

**No. 637,345.**

**Patented Nov. 21, 1899.**

**L. A. LANG.**  
**VALVE GEAR.**

(Application filed Mar. 11, 1899.)

(No Model.)

**2 Sheets—Sheet 1.**

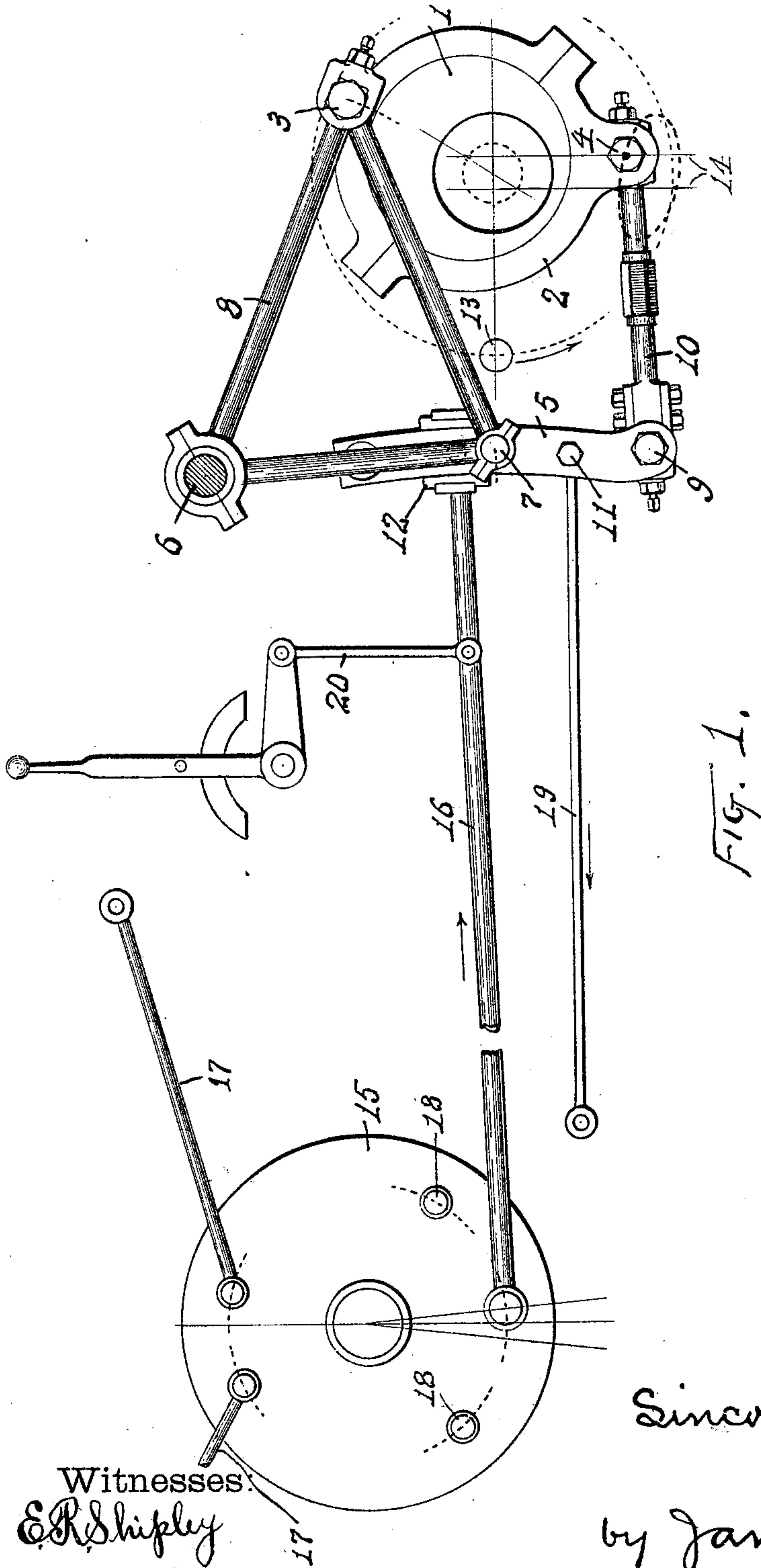


Fig. 1.

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Witnesses:  
E. R. Shipley  
Mrs Belden.

