement applied thereto, and in normal position.

Fig. 3 is a cross section of the auxiliary valve taken on the line 3-3 of Fig. 2; and

Fig. 4 shows an operating position of the auxiliary valve.

Referring to the drawings the reference letter A represents the power reverse cylinder and its associated parts, the reference letter B the operating and cut-off indicating mechanism located in the cab of the locomotive for manipulating the control valve C of the gear, and the reference letter D the auxiliary valve operable from the cab by the lever E.

The particular form of gear herein illustrated and also the operating and indicating mechanism B, are of the same general construction as shown in my Patent No. 1,500,685 issued July 8th, 1924. In general the gear comprises a cylinder 6, a piston 7, a rod 8 having screw threaded engagement with the piston, a power reverse reach rod 9, a front

cylinder head 10, and a back cylinder head 11 adapted to house the control valve mechanism C which may be of any suitable servo-governor type, the valve 12 thereof in this instance being a D-valve.

The valve 12 controls the admission ports 13 and the exhaust ports 14 in the usual manner, connections however being made to the cylinder ends in the manner now to be described.

The auxiliary valve D hereinbefore referred to is preferably located on the side of the locomotive at a point near to the reverse gear A and is provided with a fluid inlet chamber 15 (see Figs. 2, 3 and 4) to which compressed fluid is led by the pipe 15^a leading from the source of fluid supply, in this instance an air reservoir 15^b. In the position of the parts as shown in Figs. 2 and 3 the auxiliary valve D is in normal position and the servo-governor valve 12 in position to cause the piston 7 of the gear to move forward, so that air admitted to the chamber 15 passes through opening 16 and pipe 17 to the valve chest 18 of the control valve mechanism C. Due to the right-hand admission port 13 being uncovered the air passes from the chest 18 through the port 13 and pipe 19 leading to the channel 20^a in the underside of the valve disc 20 of the auxiliary valve, and thence through the pipe 21 leading from the channel 20^a to the rear end of the reverse gear cylinder 6. Exhaust from the forward end of the cylinder takes place through similar connections namely pipe 22, channel 23, pipe 24 and port 13 which is in communication with the atmosphere by means of the cavity 25 in the D-valve 12 and the exhaust port 14.

When it is desired to admit air to the forward end of the cylinder the hand wheel of the valve operating mechanism is turned to move the valve 12 to the right whereby air is admitted to such end from the valve chest 18 through port 13, pipe 24, channel 23, and pipe 22.

In connection with the operation of the valve mechanism C suffice it to say that the screw threaded rod carries an upwardly extending tongue-like member 26 by means of a suitable bearing permitting rotation of the shaft and is held relative against displacement by the collar portion 27 on the rod 8. The member 26 engages the valve 12 to shift it as the rod moves in either direction, such

movement being limited by the stops 28 and 29.

The rod 8 is turned by means of the hand wheel in the cab, through the medium of the universal connection 30 which connection is provided with a slip joint at 31 to take care of the backward and forward movement of the valve 12. For forward positions the threaded rod 8 is rotated to the right (if a left-hand thread is used and to the left if a right-hand thread is used) and the thread in engaging the piston 7 pushes the shaft rearwardly, the piston acting as a nut, carrying with it the valve 12, opening the right-hand admission port 13 and admitting pressure to the rear end of the piston as previously described. The piston now moves forward carrying with it the rod 8 and valve 12 bringing it to neutral position covering both admission ports and holding the piston in the selected position of cut-off.

The position of cut-off is indicated by the indicating finger 32, it being threaded on the rod 33 which is connected by the universal connection 30 to the rod 8 of the gear, the threads on the rod 33 being proportionate to the threads on the rod 8. Thus it will be seen that movement of the gear is proportionately indicated by the indicator finger 32.

In the operation of locomotives especially in freight service it often becomes necessary to make quick and numerous reverses and in order to be enabled to make such changes rapidly I have provided the auxiliary valve D, operating in the following manner.

Assuming that it is desired to move the piston 7 quickly forward, the lever E, located in the cab is thrown forward which in turn rotates the valve disc 20 by reason of the connection 34, to the position indicated in Fig. 4. With the auxiliary valve D in this position the pressure fluid passes from the inlet chamber 15 through opening 35, channel 36 in the body of the valve, channel 20^a which in this position registers with the channel 36 and through pipe 21 directly to the rear end of the piston 7. It will be seen that when the disc 20 is moved to the position just mentioned, communication between the inlet chamber 15 and valve chest 18 is cut off and also between the valve chest 18 and the cylinder 6.

Thus by use of the auxiliary valve, air is admitted to the cylinder independently of the servo-governor valve 12 so that the piston will continue in its forward movement as long as the auxiliary valve remains in the position just described. In its forward movement the piston 7 carries the valve 12 with it through the connections previously described until the valve strikes the abutment or stop 29, there being springs 37, 37, provided between the valve and valve body to act as a cushion when the piston receives full pressure. Upon continuing its forward movement the rod 8 is spun

or revolved (the pitch of the screw threads of course being such as to permit it), which rotary movement is transmitted to the screw 33 of the operating mechanism B whereby an indication may be had of the position of the gear. Anti-friction bearings 38 are provided on either side of the shoulder 27 on the rod 8 for reducing the friction sufficiently to permit of such revolving motion.

