J. RANK.

LINK OPERATING MECHANISM FOR LOCOMOTIVES.

APPLICATION FILED JAN. 27, 1913.

1,140,481.

Patented May 25, 1915.

2 SHEETS—SHEET 1.

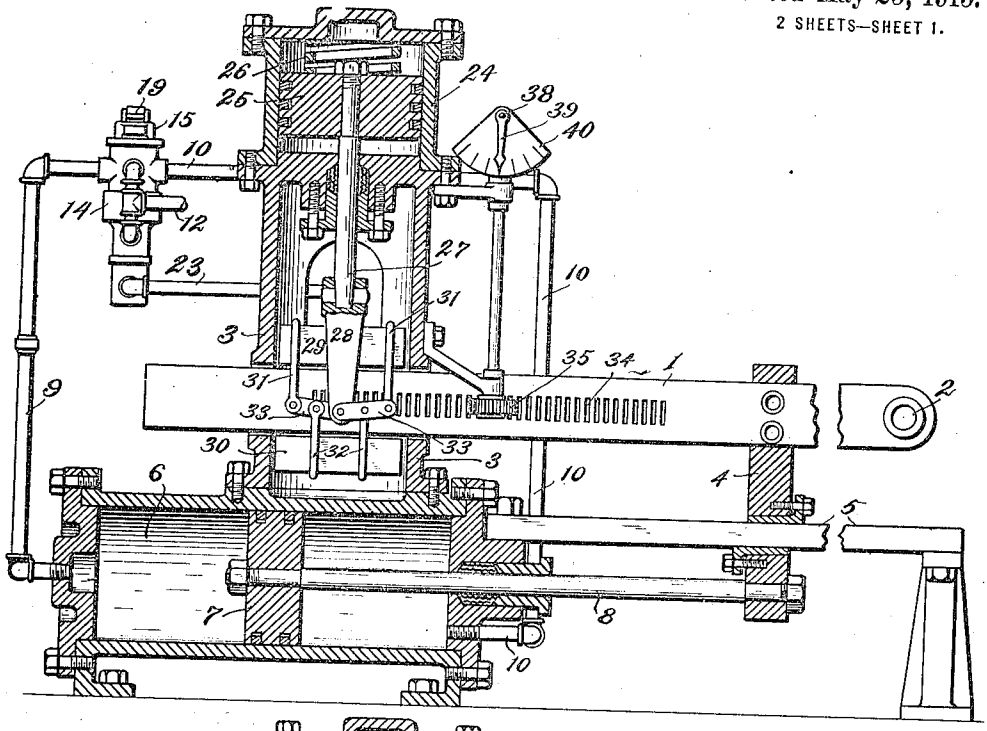


Fig. 1.

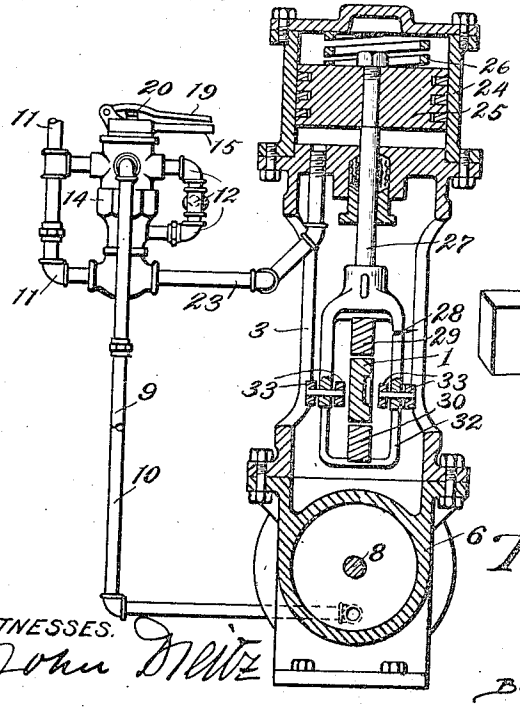


Fig. 2.

