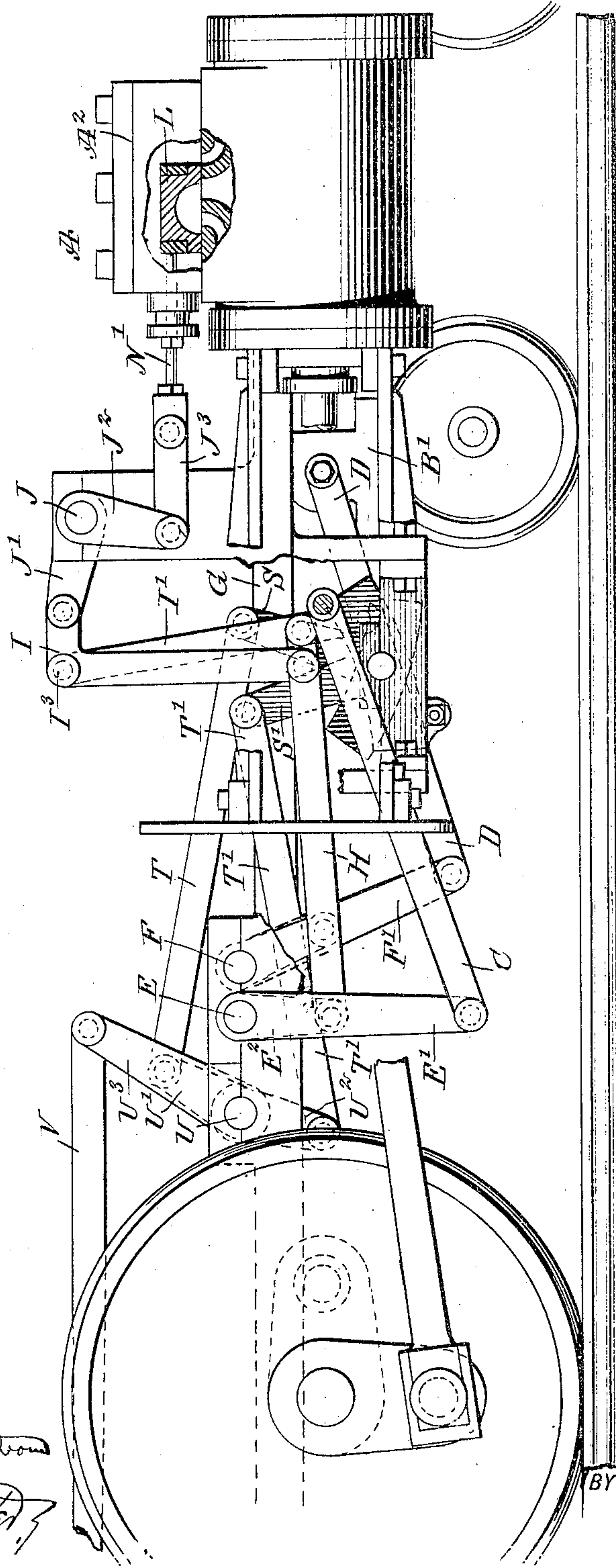


922,250.

E. L. BOWEN.
VALVE GEAR.
APPLICATION FILED JUNE 15, 1908.

Patented May 18, 1909.
3 SHEETS—SHEET 1.

