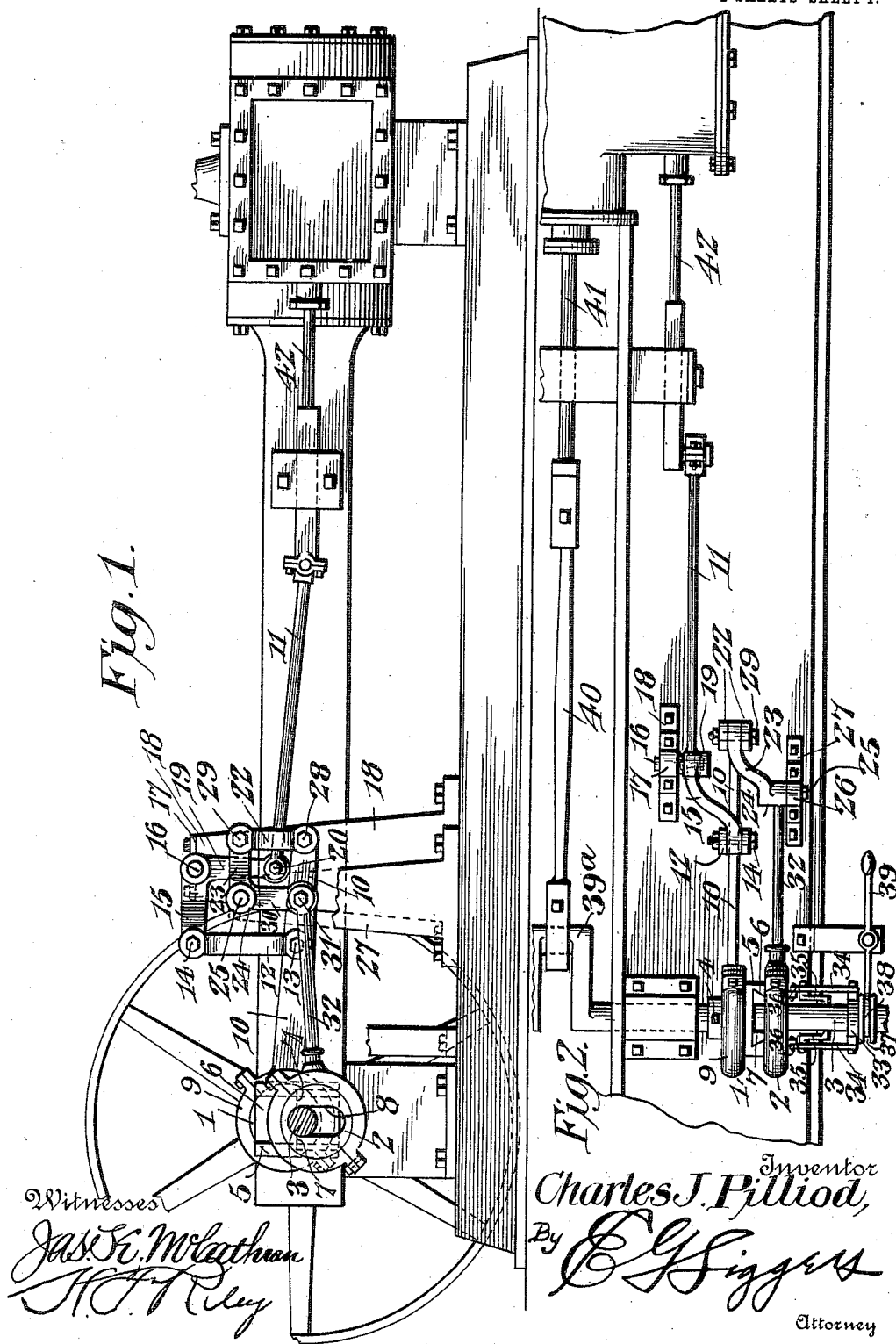


C. J. PILLIOD.
VALVE GEAR FOR STATIONARY ENGINES.
APPLICATION FILED MAY 2, 1910.

982,987.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 1.