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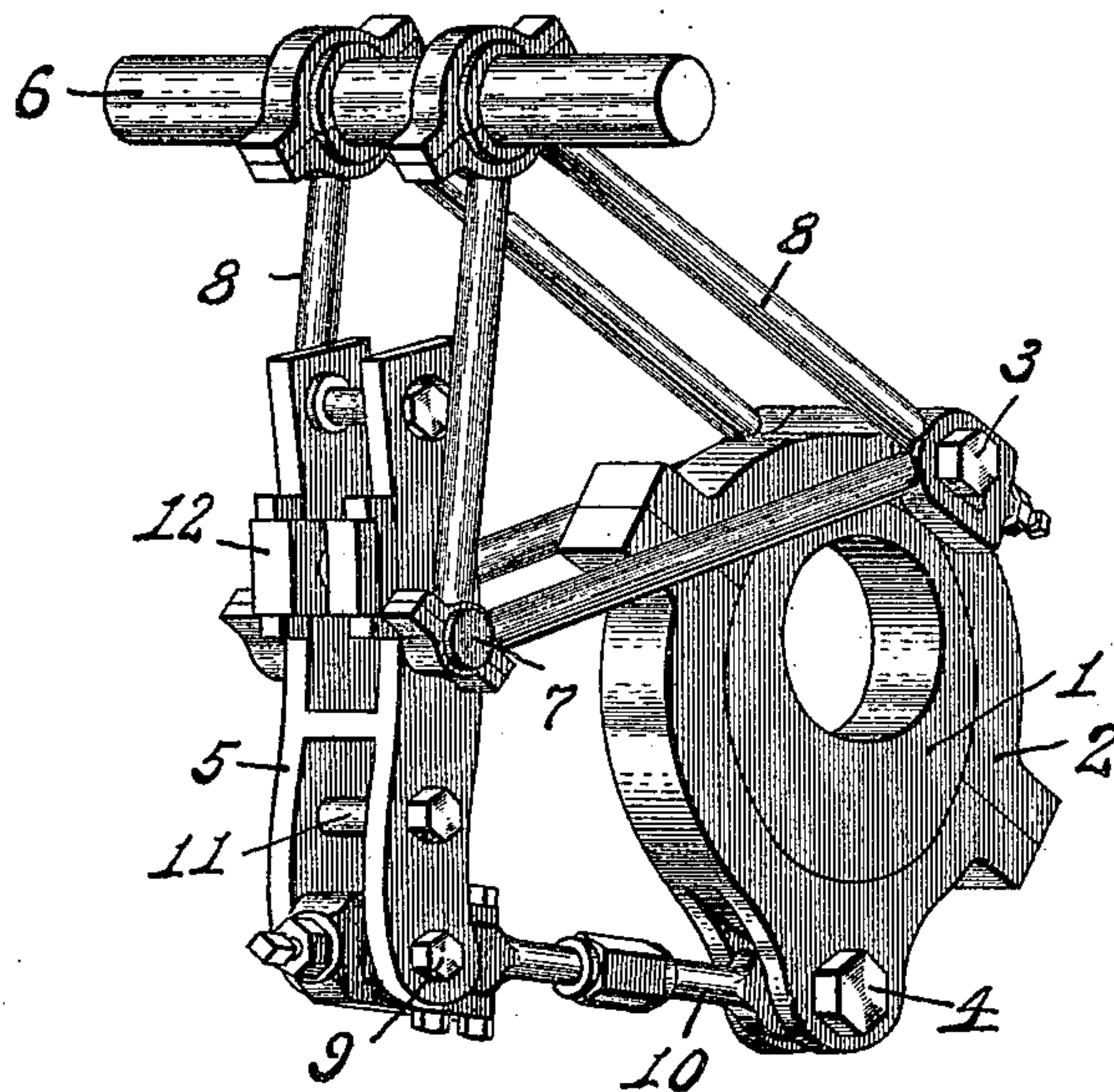


FIG. 2.

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# UNITED STATES PATENT OFFICE.

LINCOLN A. LANG, OF YULE, NORTH DAKOTA, ASSIGNOR OF ONE-HALF TO  
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## VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 637,345, dated November 21, 1899.

Application filed March 11, 1899. Serial No. 708,637. (No model.)

*To all whom it may concern:*

Be it known that I, LINCOLN A. LANG, of Yule, Billings county, North Dakota, have invented certain new and useful Improvements in Valve-Gears, (Case D,) of which the following is a specification.

This invention, pertaining to improvements in valve-gears, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a valve-gear exemplifying my invention, and Fig. 2 a perspective view of the eccentric and its immediate accessories.

In the drawings, 1 indicates the eccentric; 2, the eccentric-strap; 3, an upper pivot carried by the eccentric-strap as close to the eccentric as practicable; 4, a second pivot carried by the lower portion of the eccentric-strap; 5, the link, disposed vertically; 6, a fixed pivot disposed above the link; 7, pivots of oscillation of the link; 8, a pair of skeleton bell-cranks rocking on pivot 6, the long arm of each engaging pivot 3 of the eccentric-strap, while the shorter arms engage pivots 7 of the link; 9, a pivot carried by the lower extremity of the link; 10, a coupling-bar connecting pivots 9 and 4; 11, a pivot carried by the link between pivots 9 and 7; 12, the link-block, adapted to shift in the link, the exemplification showing the construction as such that only the upper portion of the link can be traversed by the block; 13, the crank-pin, shown as on its back center; 14, lines cutting the center of the eccentric when the crank-pin is on its respective centers, the distance between these lines representing the lap and lead; 15, a wrist-plate of ordinary construction; 16, link-rod coupling the wrist-plate to the link-block, the length of this rod representing the radius of the link; 17, valve-rods pivoted to the wrist-plate and adapted for usual connection to the steam-valves in the manner common with engines employing wrist-plate motions; 18, additional wrists in the wrist-plate, adapted for use, if desired, in giving motion to the exhaust-valves, though with the exemplifying-gear this is not necessary; 19, valve-rod coupled to pivot 11 of the link and adapted for transmission of motion to the exhaust-valves, and 20 an exemplify-