Fig. 1



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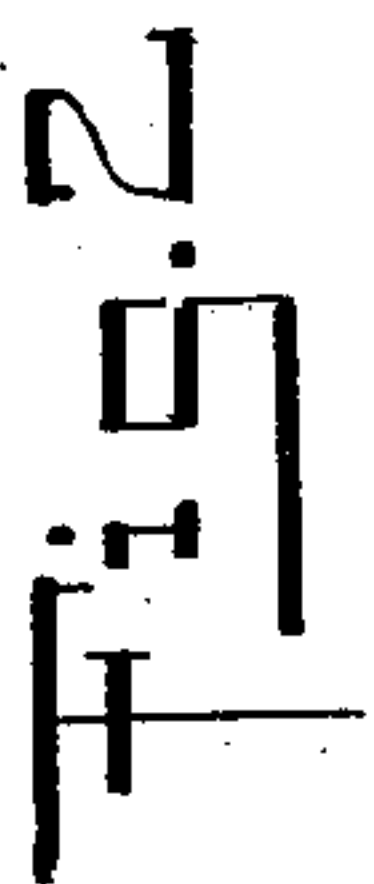
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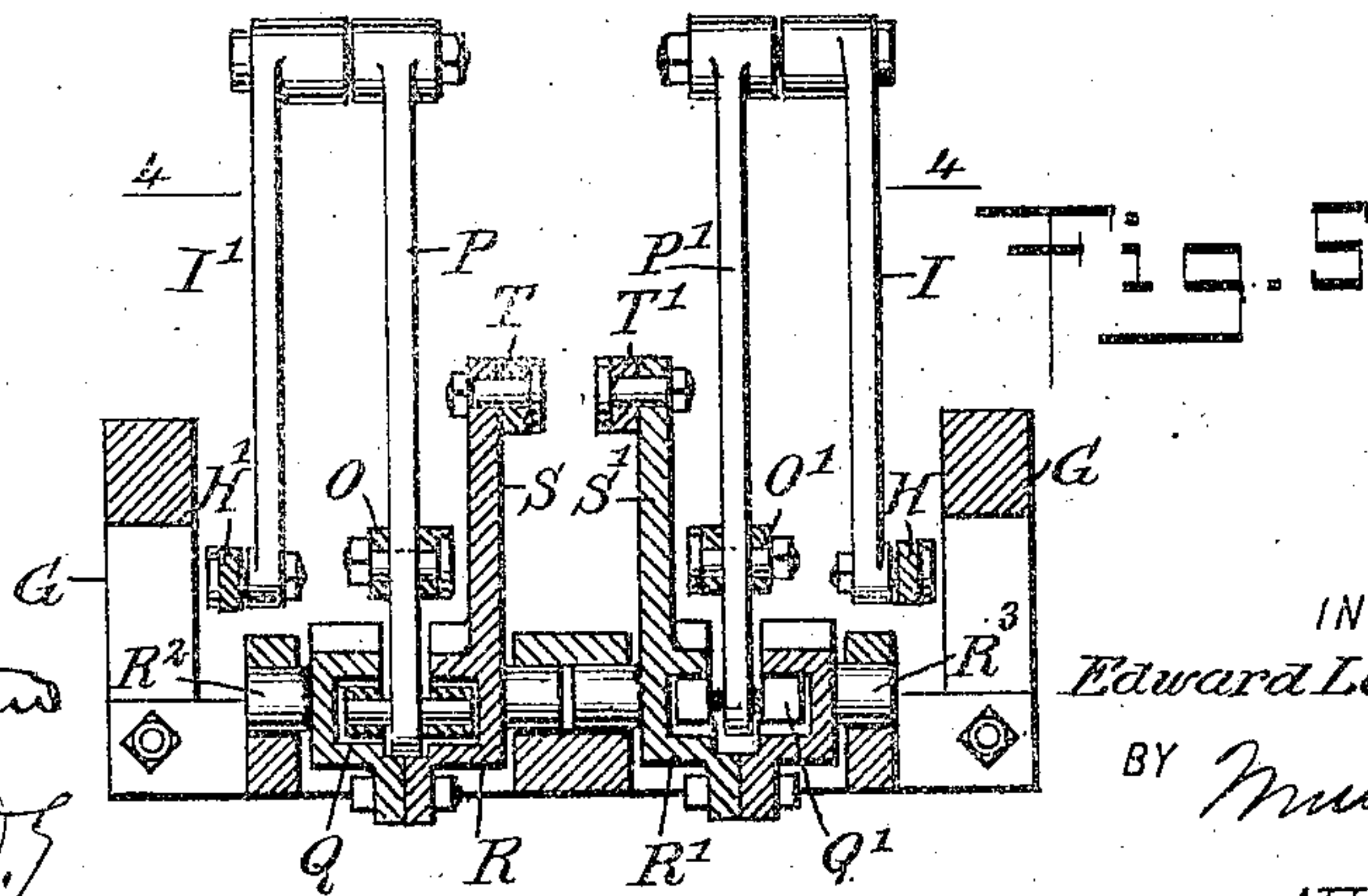
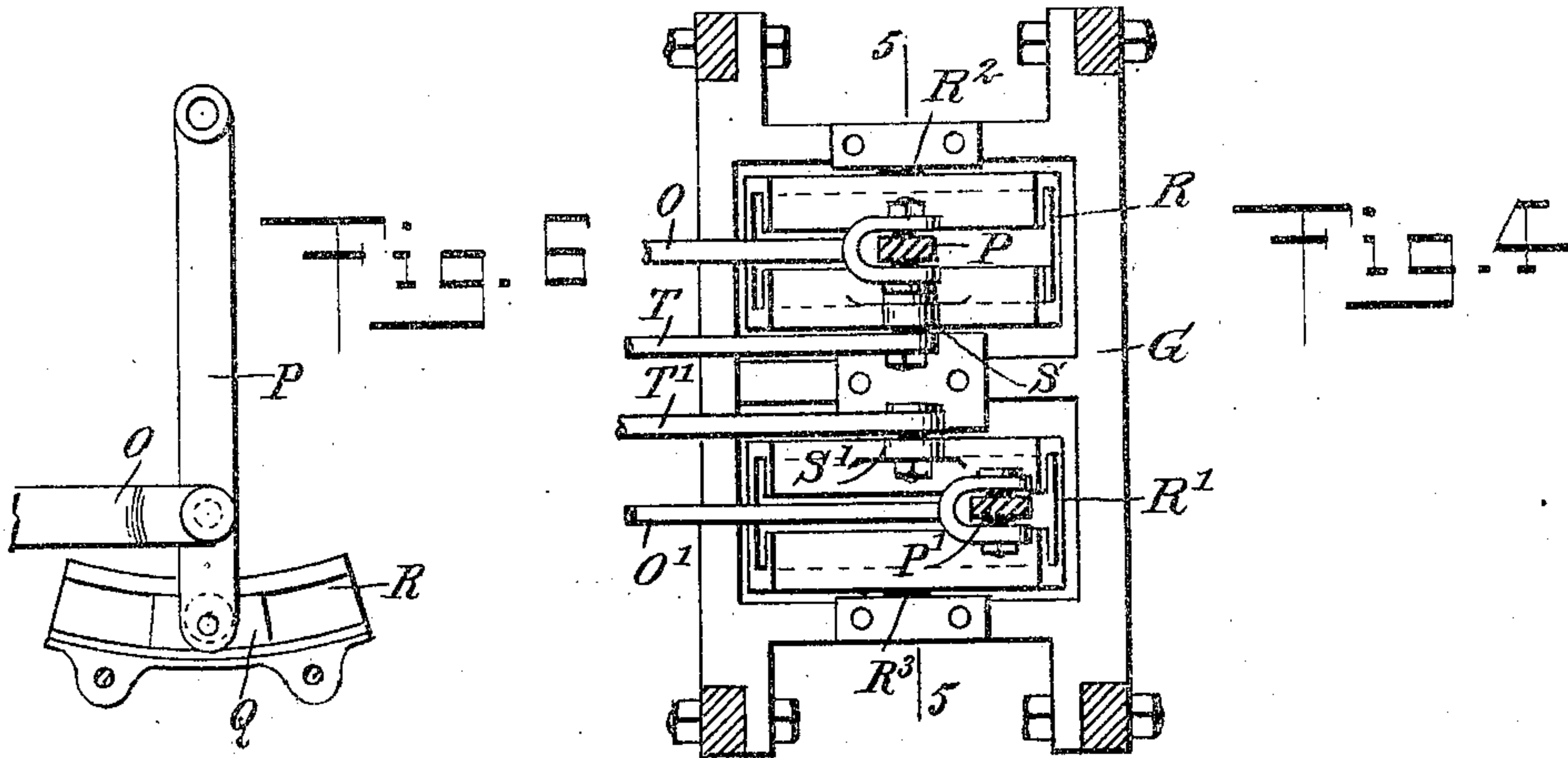
