

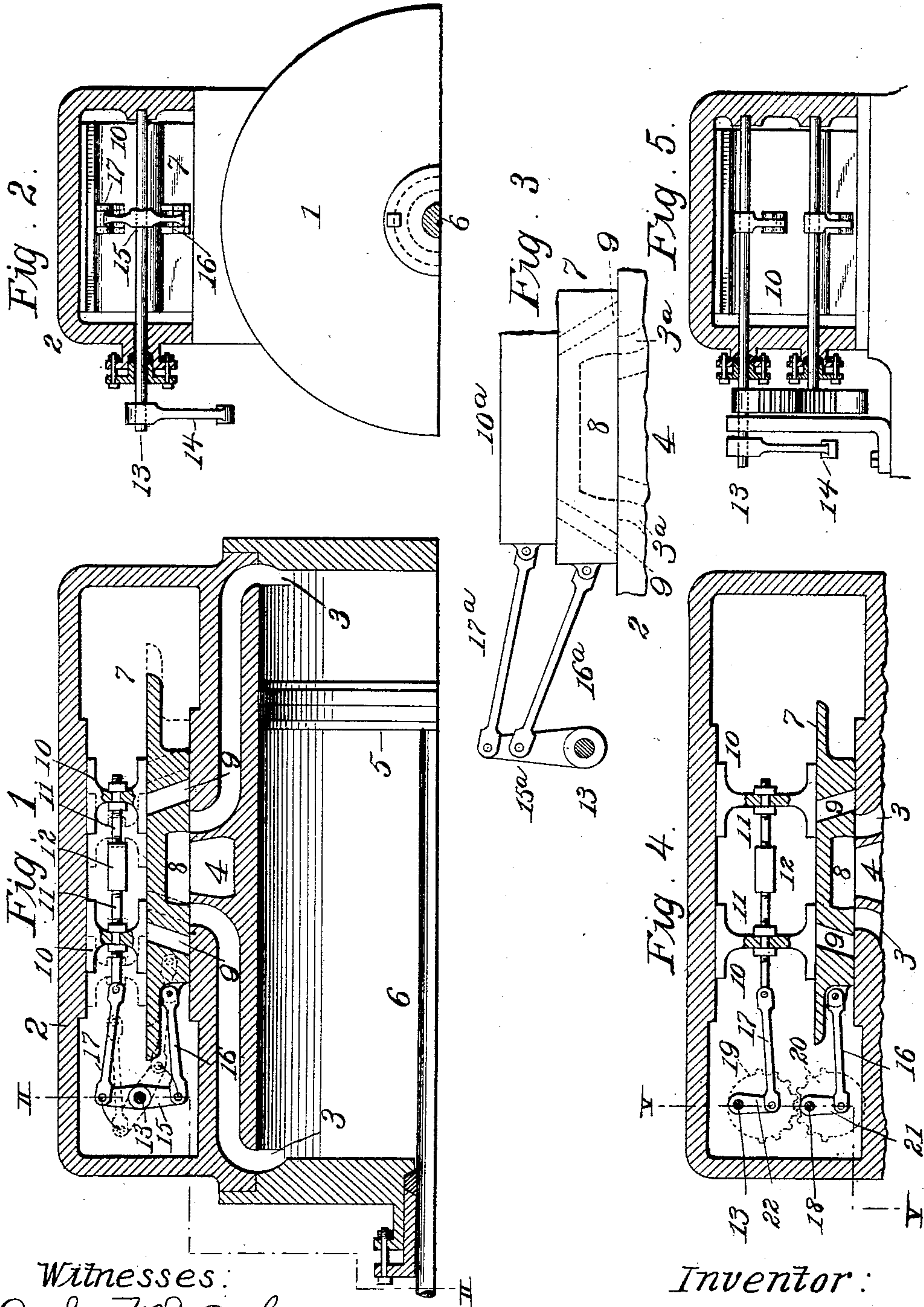
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Patented Oct. 8, 1901.

J. N. WARD.
CUT-OFF VALVE MECHANISM.

(Application filed July 13, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

JOHN N. WARD, OF KANSAS CITY, MISSOURI.

CUT-OFF-VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 684,143, dated October 8, 1901.

Application filed July 13, 1901. Serial No. 68,143. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. WARD, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Cut-Off-Valve Mechanisms, of which the following is a specification.

My invention relates to slide-valve mechanism. As now constructed and operated on locomotives where link-motion only has been available for working steam expansively the loss as compared with other means for steam distribution as employed in connection with stationary engines is variously estimated at from twenty-five to forty per cent. This loss is said to follow the failure to approximate boiler-pressure in the cylinder, too early release, too early exhaust closure, and excessive clearance, the loss being in part necessary to avoid too high pressure incident to early exhaust closure.

My object is to produce a structure whereby the advantages now possessed by stationary engines as regards variable expansion and economy of operation may in a great measure be also embodied in locomotives and analogous engines.

To this end the invention consists in certain novel and peculiar features of construction and combinations of parts, as hereinafter described and claimed, and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section of a cylinder and steam-chest provided with a valve mechanism embodying my invention. Fig. 2 is a section taken on the line II II of the same. Fig. 3 is a view, principally in elevation, of a modified construction. Fig. 4 is a vertical longitudinal section of a further modification. Fig. 5 is a section taken on the line V V of Fig. 4.