Air from the front end of the cylinder is exhausted through pipe 22, cavity 22^a, on the underside of the valve disc 20, and outlet 22^b. Upon returning the lever E to its neutral position the direct air supply to the cylinder is cut off and air is supplied to the valve mechanism C for normal operation.

The auxiliary valve operates in a similar manner for rearward movement of the piston, in which case however the lever E is moved to the left effecting communication through opening 35, channel 36, channel 23, and pipe 22, exhaust in this instance taking place through pipe 21, cavity 21^a and pipe 21^b.

From the above it will be seen that full reverse of the locomotive can be accomplished very rapidly and that the usual efforts necessary to make the reversal through the usual reverse gear operating mechanism may be eliminated.

I claim:—

1. The combination with a pressure fluid operated power reverse gear having a servo-governor control valve for normally operating the gear, of a manually operated control valve for operating the gear independently of said servo-governor valve, and a common source of pressure fluid for the valves, said manually operated valve when in normal position admitting operating fluid to the servo-governor valve, and when in operating position cutting off said fluid from the servo-governor valve.

2. In a power reverse gear the combination of a cylinder, a piston, a controlling valve manually operable and also operable by the piston when the piston moves to return said valve to its neutral position, a chest for said valve, a source of pressure fluid supply, and means normally admitting pressure fluid from said source to said valve chest for operating the gear by the aforesaid controlling valve, said means being movable to cut off such admission and to directly supply pressure fluid to the cylinder.

3. The combination with a locomotive power reverse gear having a valve chest, control valve and connecting means between the piston and valve, of means including valve controlled passages whereby fluid pressure may be supplied indirectly to the power cylinder through the valve chest or directly to the power cylinder, and cushioning means to prevent slamming of the valve when pressure is being directly supplied to the power cylinder.

4. The combination with a locomotive power reverse gear having a valve chest and control valve, of means including valve controlled passages whereby fluid pressure may be supplied indirectly to the power cylinder through the valve chest or directly to the power cylinder, together with an indicator mechanism indicating the position of cut-off irrespective of whether the pressure is supplied indirectly or directly.

5. The combination with a locomotive power reverse gear having a cylinder, a piston, a valve chest, and a control valve for the piston, of means including a valve and passages controlled thereby leading from said valve to the reverse gear valve chest and from said valve to the reverse gear cylinder whereby fluid pressure may be supplied indirectly to the reverse gear cylinder through the reverse gear valve chest or directly to the reverse gear cylinder.

6. In a power reverse gear, the combination of a cylinder, a piston, a valve for controlling the admission and exhaust of pressure fluid to said cylinder, said valve being manually operable and also operable by the piston when the piston moves to return said valve to its neutral position, and an auxiliary valve also controlling the admission and exhaust of pressure fluid to said cylinder, said valves having common passages for effecting such control and the auxiliary valve having a position connecting the passages for control thereby, and a position for effecting control by the first mentioned valve.

7. In a power reverse gear, the combination of a cylinder, a piston, a valve for controlling the admission and exhaust of pressure fluid to said cylinder, said valve being manually operable and also operable by the piston when the piston moves to return said valve to its neutral position, and an auxiliary valve also controlling the admission and exhaust of pressure fluid to said cylinder, said valves having common passages for effecting such control and the auxiliary valve having

a position for connecting the passages for control thereby for rapid operation of the gear to corner position and a position for effecting servo-governor control by the first mentioned valve.

8. In a power reverse gear, the combination of a cylinder, a piston, a screw operated servo-governor for controlling the admission and exhaust of pressure fluid to said cylinder, and a lever operated control valve also controlling the admission and exhaust of pressure fluid to said cylinder, said valves having common passages for effecting such control and the lever operated valve having a position for connecting the passages for rapid operation of the gear to corner positions through the medium of the lever operated valve and a position for effecting servo-governor control through the medium of the first mentioned valve.

9. A fluid operated power reverse gear including a cylinder, a piston, a double fluid control for the gear, and fluid passages common to both controls for admitting pressure fluid to said cylinder, one control being a servo-governor valve and the other a valve manually operable for rapid operation of the gear to corner positions.

10. The combination with a locomotive power reverse gear having a cylinder, a piston, a valve chest and control valve for the piston, of valve means and passages controlled thereby leading from said valve means to said valve chest and from the valve means to said gear cylinder whereby pressure fluid may be supplied indirectly to the reverse gear cylinder through the valve chest or directly to said cylinder, together with an indicator mechanism operatively connected to said piston for indicating the position of cut-off irrespective of whether the pressure is supplied indirectly or directly.

In testimony whereof, I have hereunto signed my name.

MONTAGUE H. ROBERTS.