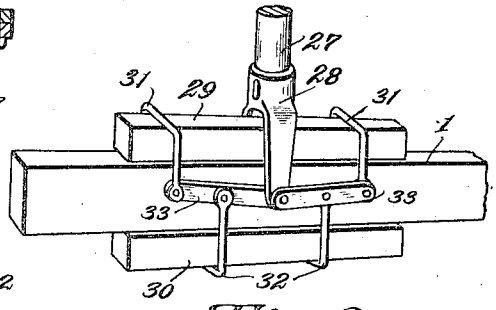


Fig. 3.

WITNESSES.

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2 SHEETS—SHEET 2.

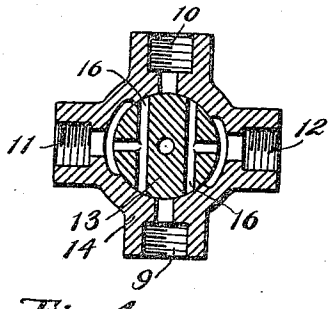


Fig. 4.

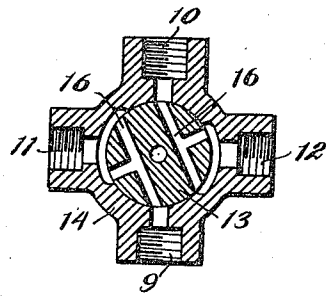


Fig. 5.

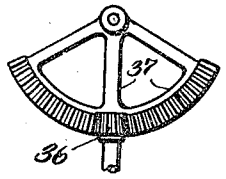


Fig. 8.

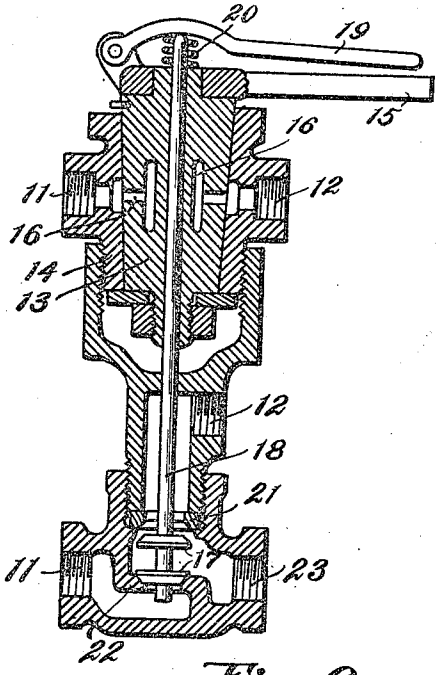


Fig. 6.

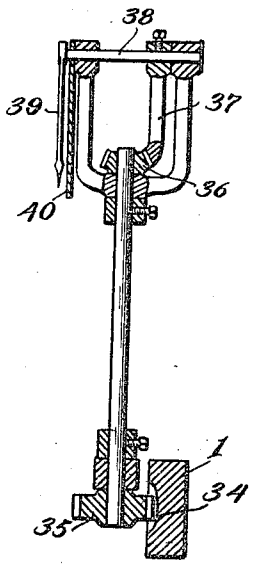


Fig. 7.

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LINK-OPERATING MECHANISM FOR LOCOMOTIVES.

1,140,481. Specification of Letters Patent. Patented May 25, 1915.

Application filed January 27, 1913. Serial No. 744,389.

To all whom it may concern:

Be it known that I, JOHN RANK, a citizen of the United States, and a resident of Olympia, in the county of Thurston, State of Washington, have invented a new and useful Link-Operating Mechanism for Locomotives, of which the following is a specification.

This invention relates to the mechanism for operating the controlling links of a steam engine and has special reference to locomotive engines.

The objects of this invention are to provide an apparatus which is completely under the control of the engineer and by means of which he may shift the position of the link mechanism of his engine to control it without having to apply a great force thereto; which will immediately lock itself in whatever position it may be in as soon as he removes his hand from the controlling lever; which will indicate the exact relative position of the link mechanism at all times; and which is strong, effective and durable in form and arrangement.