In the said drawings, 1 designates the cylinder, 2 the valve-chest, 3 the ports connecting with the ends of the cylinder, 4 the exhaust-port, 5 the piston, and 6 the piston-stem, all of these parts being of the usual or any preferred type.

7 designates a slide-valve arranged to operate in the usual manner in connection with the ports 3 and 4, and 8 the usual port therein for establishing communication between

one or the other of ports 3 and port 4, and said valve is provided at opposite sides of port 8 with supplemental ports 9, operating in conjunction with supplemental valves 10, said valves each carrying a screw-rod 11, which rods are connected together by a turnbuckle 12, so as to effect a variable adjustment of the valves when desired.

At one end of the main valve and extending through the steam-chest at right angles to the motion of the valve is a rock-shaft 13, carrying at its outer end a crank 14, adapted for connection with and operation by an eccentric. (Not shown.) Upon said shaft, within the steam-chest, a rock-arm 15 is mounted, its lower end being pivotally connected by link 16 with the main valve and its upper end by link 17 with one of the supplemental valves. With this construction it is obvious that the main and supplemental valves work in opposite directions, and therefore make it possible to get a quick full admission of steam to the cylinder. It also enables the area of the steam-ports to be increased and the clearance reduced. Furthermore, the main-valve travel needs only about half the adjustment necessary with a single valve for effecting variable cut-offs, which results in a more equal exhaust closure, and consequently reduced compression.

In Fig. 3 a construction is shown practically the same as in Fig. 1, except that the duplicate supplemental valves 10 are replaced by a single valve 10^a and also in the fact that the main and supplemental valves move in the same instead of in opposite directions, this movement, however, being differential as to speed, because the links 16^a and 17^a connect the main and supplemental valves with the rock-arm 15^a at different distances from its axis. In consequence the supplemental-valve movement is more rapid and greater than that of the main valve.

In Figs. 4 and 5 in lieu of the use of the rock-arm 15, projecting above and below its center of motion, I mount eccentrically upon shaft 13 a mutilated gear-wheel 19, and upon a companion shaft 18 I mount eccentrically a mutilated gear-wheel 20, said gears being so arranged that movement of gear 19 shall invariably impart movement to gear 20. The link 16, connected to slide-valve 7, is pivot-

ally connected at its opposite end to the lower end of a rock-arm 21, depending from shaft 18, and link 17, connected to the supplemental valves, is pivotally connected at its opposite
 5 end to rock-arm 22, depending from shaft 13, so that movement imparted to rock-shaft 14 shall through the medium of said eccentrically-disposed gear-wheels cause the main and supplemental valves to move in opposite di-
 10 rections. In fact, the action is practically the same as in Fig. 1, the only difference residing in a different style of gear.

As the advantages hereinbefore referred to which follow the use of main and supplemen-
 15 tal valves in stationary engines as now constructed are indisputable, it is unnecessary to dwell thereon and trace herein the course of the steam and of the valves, the essence of this invention lying in the construction which
 20 renders it practicable for these main and supplemental valves to be used on a locomotive or similar type of engine and be operated by a single eccentric.

From the above description it will be ap-
 25 parent that I have produced a slide-valve mechanism for locomotive and like engines which embodies the feature of advantage enumerated as desirable in the statement of invention and which is susceptible of changes
 30 in the form, proportion, detail construction, and arrangement of the parts without departing from its spirit and scope or sacrificing any of its advantages.

Having thus described the invention, what
 35 I claim as new, and desire to secure by Letters Patent, is—

1. In a slide-valve mechanism, the combination of a cylinder having the usual ports, the main valve provided with the usual port
 40 and supplemental ports at opposite sides of the main port, a supplemental valve or valves controlling the entrance of steam to said supplemental ports, a rock-shaft extending through the steam-chest at right angles to the
 45 valve travel, means for rocking said shaft, and instrumentalities linking said shaft to said valves, substantially as described.

2. In a slide-valve mechanism, the combination of a cylinder having the usual ports, the main valve provided with the usual port
 50 and supplemental ports at opposite sides of the main port, a supplemental valve or valves controlling the entrance of steam to said supplemental ports, a rock-shaft extending through the steam-chest at right angles to the
 55 valve travel, means for rocking said shaft, and instrumentalities connecting said shaft with said valves and adapted to operate them in opposite directions, substantially as described.

3. In a slide-valve mechanism, the combination of a cylinder having the usual ports, the main valve provided with the usual port
 60 and supplemental ports at opposite sides of the main port, a supplemental valve or valves controlling the entrance of steam to said supplemental ports, a rock-shaft extending through the steam-chest at right angles to the
 65 valve travel, means for rocking said shaft, a rock-arm mounted on and projecting above
 70 and below said shaft, and links pivotally connecting said rock-arm with said valves.

4. In a slide-valve mechanism, the combination of a cylinder having the usual ports, the main valve provided with the usual port
 75 and supplemental ports at opposite sides of the main port, a supplemental valve or valves controlling the entrance of steam to said supplemental ports, a rock-shaft extending through the steam-chest at right angles to
 80 the valve travel, a parallel shaft extending through the steam-chest, gear-wheels connecting said shaft, rock-arms projecting in the same direction from said shaft, and links
 85 pivotally connecting said rock-arms with the main and supplemental valves, substantially as described.

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

JOHN N. WARD.

Witnesses:

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