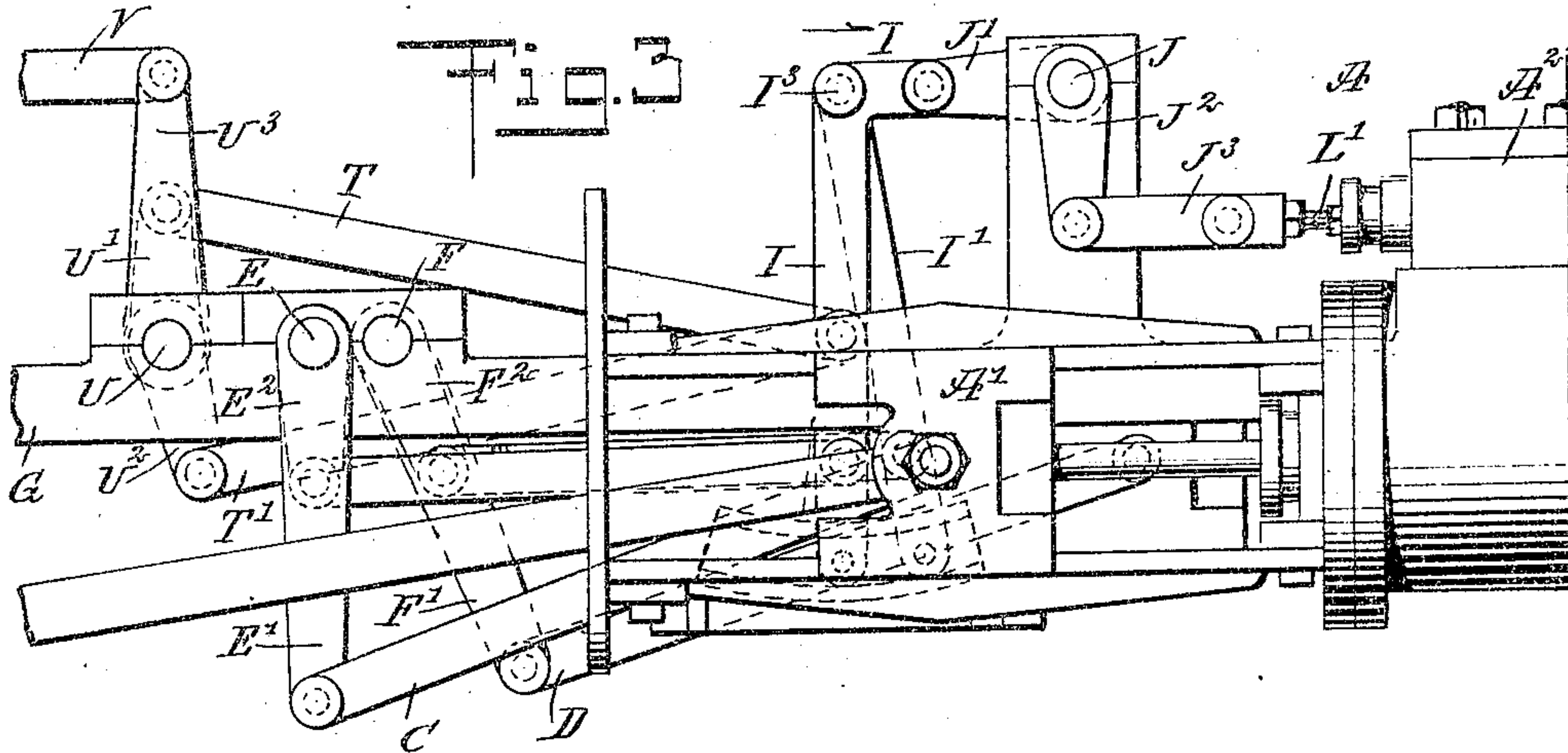
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3 SHEETS—SHEET 3.

