

H. DUBERT.  
VALVE GEAR.

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978,143.

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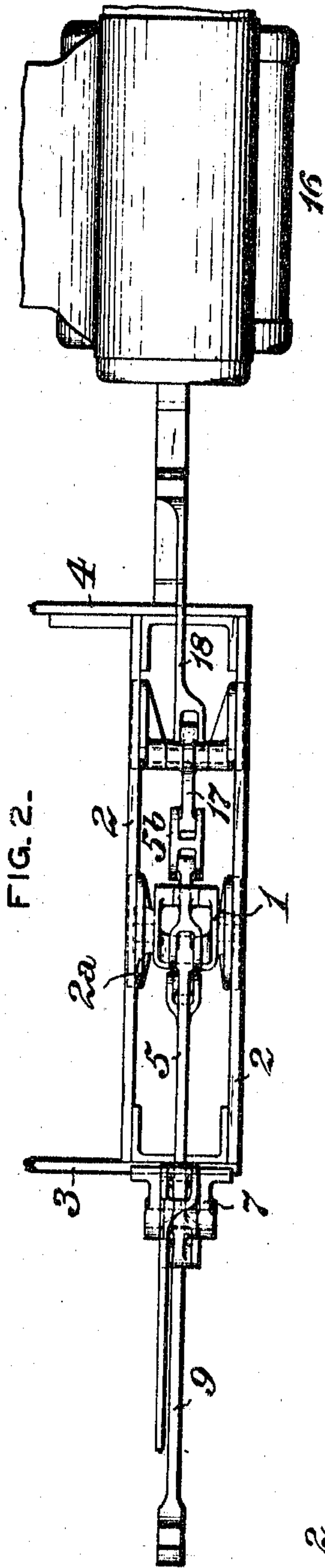


FIG. 2.

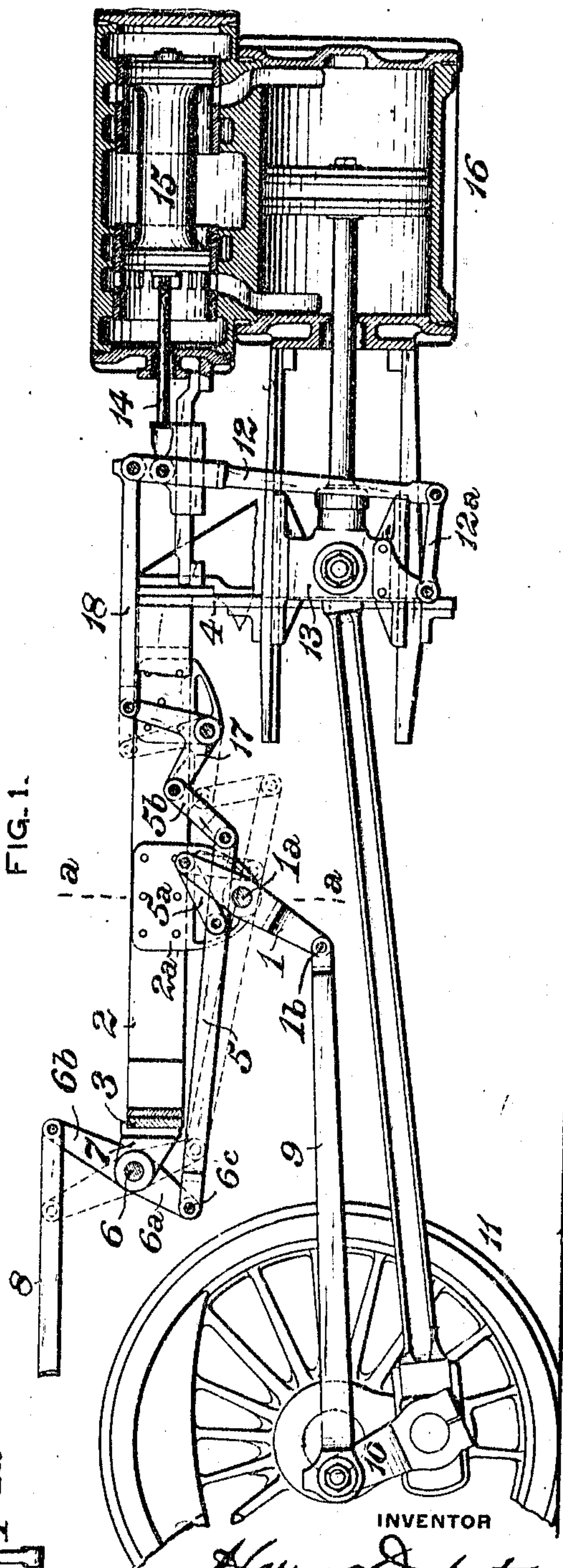


FIG. 1.