ing-suspender for supporting the link-block in adjusted position, this suspender to be under the control of any suitable adjusting device, such as an automatic governor or a hand-lever.

The center of the eccentric as it appears in Fig. 1 is cut by one of lines 14, the crank being on the center. In this position the link is normal to link-rod 16. When the crank shall have reached the opposite center, then pivot 4, moving to the left, follows its elliptical path until in moving to the right it reaches the plane of the left-hand one of lines 14, under which conditions the link is again normal to the link-rod. It is thus obvious that constancy of lead is maintained. The movements of pivot 4 in its elliptical path outwardly beyond the planes of lines 14 represent port opening and closure due to the oscillation of the link upon its pivots 7, these movements being produced with extreme sharpness and with comparatively long periods of valve-rest for the entry and exhaust of steam, full port opening and cut-off being secured with peculiar promptness.

The link-rod rocks the wrist-plate and gives the usual movement to the wrist-plate; but while the link is impressing upon the wrist-plate the peculiarly-rapid motions pertaining to port opening and cut-off the valve-rod wrists of the wrist-plate are themselves under conditions of most rapid travel, the result upon the valve-rods being extremely-rapid motions available for port opening and cut-off, while the movements pertaining to lap and lead are performed with comparative deliberateness. The lap and lead movements are constant regardless of the position of the link-block in the link; the effect of the shifting of the link-block being to simply alter the port opening and cut-off. The exhaust-valves might be operated by the usual wrists 18 of the wrist-plate; but it is preferable in non-reversing engines that they be actuated by rod 19, having constant stroke.

In the exemplifying-gear the link is not arranged for reversal of motion, the movement of the block being confined to one end only of the link. In a reversible gear the block should be arranged to work in both ends of the link, as in my Patent No. 607,058, of July



12, 1898, it being understood, of course, that in such case the wrist-plate will be employed in imparting motion to the exhaust-valves, as well as to the steam-valves.

5 The expressions "upper," "lower," "below," "above," "vertical," &c., are to be understood in the relative sense only.

I claim as my invention—

10 1. In a valve-gear, the combination, substantially as set forth, of an eccentric, a rodless strap therefor, an upper pivot carried by said strap, an arm connected with said pivot and oscillating on a fixed pivot and serving to prevent the rotation of the eccentric-strap,  
15 a lower pivot carried by said strap, a wrist-plate, valve-rods connected therewith, and connections between said wrist-plate and the second pivot of said eccentric-strap.

20 2. In a valve-gear, the combination, substantially as set forth, of an eccentric, a rodless strap therefor, a bell-crank mounted for oscillation on a fixed pivot, a vertical link oscillating on one arm of said bell-crank, a link-block sliding in the link, a wrist-plate, valve-  
25 rods connected therewith, a link-rod connecting said wrist-plate and link-block, an upper pivot carried by the eccentric-strap and engaging the other arm of the bell-crank, a second pivot carried by the eccentric-strap, and  
30 a connecting-bar pivoted to the last-mentioned pivot and to the link.

3. In a valve-gear, the combination, substantially as set forth, of an eccentric, a rodless strap therefor, a bell-crank mounted for oscillation on a fixed pivot, a vertical link os- 35  
cillating on one arm of said bell-crank, a link-block sliding in the link, a wrist-plate, valve-rods connected therewith, a link-rod connecting said wrist-plate and link-block, an upper pivot carried by the eccentric-strap and en- 40  
gaging the other arm of the bell-crank, a second pivot carried by the eccentric-strap, and a connecting-bar pivoted to the second pivot and to the link, and a valve-rod pivoted to said link independent of said link-rod. 45

4. In a valve-gear, the combination, substantially as set forth, of an eccentric, a rodless strap therefor, an upper pivot and a lower pivot carried by said strap, a link dis- 50  
posed in the plane of said eccentric-strap, a block sliding in the link, pivots of oscillation carried by the link, a connecting-bar pivoted to the link and the lower pivot of said strap, and a pair of bell-cranks mounted on a fixed pivot and straddling the link and strap and 55  
engaging the pivots of oscillation of the link and the upper pivot of the eccentric-strap.

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Witnesses:

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