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VALVE-GEAR.

No. 922,250.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed June 15, 1908. Serial No. 438,546.

To all whom it may concern:

Be it known that I, EDWARD LEE BOWEN, a citizen of the United States, and a resident of McComb city, in the county of Pike and State of Mississippi, have invented a new and Improved Valve-Gear, of which the following is a full, clear, and exact description.

The invention relates to locomotive engines and other double reversing engines, and its object is to provide a new and improved valve gear which is simple, strong and durable in construction, easy to manipulate and arranged to utilize the motion of the cross head of one engine to positively actuate the valve of the other engine, to provide a constant lead independent of the main traveling movements of the valves, to reduce the effects of angularity to a minimum and to allow of conveniently applying the gear to double reversing engines of different styles.

The invention consists of novel features and parts and combinations of the same, which will be more fully described herein- after and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement as applied to a locomotive, parts being broken out and parts being in section; Fig. 2 is a plan view of the same, the covers of the steam chests and one of the valves being removed; Fig. 3 is a side elevation of the improvement showing the parts in a different position; Fig. 4 is a sectional plan view of the improvement on the line 4-4 of Fig. 5; Fig. 5 is a transverse section of the same on the line 5-5 of Fig. 4; and Fig. 6 is a side elevation of one of the slides and its rods.

The reversing engines A and B of the usual construction are connected at their cross heads A', B' by connecting rods C, D with depending arms E', F' of rock shafts E and F, extending transversely and journaled in suitable bearings in the frame G of the engine.

The rock shafts E and F are provided with short depending arms E² and F², connected by rods H and H' with the vertical members of bell crank levers I and I', the said levers with their pivots being arranged to be

bodily oscillated and having their horizontal members pivotally connected with horizontally-disposed arms J', K', attached to the inner ends of the shafts J and K journaled on the engine frame G. The outer ends of the shafts J and K are provided with depending arms J², K² connected by links J³, K³ with the stems L', N' of the slide valves L and N, mounted to reciprocate in the steam chests A² and B² of the engines A and B.

The rock shafts E and F are also provided with another set of depending arms E³, F³, connected by rods O, O' with the rods P, P' mounted on the pivot pins I², I³ of the bell crank levers I', I, and the said rods P and P' are pivotally connected at their lower ends with blocks Q, Q' (see Fig. 5) mounted to move in slides R, R', having their trunnions R², R³ extending transversely and journaled in suitable bearings arranged on the engine frame G.

The slides R and R' are under the control of the engineer in charge of the locomotive in the usual manner, and for this purpose the slides R, R' are provided with upwardly-extending arms S, S' connected by rods T, T' with the arms U', U² of the tumbling shaft U, journaled in suitable bearings in the engine frame G and provided with an upwardly-extending arm U³ connected by the reach rod V with the usual reversing lever under the control of the engineer. By the arrangement described the engineer in charge of the double reversing engine can swing the slides R and R' into the required position for forward or reversing movement.

Now by the arrangement described it will be seen that the rock shaft E has connection with the shaft J of the engine A by way of the rod H, bell crank lever I and arm J' so that the same lead is given to the valve L when the engine is running, but the regular traveling motion of this valve L is received from the cross head B' of the other engine B by way of the rock shaft F, the rod O' and the rod P' connected with the bell crank lever I and connected with the block Q' in the slide R'. Thus the lead for the valve L of the engine A is obtained from the cross head A' of the engine A, while the regular travel given to the valve L is derived from the cross head B' of the engine B. In a like manner the lead of the valve N is derived from the cross head B' by way of the rock

shaft F, rod H', bell crank lever I' and arm K' of the shaft K, while the regular travel of the valve N is obtained from the cross head A' of the engine A by way of the rock shaft E, rod O, rod P fulcrumed on the bell crank lever I and connected with the block Q of the slide R.

From the foregoing it will be seen that the regular travel of the valve of one engine is derived from the cross head of the other engine, while the lead of a valve is derived from the cross head of its engine, and the rate of expansion of the steam in the cylinders is governed by tilting of the slides R and R' actuated from the reversing lever manipulated by the engineer. The movements of the several parts are positive and a uniform lead is maintained no matter at what point the steam is cut off.

By the arrangement described the usual counterbalance spring and eccentrics are entirely dispensed with, and only one adjustment is necessary to properly set the valve gear, that is, to adjust the valve stem for the valve to travel evenly over its ports. It will also be noticed that the valve gear has no connection with the axle of the drivers, and hence the gear is not affected by vertical movement of the axle and the latter may be removed without disturbing the valve gear.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A valve gear for double reversing engines, comprising shafts having right angle arms, of which the vertical ones are connected with the valves of the engines, bell crank levers having their horizontal arms connected with the horizontal arms of the said shafts, rock shafts connected with the cross heads of the engines so as to be rocked thereby, said rock shafts being connected with the vertical arms of the said bell crank levers, slides under the control of the operator, slide blocks in the said slides, rods connecting the said blocks with the said bell crank levers at the fulcrums thereof, and means connecting the rock shaft actuated from one engine with the slide block rod for the valve of the other engine.

