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1,751,920

VALVE CONTROL FOR DRIVING ENGINES

Filed May 28, 1925

2 Sheets-Sheet 1

FIG. 1.

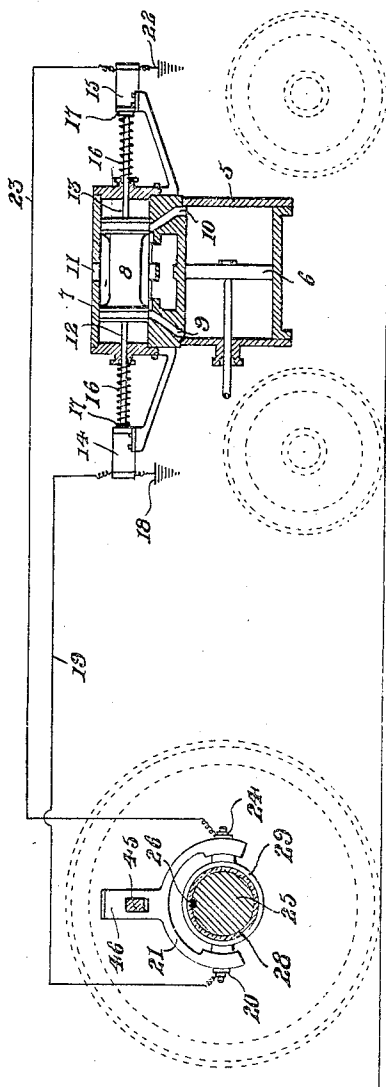


FIG. 5.

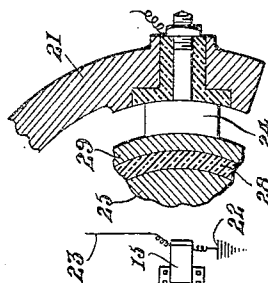


FIG. 2.

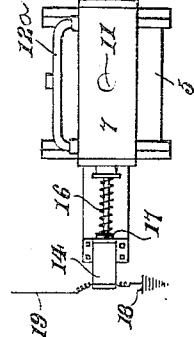
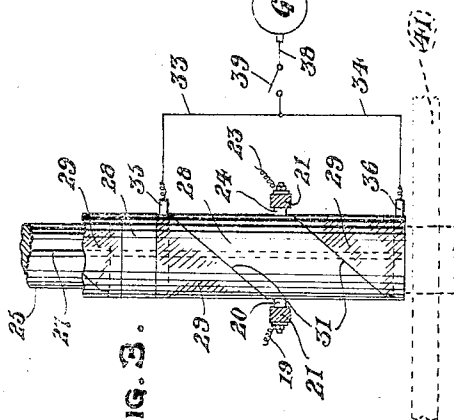


FIG. 3.



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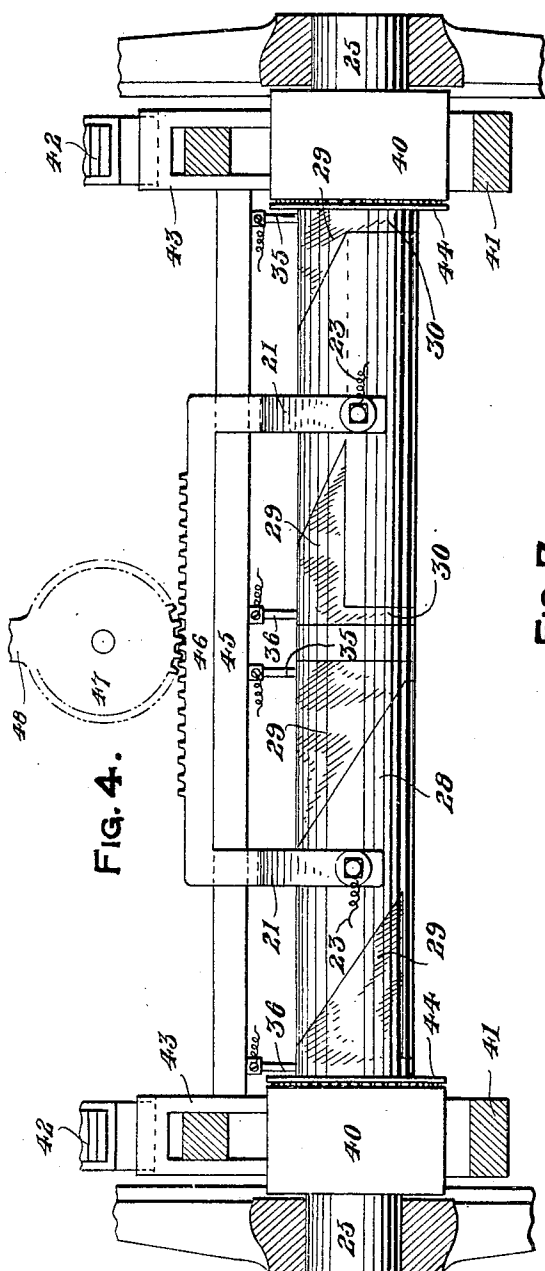
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2 Sheets-Sheet 2