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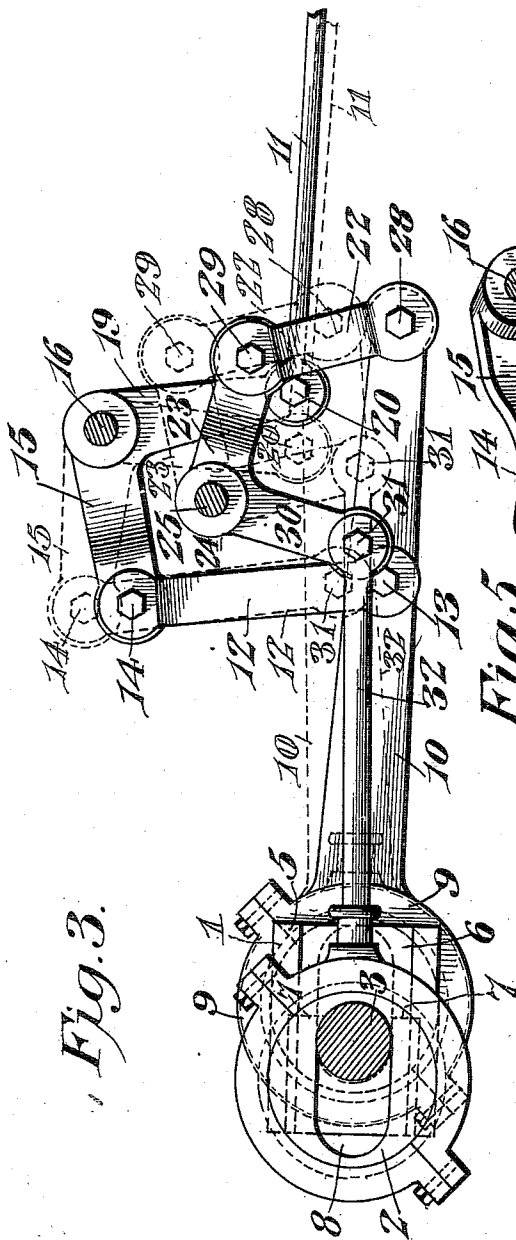


Fig. 3.

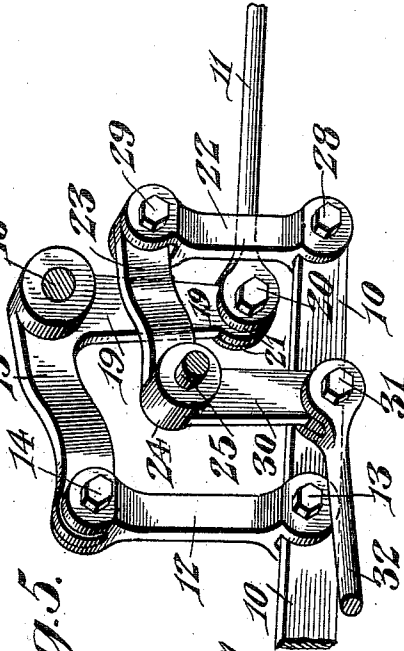


Fig. 5.

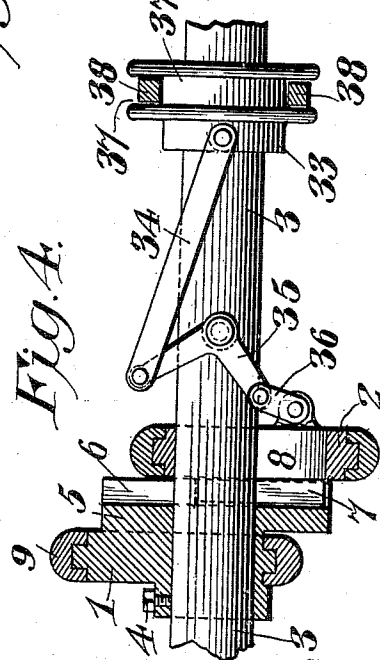


Fig. 4.