2. A valve gear for double reversing engines, comprising shafts having right angle arms, of which the vertical ones are connected with the valves of the engines, bell crank levers having their horizontal arms connected with the horizontal arms of the said shafts, rock shafts connected with the cross heads of the engines so as to be rocked thereby, said rock shafts being connected with the vertical arms of the said bell crank levers, slides under the control of the operator, slide blocks in the said slides, rods connecting the said blocks with the said bell crank levers at the fulcrums thereof, arms depending from the said rock shafts, and rods connecting the

depending arm of the rock shaft actuated from one of the engines with the slide block rod for the valve of the other engine.

3. A valve gear for double reversing engines, comprising shafts having right angle arms, of which the vertical ones are connected with the valves of the engines, bell crank levers having their horizontal arms connected with the horizontal arms of the said shafts, rock shafts connected with the cross heads of the engines so as to be rocked thereby, said rock shafts being connected with the vertical arms of the said bell crank levers, slides under the control of the operator, slide blocks in the said slides, rods connecting the said blocks with the said bell crank levers at the fulcrums thereof, arms depending from the said rock shafts, rods connecting the depending arm of the rock shaft actuated from one of the engines with the slide block rod for the valve of the other engine, and manually-controlled means for rocking the said slides in unison and in opposite directions.

4. A valve gear for double reversing engines, comprising rock shafts, means connecting the said rock shafts with the cross heads of the engines, shafts having horizontal and vertical arms, the vertical arms being connected with the engine valves, bell crank levers having horizontal and vertical members, the horizontal members being connected with the horizontal arms of said shafts, and connections between the rock shafts and the vertical members of said bell crank levers for controlling the lead of the valves.

5. A valve gear for double reversing engines, comprising rock shafts, means connecting the said rock shafts with the cross heads of the engines, bell crank levers, shafts having arms connected with the engine valves, the said shafts also having arms connected with the bell crank levers, connections between the rock shafts and the said bell crank levers for controlling the lead of the valves, slide-ways under the control of the operator and having trunnions journaled in bearings in the engine frame, blocks mounted to slide in said slide-ways, slide block rods connecting the said blocks with the bell crank levers, and connections between the rock shaft actuated from the cross head of one engine and the slide block rod connected with the valve of the other engine.

6. A valve gear for double reversing engines comprising bell crank levers, shafts having arms connected with the valves of the engines and arms connected with the bell crank levers, rock shafts connected with the cross heads of the engines so as to be rocked thereby, said rock shafts being connected with the bell crank levers, manually controlled slides, blocks slidable therein, and connections between the said blocks and the bell crank levers.

7. A valve gear for double reversing en-

gines, comprising bell crank levers, shafts having arms connected with the valves of the engines and arms connected with the bell crank levers, rock shafts connected with the cross heads of the engines so as to be rocked thereby, connections between the rock shafts and the bell crank levers, slide-ways mounted to rock, blocks slidable in said slide-ways, rods mounted on the pivots of the bell crank levers and connected with said blocks, and connections between the said rock shafts and the said rods.

8. A valve gear for double reversing engines, comprising manually controlled slide-ways, blocks slidable therein, bell crank levers, connections between the bell crank levers and the engine valves, rods mounted at one end on the pivots of the bell crank levers and pivotally connected at the other end with the said blocks, and means connected with said rods for actuating the block in the slide-way for the valve of one engine from the cross head of the other engine.

9. A valve gear for double reversing engines, comprising slideways having trunnions journaled in bearings in the engine frame, the slideways being provided with upwardly

extending arms, means under the control of the operator and connected with said arms for adjusting the slideways, blocks slidable in said slideways, bell crank levers movable bodily with their pivots, connections between said levers and the engine valves, slide block rods mounted at one end on the pivots of the bell crank levers and pivotally connected at the other end with the said blocks, rock shafts connected with the cross heads of the engines so as to be rocked thereby, arms on said rock shafts, rods connecting said arms with the said bell crank levers, a second set of arms on said rock shafts, and rods connecting said arms with the slide block rods, the rod connected with the arm of the rock shaft actuated from the cross head of one engine being connected with the slide block rod for the valve of the other engine.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD LEE BOWEN.

Witnesses:

JAMES DAVIS FRITH,
RICHARD CHARLES PENDEGRAST.