4.

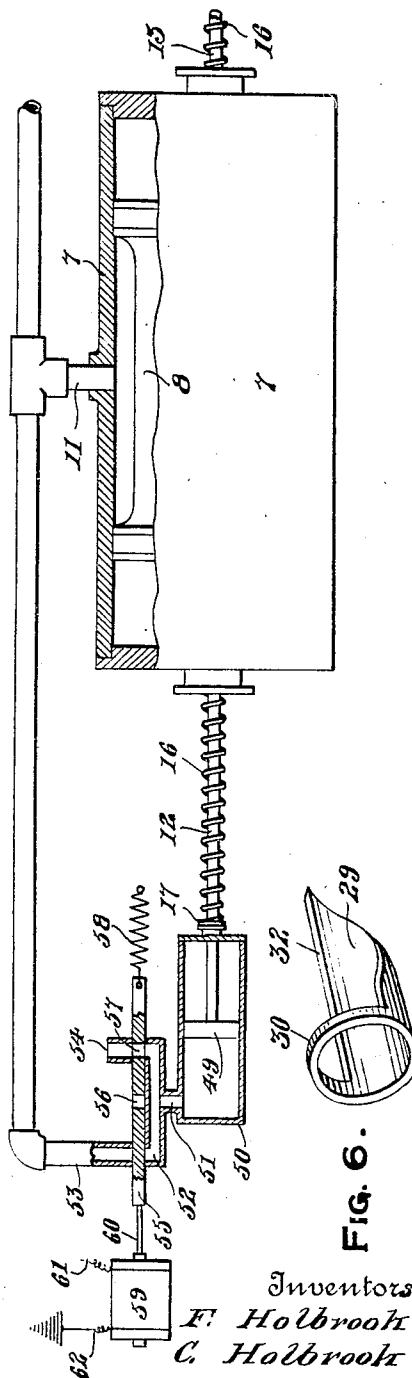


Fig. 6.

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UNITED STATES PATENT OFFICE

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VALVE CONTROL FOR DRIVING ENGINES

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This invention relates to new and useful improvements in valve controls for driving engines.

The primary object of the invention is to provide a valve control which is far more efficient than the types of valve gears or motions now in use, the substantial improvements consisting in reducing the number of parts, thereby minimizing possible failures and reducing the cost of operation; by reducing the number of movable parts, thereby reducing friction losses and providing more power for driving; by affording instant full port opening and closing for admitting and exhausting steam, and by permitting valve to be idled to render the engine inoperative.

A further object of the invention is to provide a valve control which may be applied to any steam engine using valve gear and with any number of valves and cylinders with the said valves being independently operated if desired.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a longitudinal sectional view of a steam engine and its valve with the improved form of control for the latter,

Figure 2 is a top plan view of the steam engine and valve with a portion of the control for the said valve,

Figure 3 is a fragmentary top plan view, partly in section, of the circuit making and breaking means for the valve control.