I attain these and other objects by the devices, mechanisms, and arrangements illustrated in the accompanying drawing, in which—

Figure 1 is a vertical longitudinal section of the machine, showing only one bar of the link operating mechanism of the engine; Fig. 2 is a vertical transverse section thereof; Fig. 3 is a perspective view of the clamp; Figs. 4 and 5 are horizontal sections through the controlling valve showing it respectively in the closed and operative positions; Fig. 6 is a vertical section through the valve mechanism; Fig. 7 is a section through the indicating mechanism; and Fig. 8 is an elevation of the indicating quadrant and pinion.

Similar numerals of reference refer to similar parts throughout the several views.

The machine illustrated in the drawings is especially designed for use on locomotives for the operation of the reach rod by which the valve motion of the engine is controlled through the links thereof but it may be arranged for other uses as well, as for instance, the operation of a steering mechanism on a ship, the operation of a controlling mechanism on a flying machine, or in fact the operation of any mechanism which is to be moved intermittently and irregularly in either direction.

The bar 1, of the drawings, is the reach rod or reversing rod which is operated and controlled by the machine and is connected at its end to one arm secured to the lifting shaft of the link operating mechanism of the locomotive by a pin passing through the hole 2 therein. One end of the bar 1 passes through a portion of the frame work 3 of the machine, in which it is supported and guided so as to have an axial or longitudinal motion. A carrier plate or cross head 4 is secured to the bar 1 near the other end thereof and slides on a guide bar 5 fixedly secured in the machine and parallel with the bar 1. The position of the bar 1 is therefore controlled by the cross head 4. A cylinder 6 is mounted in the machine, having its axis parallel to that of the bar 1 and guide 5, and has a piston 7 therein, which is connected to the cross head 4 by means of a piston rod 8, as shown in the drawings. The piston 7 may be operated either by air pressure or steam pressure in the cylinder. The pressure on either side of the piston is controlled by means of a valve from which a pipe 9 leads to the rear end of the cylinder and a pipe 10 leads to the front end thereof. Pressure pipes 11 lead from the source of pressure supply (steam or air) to the valve, and exhaust pipes 12 lead therefrom as needed. The valve 13 is a cylindrical body, or is preferably slightly tapered, and fits snugly within the valve casing 14. This casing has four passages lying in the same plane and arranged equidistantly around it, into which the said pipes 9, 10, 11 and 12 are secured. The ports of the pipes 9 and 10 are opposite each other and lead directly through the casing 14 to the valve 13. The ports for the pipes 11 and 12 are also opposite each other and they are provided with circumferential cavities adjacent the valve 13 and leading on each side of the port toward the ports of the pipes 9 and 10. The valve 13 is provided with a handle 15 by means of which it may be turned on its axis within the casing 14. Two sets of passages 16 are formed in the valve 13 and extend to diametrically opposite points and are adapted to register

with the ports in the casing 14 so that either port 9 or 10 may be connected with either port 11 and 12, or may be shut off therefrom (Fig. 4). Thus it will be seen that if the valve is in the position shown in Fig. 4 the pressure on the two sides of the piston is equalized because the exhaust port is closed, but that when it is turned to the position shown in Fig. 5, a new pressure is admitted on the rear end of the cylinder 6 while the front end thereof is connected to the exhaust, thus causing the piston to travel forward, and that if the valve is reversed in position the pressure will be brought to the front end and the rear end will be exhausted thus causing the piston to travel rearward.