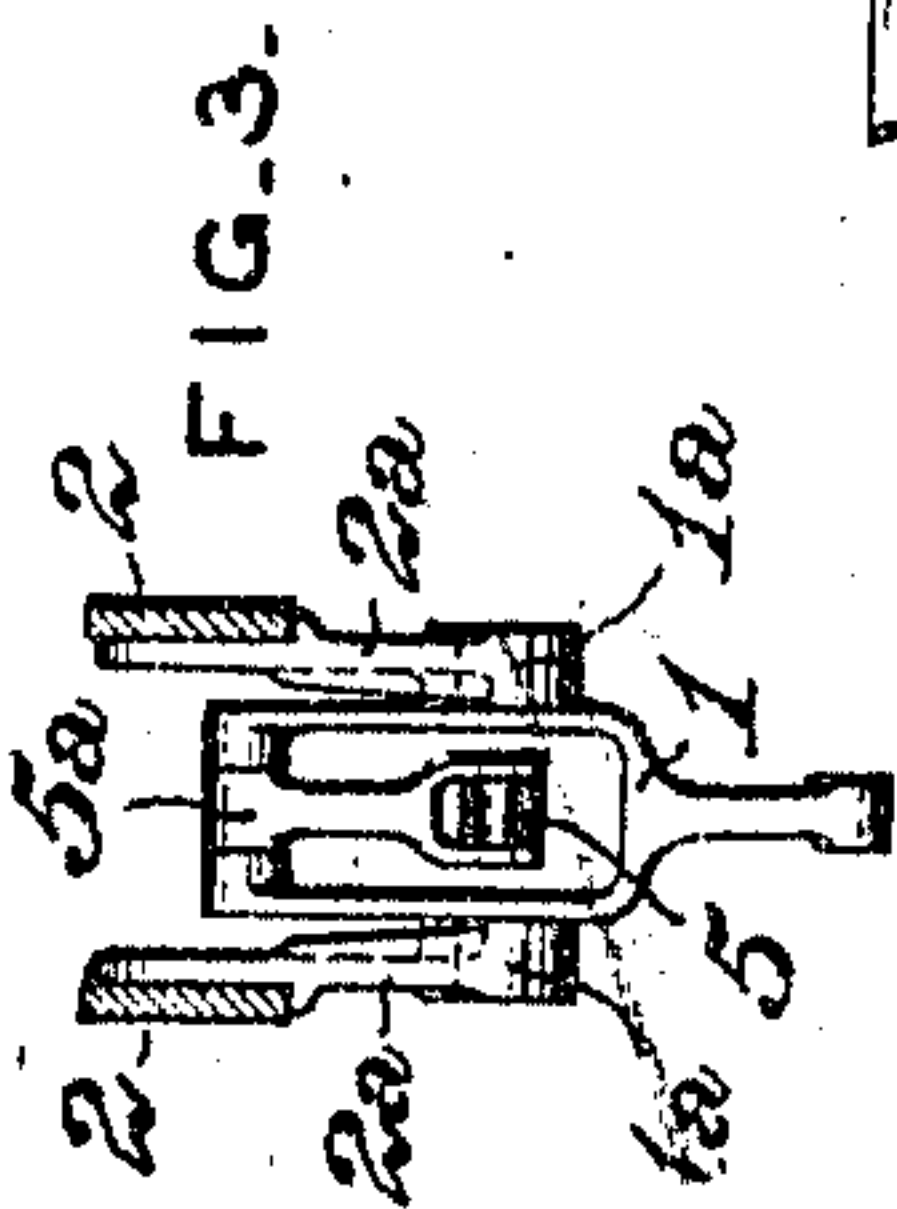


FIG. 3.

WITNESSES

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# UNITED STATES PATENT OFFICE.

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## VALVE-GEAR.

978,143.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, HARRY DUBERT, of Dunkirk, in the county of Chautauqua and State of New York, have invented a certain new and useful Improvement in Valve-Gears, of which improvement the following is a specification.

My invention more particularly relates to locomotive engine valve gears of the so-called radial type, and its object is to provide a valve gear of such type, which, while embodying all the advantages of those now in service, shall attain the additional ones of simplification in construction, capability of effecting quick port opening, and exemption from disturbance in operation by raising and lowering of the eccentric crank occasioned by inequalities in the track.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a side view of a valve gear illustrating an embodiment of my invention, as applied on a locomotive engine; Fig. 2, a plan view of the same; and Fig. 3, a transverse section on the line *a a* of Fig. 1.

In general operative principle, my improved valve gear accords with the "Walschaert" gear, now largely applied in railroad service, in being actuated by connection with a return crank on a locomotive driving wheel and with a cross head, respectively.