Witnesses

Jas. E. McLaughlin
H. H. Clegg

Charles J. Pilliod, Inventor

By

E. G. Siggers

Attorney

UNITED STATES PATENT OFFICE.

CHARLES J. PILLIOD, OF TOLEDO, OHIO.

VALVE-GEAR FOR STATIONARY ENGINES.

982,987.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES J. PILLIOD, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Valve-Gear for Stationary Engines, of which the following is a specification.

The invention relates to improvements in valve gears for stationary engines.

10 The object of the present invention is to improve the construction of valve gears, and to provide a simple and efficient valve gear, adapted to correct the evils in valve motion, viz., the unequal port opening, cut-off and
15 release due to the angularity of the eccentric arm.

20 With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended.

25 In the drawings: Figure 1 is a side elevation of a portion of an engine, equipped with a valve gear, constructed in accordance with this invention. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged elevation of the valve gear, the crank shaft being in section. Fig. 4 is a detailed sectional view, illustrating the construction of
30 the fixed and slidable eccentrics and the means for operating the slidable eccentric. Fig. 5 is an enlarged detail perspective view of the mechanism for transmitting motion
35 from the eccentric arm to the valve rod and for modifying such motion.

40 Like numerals of reference designate corresponding parts in all the figures of the drawings.

45 The specification is a disclosure of one form of the invention, while the claims define the actual scope of the invention.

50 In the embodiment of the invention illustrated in the accompanying drawings, the valve gear comprises in its construction a fixed eccentric 1, and a slidable eccentric 2, movable diametrically across the crank shaft 3 to reverse the engine and to vary the cut-off. The fixed eccentric 1 is secured to the crank shaft by a set screw 4, or other suitable means, and it is provided at one side with an integral guide block 5, having a dovetailed groove or guide-way 6 for the reception of a dovetailed projecting portion or slide 7 of the slidable eccentric 2.
55 The slidable eccentric 2 is provided with a

slot 8 receiving the shaft, and adapted to permit the slidable eccentric to be moved straight across the shaft in a diametrical line from one side to the other for reversing
60 the engine and also to be shifted to different points between such extreme positions for varying the cut-off.

65 The strap 9 of the fixed eccentric 1 is connected with the inner or rear end of the eccentric arm or rod 10, and the lateral movement thereof is transmitted to a valve rod 11 by means of a link 12, extending upwardly from the eccentric arm and pivoted to the same at a point intermediate of the
70 ends thereof by a bolt 13, or other suitable pivot. The upper end of the link 12 is pivoted by a bolt 14, or other suitable fastening device, to the free end of a rocker arm 15, preferably forming one of the arms
75 of a bell crank and fulcrumed on a transverse shaft 16, which is journaled in a bearing 17 of a suitable support 18. The ends of the link 12 are preferably bifurcated to straddle the eccentric arm 10 and the rocker
80 arm 15. The rocker arm 15, which extends rearwardly from the shaft 16, is bent laterally to arrange its terminal portion in the vertical plane of the eccentric arm, and the other bell crank arm 19 extends downwardly
85 from the shaft 16 and is connected at its lower end by a suitable pivot 20 with the valve rod 11. The valve rod 11 has a bifurcated end 21 to receive the lower end of the bell crank arm 19. The position of the
90 rocker arm 15 may, however, be reversed, and the rocker arm may extend forwardly from the shaft 16 to reverse the motion of the valve. By changing the position of the rocker arm 15 with respect to the shaft 16,
95 the valve may be caused to lead or follow the crank according to whether it is an inside or outside admission valve.