Figure 4 is a fragmentary elevational view of the circuit making and breaking means for the valve control,

Figure 5 is a vertical sectional view of a fragmentary portion of one of the circuit making and breaking brushes shown in Figs. 1, 3 and 4,

Figure 6 is a detail perspective view of one of the contacts which forms a part of the circuit making and breaking means, and

Figure 7 is a view partly in elevation and

partly in longitudinal section of a modified form of valve control.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the numeral 5 in Figs. 1 and 2 designates the cylinder of a steam engine having the piston 6 operatively mounted therein. Suitably associated with this cylinder 5 is a valve cylinder 7 having the central admission valve 8 mounted for reciprocation therein. The ports 9 and 10 form communications between the valve cylinder 7 and the opposite ends of the engine cylinder 5 and are shown in Fig. 1 as being closed when the valve 8 is arranged in a position intermediate the ends of the valve cylinder 7. These Figures 1 and 2 show the steam entrance 11 for the valve cylinder 7 and the steam exhaust 12^a for the said cylinder 7.

This central admission valve 8 is provided with the oppositely extending axially arranged valve stems 12 and 13 which project into the bores of the solenoids 14 and 15 respectively. Surrounding each valve stem is a spring 16 which bears at its inner end against the adjacent head of the valve cylinder 7 and at its outer end against a collar 17 rigidly fastened to the said stem. These springs function to return the valve 8 to its port closing position after having been reciprocated or moved in either direction by the solenoids 14 and 15.

The solenoid 14 is illustrated as having a ground connection 18 and a wire 19 which leads to a brush 20 carried by the yoke 21. The solenoid 15 is illustrated as being provided with a ground connection 22 and a wire 23 which extends to a brush 24 carried by the said yoke 21. In Figs. 1 and 3 the journal 25 is illustrated as having formed therein a longitudinally extending keyway 26 provided with a key 27 which is also slidably received within a keyway formed in the insulating sleeve 28 surrounding the journal so that said sleeve is caused to turn with the journal and the journal is allowed longitudinal play in the sleeve. This insulating sleeve is illustrated in Fig. 3 as having two contacts of the general shape illustrated in Fig. 6 embedded therein. Each one of

these contacts consists of a right-angle triangle contact portion 29 having formed integrally therewith a collector ring 30. These contacts 29 are intended to be of a suitable size to surround substantially one-half of the circumference of the sleeve 28 and to have their oblique or beveled edges 31 opposing each other so that their longitudinal edges 32 will be arranged on opposite sides of the sleeve. The brushes 20 and 24 are illustrated as being arranged on diametrically opposite sides of the sleeve 28 so that during the rotation of the journal 25 only one brush will be arranged in engagement with a contact at any time. These contacts are supplied with electricity from the generator G by the lines 33 and 34 which extend to the brushes 35 and 36 riding upon the collector ring portions 30 of the said contacts. This generator G is provided with a ground connection 37 and the supply line 38 leading to the branch wires 33 and 34 is provided with a control switch 39 by means of which the supply to the brushes 35 and 36 may be made or broken as desired. It will be seen that the brushes 20 and 24 are shown in Fig. 3 as being arranged in a circumferentially extending clear space on the insulating ring 28 which occurs between the adjacent ends of the contacts 29. It will be understood, therefore, that the brushes may be arranged as shown for rendering the solenoids 14 and 15 inoperative to permit idling of the said steam engine.

In Fig. 4 the circuit making and breaking means is illustrated as being associated with the journal 25 of a locomotive which is supported by the journal boxes or bearings 40 vertically slidably supported by the pedestal frames 41. The usual springs 42 are supported or mounted upon the journal boxes 40 by means of the spring saddles 43, as illustrated. The insulating sleeve 28 is mounted upon the journal 25 and extends between the journal boxes 40, the opposite ends of the sleeve 28 being held in spaced relation in respect to the journal boxes 40 by the anti-friction ball bearing structures 44 which will prevent any undesirable wearing away of the ends of the said sleeve.

It will be seen that the contacts 29 are embedded in this insulating sleeve 28 in a manner to arrange the same in longitudinally aligned pairs with the respective pairs advanced around the circumference of the sleeve substantially one-quarter or ninety degrees of the same.