In the practice of my invention, the description of which is given of the gear on one side only of the locomotive, that on the opposite side being similar, I provide a rocker yoke, 1, comprising two parallel arms, connected at bottom in U form and having a central arm depending downwardly from their bottom connection. Trunnions, 1<sup>a</sup>, are formed on the outer sides of the parallel arms of the yoke, through which trunnions the yoke is journaled in bearing castings, 2<sup>a</sup>, secured to supporting bars, 2, which are, in turn, suitably fixed to the frame of the locomotive, as by being bolted to a frame cross tie, 3, and guide yoke, 4. The lower central arm of the yoke, 1, is coupled, by an eccentric rod, 9, to an eccentric crank or return crank, 10, fixed upon one of the driving wheels, 11, of the locomotive, and the location of the axis of the trunnions and the length of the lower arm of the yoke, are such that when the bottom pin, 1<sup>b</sup>, of said arm is at the middle of its arc of traverse

about the axis of the trunnions, said pin, by which the yoke is coupled to the eccentric rod, 9, will be in, or substantially in, line horizontally with the axis of the driving wheel to which the return crank of the eccentric rod is connected. Disturbance of valve movements by the raising and lowering of the eccentric crank, due to inequalities in the track, is thereby prevented. The upper arms of the yoke, 1, are coupled, by a downwardly and rearwardly extending link, 5<sup>a</sup>, to a longitudinally extending transmission bar, 5, the rear end of which is coupled by a pin, 6<sup>c</sup>, to an arm, 6<sup>a</sup>, fixed upon and projecting downwardly from a reverse shaft, 6, journaled in bearings, 7, secured to the frame cross tie, 3. The reverse shaft carries an upwardly extending arm, 6<sup>b</sup>, which is coupled, by a reach rod, 8, with a reverse lever (not shown) in the cab of the locomotive. The forward end of the transmission bar, 5, is coupled by a link, 5<sup>b</sup>, to the lower arm of a bell crank, 17, journaled on the supporting bars, 2, and the upper arm of said bell crank is coupled by a bar, 18, to the upper end of a combination lever, 12, the lower end of which is coupled, by a combination link, 12<sup>a</sup>, to the adjacent cross head, 13, of the locomotive. A valve stem, 14, upon which is fixed a steam distribution valve, 15, which is here shown as of the inside admission piston type, but which may be of any other known and preferred form, is coupled to the combination lever, 12, the valve, 15, controlling the admission and exhaust of steam to and from the adjacent cylinder, 16, of the locomotive.

In the operation of a valve gear, constructed substantially as above described, the transmission bar, 5, is, through its connection with the yoke, 1, raised and moved backwardly, or lowered and moved forwardly, when the reverse shaft, 6, is rocked in its bearings by the reverse lever, in accordance with the desired direction of forward or backward movement, respectively, of the locomotive, and to an extent governed by the degree of expansion or point of cut off to be effected. This movement of the transmission bar is, through the link, 5<sup>b</sup>, bell crank, 17, bar, 18, and combination lever, 12, transmitted to the distribution valve, 15, and correspondingly affects the desired direction and extent of its movements under the adjustment of the reverse lever for either forward or back motion.



Among the advantages of my invention, there will be recognized that of a positive connection of the transmission bar to the operating eccentric rod, instead of one through the intermediation of a block sliding in a segmental link, as in the ordinary construction. The slip of a block in a link being thereby avoided, positive movement is imparted to the transmission bar and connected distribution valve, in any and all positions to which the transmission bar may be moved for adjustment of the point of cut off in either forward or back motion. The simplicity of the mechanism and its capability of imparting quick opening movement to the distribution valve will also be apparent to those familiar with this subject matter, as will be the advantage of avoiding disturbance of the normal valve movements by the raising and lowering of the eccentric crank, which objection is marked in several of the prior constructions.

I claim as my invention and desire to secure by Letters Patent:

1. The combination, in a steam engine valve gear of the radial type, of an eccentric crank, a transmission bar, a valve stem coupled to the transmission bar, a double armed rocker yoke, journaled on a fixed support and coupled, at its opposite ends, to the eccentric crank and to the transmission bar, and means for imparting movement to the transmission bar relatively to the eccentric crank.
2. The combination, in a steam engine valve gear of the radial type, of an eccentric crank, a transmission bar, a valve stem coupled to the transmission bar, a double armed rocker yoke journaled on a fixed support and coupled, at its opposite ends, to the eccentric crank and to the transmission bar, respec-

tively, and an oscillatory reverse shaft coupled to the transmission bar and adapted to impart movement thereto relatively to the eccentric crank.

3. The combination, in a steam engine valve gear of the radial type, of a driving axle, an eccentric crank fixed thereon, a transmission bar, a valve stem coupled to the transmission bar, a double armed rocker yoke journaled on a fixed support and having a pin on its lower arm traversing in an arc the middle of which is substantially in line horizontally with the driving axle, the upper arm of said yoke being coupled to the transmission bar, an eccentric rod coupling the pin of the lower arm of the rocker yoke to the eccentric crank, and means for imparting movement to the transmission bar relatively to the eccentric crank.

4. The combination, in a steam engine valve gear of the radial type, of a driving axle, an eccentric crank fixed thereto, a double armed rocker yoke journaled on a fixed support, a transmission bar, a link coupling the upper arm of said yoke to the transmission bar, an eccentric rod coupling the lower arm of the yoke to the eccentric crank, a bell crank journaled on a fixed support, a link coupling said bell crank to the transmission bar, a combination lever actuated from the cross head of the engine, a valve stem coupled to the combination lever, a bar coupling the combination lever to the bell crank, and means for imparting movement to the transmission bar relatively to the rocker yoke and eccentric crank.

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Witnesses:

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