100 The forward end of the eccentric rod or arm 10 is connected by a link 22 with an arm 23 of a bell crank 24, fulcrumed at its angle on a horizontal shaft 25, which is journaled in a suitable bearing 26 of a support 27. The arm 23 of the bell crank 24 constitutes
105 a rocker arm, and it extends forwardly from the shaft 25, and it is bent laterally to arrange its forward terminal portion in the vertical plane of the eccentric rod or arm 10. The link 22, which is straight, has its
110 ends bifurcated to receive the eccentric arm or rod and the bell crank 23, and it is pivoted to the said parts by bolts 28 and 29, or

other suitable fastening devices. The other arm 30 of the bell crank 24 also constitutes a rocker arm, and it depends from the shaft 25 and is connected by a bolt 31 to the forward end of the crank rod 32. The crank rod 32 is bifurcated at its front end to receive the lower end of the bell crank arm 30, and it is connected at its rear end with the shiftable eccentric.

Various means have been provided for modifying the reciprocation of the eccentric rod or arm to cause the pivot, which connects the valve actuating mechanism with the eccentric rod or arm and which is located at an intermediate point between the ends of the eccentric rod or arm, to travel in an elliptical path to dissipate the effects of the angularity of the eccentric arm, but with such mechanism the forward end of the eccentric arm or rod has heretofore always oscillated in a true arc, the compounding of the oscillation of the front end of the eccentric rod or arm and the reciprocation of the same through the throw of the eccentric producing the said elliptical path of movement of the said pivot. It has been found by experience that when the forward end of the eccentric rod or arm oscillates in a true arc, it is impossible to produce for the pivot pin of the valve actuating mechanism an ellipse capable of imparting uniform travel of the valve in each stroke thereof. This defect, however, has been overcome by causing the forward end of the eccentric rod or arm to travel in an elliptical path, which permits the elliptical movement of the pivot 13 to be modified so as to produce uniform admission and release at each end of the cylinder, and uniform cut-off at equidistant points from the ends thereof. The vertical motion of the bell crank 24 of the sliding eccentric and the horizontal movement of the eccentric arm or rod produce an elliptical path of movement of the pivot 13, and the link connection between the forward end of the eccentric arm or rod and the forwardly extending arm of the bell crank 24 cause the pivot 28 to travel in a long narrow ellipse instead of an arcuate path, and this modifies the ellipse, which results when the forward end of the eccentric arm or rod swings through a true arc. An equal travel of the valve at the backward and forward movements and a uniform distribution of steam are secured through the above operation.

Any suitable means may be employed for shifting the slidable eccentric 2 across the shaft either to reverse the engine or to vary the cut-off. In the accompanying drawings this movement is effected through shifting mechanism comprising a slidable collar 33, connected at opposite sides by links 34 with a pair of bell crank levers 35, fulcrumed at their angles on the shaft and connected by

links 36 with the slidable eccentric. The slidable collar 33 is provided with a groove 37, which is engaged by a forked portion 38 of a shifting lever 39. Any other suitable means, however, may be employed, and in practice suitable means will be provided for locking the sliding eccentric in its adjustment at various points of the cut-off.

In the accompanying drawings the valve gear is shown applied to a horizontal engine, and the crank 39^a of the shaft 3 is connected by the main rod 40 with the piston rod 41, and the valve rod 11 is connected with the valve stem 42, but the valve gear is equally applicable to a vertical engine, the only change required will be the means for transmitting motion from the rocker arm to the valve. The bell crank arm 19, which is connected with the valve rod, may be arranged in any position to accommodate itself to the position of the valve rod.

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

1. A valve gear including a crank shaft, an eccentric rod or arm actuated by the crank shaft, a pivoted rocker arm, a link connecting the rocker arm with the eccentric rod or arm, means for transmitting motion from the rocker arm to a valve, a shiftable eccentric slidable across the shaft to reverse the engine and to vary the cut-off, a crank rod, a bell crank having one of its arms connected to the crank rod, and a link connecting the other arm to the bell crank with the eccentric arm or rod.