Now, in order to hold the bar 1 in any desired position, so that the vibration of the engine or machinery will not displace it, I provide a clamp which is normally in action but which is released when the engineer's hand is applied to the operating handle of the valve. This clamp is set by the pressure of the air or steam and is released as soon as the said pressure is withdrawn. The pressure is controlled by means of a double faced valve 17 mounted on a long stem 18 which passes through the center of the valve 13 and extends above the top thereof. A handle 19 is pivoted to the handle 15 above described in such a way as to always lie above it and so that both handles will be simultaneously grasped by the engineer when controlling the mechanism. A spring 20 raises the handle 19 slightly when the weight of the engineer's hand is removed therefrom. The handle 19 presses down on the end of the valve stem 18 and moves it downward when the engineer's hand is applied thereto. The double faced valve 17 is mounted between two opposite seats 21 and 22 in such a manner that normally, when the engineer's hand is removed from the handle 19, the valve 17 engages the seat 21 and this opens the passage through the seat 22 thus connecting the inlet pipe 11 (which also leads to this part of the valve mechanism) with the clutch pipe 23, but when the engineer grasps the handles 15 and 19, the valve 17 is lowered to its seat 22, thus closing connection between the pipes 11 and 23, but opening connection between the pipes 23 and 12, which also communicates with this part of the valve mechanism through the seat 21 and leads to the exhaust. A cylinder 24 is mounted in vertical position on the frame 3 and has a piston 25 therein, said piston being pressed downward by a spring 26 above it, but upward under the pressure of the air or steam delivered below it through the pipe 23. The piston rod 27 passes downward out of the cylinder 24 and has a forked head 28 at its lower end, said head spanning the bar 1 as shown in Fig. 3. The clamp consists of two blocks 29 and 30 mounted above and below the bar 1, respectively, and prevented from longitudinal motion by the frame 3 in which they are mounted, said blocks being drawn toward each other by means of the pairs of loops 31 and 32 which pass above and below them respectively. The ends of the two loops 31 are secured to the outer ends of four levers 33. The ends of the two loops 32 are secured to an intermediate point in each of said levers 33. The inner ends of said levers 33 are all secured to the ends of the forked head 28 of the piston rod. Thus when the piston 28 is down, the pressure below it having been reduced by the engineer in grasping the handle 19, the said levers 33 are inclined so as to release any strain on the loops 31 and 32, freeing the bar 1 from any gripping action of the blocks 29 and 30; but when the engineer's hand is removed from the handle 19, the pressure is admitted below the piston 25 and this raises the inner ends of the levers 33 and clamps the blocks 29 and 30 tightly on the bar 1 and since the blocks cannot move because of the frame 3, the said bar is held firmly in whatever position it might be in. This position is indicated to the engineer by means of a rack 34, cut in the bar 1, operating a gear 35 mounted adjacent to it, said gear operating a beveled pinion 36, suitably located, and engaging a quadrant gear 37 (Fig. 7). This gear 37 is mounted on an axle 38, to the other end of which a pointer 39 is secured. A suitably marked card 40 is mounted adjacent to the pointer. It is evident that as the bar 1 moves longitudinally, it will turn the gears 35, 36 and 37 proportionately to the distance and in the direction moved and that therefore the pointer 39 will move over the scale card 40 a corresponding proportionate distance.

Having described my invention, what I claim is:

1. In a machine of the class described, the combination with a bar adapted to be actuated longitudinally through a frame; of clamp blocks confined from longitudinal motion by the frame, said blocks being on opposite sides of and adapted to engage the bar; oppositely acting loops engaging said blocks and adapted to draw them into clamping contact with the bar; and fluid pressure actuated means whereby said loops are actuated.

2. In a machine of the class described, the combination with a bar adapted to be actuated longitudinally through a frame; of clamp blocks confined from longitudinal motion by the frame, said blocks being on opposite sides of and adapted to engage the bar; oppositely acting loops engaging said blocks and adapted to draw them into clamping contact with the bar; a cylinder;

a piston therein connected to said loops whereby the clamping pressure of the loops is determined by the position of the piston; a spring acting on the piston to release the clamping pressure of the loops; and means for admitting fluid pressure on the opposite side of the piston whereby the spring is compressed and the loops are actuated to clamp the bar.

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Witnesses:
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GEO. L. VAN ANTWERP.