Extending between the spring saddles 43 and suitably connected thereto is a slide bar 45 upon which is slidably arranged a pair of the yokes 21 which are connected by the rack 46. A pinion 47 having an operating arm 48 engages the teeth of the rack 46 and is intended to act as a manual control or adjusting means for the yokes 21. It is intended that this arm 48 be suitably connected to

mechanism extending to the cab of the locomotive for permitting the engineer to adjust the yokes as desired for arranging the brushes carried by the said yokes so that they will successively engage either the left or the right hand contact of either pair or so that they will be arranged, as shown in Figs. 3 and 4, to travel in the space provided between the adjacent ends of the contacts in each pair. The triangular shape of the contacts 29 will permit the brushes to be shifted longitudinally thereof for varying the length of time required for the brushes to travel the width of the contacts whereby valves 8 may be held in either shifted position for different lengths of time. The brushes 35 and 36 are shown in Fig. 4 as being supported by the slide bar 45.

In Fig. 7 there is shown a slightly modified form of valve actuating or controlling means. In this form, the valve stems 12 and 13 are intended to be provided with pistons 49, one of which is shown.

This illustrated piston is arranged within a small cylinder 50 having a port 51 entering its outer end. This port communicates with a pipe line 52 having a steam supply 53 connected to one end and a steam exhaust 54 connected to the opposite end. The supply line 53 communicates with the steam supply 11 for the valve cylinder 7. Associated with these lines 53 and 54 is a slide valve 55 having the ports 56 and 57 formed therein. The spring 58 is connected to its valve 55 and functions to arrange the same with the port 57 forming a communication between the pipe 2 and the exhaust 54. The solenoid 59 is connected by the stem 60 to the opposite end of the slide valve 55 and has the wire 61 which is intended to extend to one of the brushes carried by a yoke 21, in the same manner as the wires 19 and 23 for the solenoids 14 and 15 respectively. This solenoid 59 is provided with a ground connection 62 which functions in the same manner as the ground connections 18 and 22 for the said solenoids 14 and 15. It will now be understood that when the solenoid 59 is energized, the slide valve 55 will be moved against the tension of the spring 58 for causing the port 47 to be moved out of alinement with the exhaust 54 and for moving the port 56 into register with the supply line 53 for connecting the same to the pipe 52.

It is now believed that the functioning of the two different forms of valve controls embodying this invention will be clearly understood from the above detail description when taken in connection with the drawing; however, it might be well to note that these types of controls have many advantages not possessed by the types of valve gears or motions now in use. For instance, the engines arranged on opposite sides of a locomotive, one of which is illustrated in Fig. 1, may be in-

dependently used by disconnecting the pair of contacts employed for controlling the operation of the other engine by means of the switch control 39 shown in Fig. 3. This will permit the locomotive to be driven in case one engine fails. The moving of the valve 8 instantly into its full port opening positions will permit the full energy of the steam to be applied. The arranging of the yoke carried brushes in the clear spaces between the adjacent ends of the pairs of contacts will permit the springs 16 to arrange the valves 8 in port closing positions for rendering the engines inoperative. The left hand contacts of each pair are employed for operating the valves 8 to drive the locomotive forwardly and by shifting the yokes so that their brushes will engage the right hand contacts of each pair, the engines may be reversed for driving the locomotive rearwardly.

It is to be understood that the forms of this invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described the invention, we claim:—

Circuit making and breaking means, comprising in combination, an axle having a longitudinal keyway, an insulating sleeve keyed to said axle for relative longitudinal movement in respect thereto, said sleeve being held against lateral movement relative to the bearings, a plurality of contacts embedded in said sleeve and arranged in pairs, a collector ring formed integrally with each contact, a slide bar connecting said bearings, an electricity supply brush for each collector ring carried by the slide bar, a yoke for each pair of contacts slidably carried by said bar and straddling the sleeve and journal, a brush carried by each end of each yoke, and means for sliding said yokes in unison longitudinally of the slide bar and sleeve.

In testimony whereof we affix our signatures.

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