2. A valve gear including a crank shaft, an eccentric rod or arm actuated by the shaft, a pivoted rocker arm, a link connecting the rocker arm with the eccentric rod or arm at a point intermediate of the ends of the latter, means for transmitting motion from the rocker arm to a valve, a shiftable eccentric slidable across the shaft, a crank rod connected with the slidable eccentric, a bell crank having one of its arms connected to the crank rod, and a link connecting the bell crank with the forward end of the eccentric rod or arm.

3. A valve gear including a crank shaft, an eccentric rod or arm, a valve rod, a bell crank fulcrumed at its angle and connected at one of its arms to the valve rod, a link connecting the other arm of the bell crank with the eccentric arm or rod at a point intermediate of the ends thereof, a shiftable eccentric slidable across the shaft, a crank rod connected with the shiftable eccentric, a second bell crank fulcrumed at its angle and having one of its arms connected with the crank rod, and a link connecting the other arm of the second bell crank lever with the forward end of the eccentric arm or rod.

4. A valve gear including a crank shaft,

an eccentric rod or arm, a pivoted rocker arm, a link connecting the rocker arm with the eccentric rod or arm and arranged at a point intermediate of the ends of the latter, means for transmitting motion from the rocker arm to a valve, a shiftable eccentric slidable across the shaft, a crank rod connected with the shiftable eccentric, a bell crank fulcrumed at its angle and composed of a depending arm connected to the crank rod, and an approximately horizontal arm, and a link connecting the latter arm of the bell crank with the forward end of the eccentric rod or arm.

5. A valve gear including a crank shaft, an eccentric rod or arm, a pivoted rocker arm, a link connecting the rocker arm with the eccentric rod or arm and arranged at a point intermediate of the ends of the latter, means for transmitting motion from the rocker arm to a valve, a shiftable eccentric slidable across the shaft, a crank rod connected with the shiftable eccentric, a bell crank fulcrumed at its angle and composed of a depending arm connected with the crank rod, and a forwardly extending approximately horizontal arm, and a link connected to the forwardly extending arm of the bell crank and extending therefrom to the forward end of the eccentric rod or arm and connected to the same.

6. A valve gear including a crank shaft, an eccentric arm or rod, a valve rod located at one side of the eccentric rod or arm, a crank rod located at the opposite side of the eccentric rod or arm, a slidable eccentric movable across the shaft and movable with the crank rod, a rocker arm pivoted above the valve rod and bent laterally and having its terminal portion located above the eccentric rod or arm, a link connecting the rocker arm with the eccentric rod or arm at a point intermediate of the ends of the latter, means for transmitting motion from the rocker arm to the valve rod, a bell crank

pivoted above the crank rod and having one arm connected therewith, the other arm of the bell crank being bent laterally and having its terminal portion arranged in the plane of the eccentric rod or arm, and a link connecting the latter arm of the bell crank with the forward end of the eccentric rod or arm.

7. A valve gear including a crank shaft, a fixed eccentric, an eccentric rod or arm connected with the fixed eccentric, a rocker arm, a link connecting the rocker arm with the eccentric rod or arm and located at a point intermediate of the ends of the latter, means for transmitting motion from the rocker arm to a valve, a slidable eccentric movable across the shaft, a crank rod connected with the slidable eccentric, a bell crank fulcrumed at its angle and having one arm connected with the crank rod, and a link connecting the other arm of the bell crank with the forward end of the eccentric arm or rod.

8. A valve gear including a crank shaft, a fixed eccentric mounted on the crank shaft and provided with a guide, a shiftable eccentric movable across the shaft and provided with a slide operable in the said guide, an eccentric rod or arm connected with the fixed eccentric, a crank rod connected with the shiftable eccentric, a rocker arm, a link pivoted to the rocker arm and to the eccentric rod or arm at a point intermediate of the ends of the latter, a bell crank having one arm connected with the crank rod, and a link connecting the other arm of bell crank with the forward end of the eccentric rod or arm.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES J. PILLIOD.

Witnesses:

JAMES JNO. HAND,
CHARLES J. PILLIOD, Jr.