

1,012,084.

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REVERSIBLE VALVE-GEAR.

1,012,084.

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To all whom it may concern:

Be it known that I, OLIVER T. ISAACSON, a citizen of the United States, residing at Champaign, in the county of Champaign and State of Illinois, have invented certain new and useful Improvements in Reversible Valve-Gear, of which the following is a specification.

My invention relates to a reversible valve gear, so constructed that the entire operation of the engine is controlled by a single lever, that is, the engine may be stopped, made to operate in either direction or reversed by proper movement of said lever.

An important object of this invention is to provide a valve gear of the above character, so constructed that different points of cut-off may be obtained by placing the controlling lever in requisite positions.

A further object of this invention is to provide a device of the above character, which is simple in construction, easy to operate, and cheap to manufacture.

Other objects and advantages of this invention will be apparent during the course of the following description.

In the accompanying drawing forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a partly diagrammatic side view of my reversible valve gear, the cylinder and associated members being shown in section, Fig. 2 is an end view of the operating bell-crank levers, Fig. 3 is a vertical cross-sectional view taken on line 3—3 of Fig. 1, and, Fig. 4 is a horizontal sectional view taken on line 4—4 of Fig. 3.

In the drawing wherein is illustrated a preferred embodiment of my invention, the numeral 1 designates a crank-shaft of an engine, upon which is rigidly mounted an eccentric 2, serving to carry arms 3. Each of the arms 3 comprises an annular head which is loosely mounted upon the periphery of the eccentric 2 and formed of two parts 4 and 5, which are connected by bolts 6. The outer ends of the arms 3 are bifurcated for receiving therein outer ends of bell-crank levers 7, pivoted therewith, as shown at 8. The bell-crank levers 7 are pivotally mounted upon a common pin 9, having engagement with a stationary support 10. The bell-crank levers 7 and the arms 3 form in effect a toggle joint, as shown. The forward short arms of the bell-crank levers 7

are preferably bifurcated for pivotal connection with reach-rods 11 and 12, the upper bell-crank lever having connection with the reach-rod 11 and the lower bell-crank lever with the reach-rod 12. These reach-rods extend forwardly in diagonal positions and cross each other, so that the forward end of the reach-rod 12 has pivotal connection with the upper portion of a link 13, as shown at 14. The reach-rod 11 extends downwardly for pivotal connection with the lower portion of the link 13, as shown at 15. The link 13 is curved or in the shape of a segment, as shown. This link is capable of being raised and lowered. The link 13 is provided upon its outer side and midway the ends thereof with a U-shaped bracket 16, having pivotal connection with a link 17, which extends upwardly for connection with a bell-crank lever 18, fulcrumed as shown at 19. The bell-crank lever 18 receives its movement from a controlling lever 20 through the medium of a reach-rod 21. The lever 20 is pivoted at its lower end with a quadrant support 22, as shown, this quadrant support serving to support a quadrant 23 provided with notches 24, 25, 26 and 27. The controlling lever 20 is equipped with a latch mechanism 28 for coöperation with the quadrant 23, whereby said controlling lever 20 may be held in adjustment at different positions.

The numeral 29 designates a working cylinder, within which is mounted a piston 30, connected with a piston rod 31, operating through a stuffing box 32. Disposed upon the working cylinder 29 is a steam chest 33, equipped with a stuffing box 34, through which operates a valve stem 35, having connection with a slidable valve 36. The slidable valve 36 covers and uncovers ports 37 and 38, which supply steam to the opposite ends of the cylinder 29. The valve stem 35 has a portion thereof formed preferably square in cross-section and slidably mounted in guides 39. The valve stem 35 has an extension or block 39' rigidly connected therewith which extends laterally and is slidably mounted within the link 13. The extension 39' may preferably be provided with a head 40, to prevent any perceptible lateral movement of the extension 39', with relation to the link 13.

In the operation of my reversible valve gear, when the control lever 20 is in its normal vertical position, as shown in Fig. 1, the slide extension or the block 39' is dis-

posed midway the ends of the link 13, whereby the oscillatory movement of the link will impart a longitudinal movement to the valve stem 35 sufficiently to admit steam into that end of the cylinder in which the piston is, when the engine is on dead center. This admission is equal to the lead of the engine, but if the engine has no lead there will be no admission of steam at this point. When the controlling lever 20 is oscillated forwardly so that its latch device 28 catches in the notch 24, the link 13 will be raised, which causes a longitudinal movement of the valve stem 35, to start the engine in operation in the direction as indicated by the arrow. When the engine is put in operation the slide valve 36 is automatically reciprocated. The engine operates with a cut-off of one-half stroke. When the controlling lever 20 is oscillated in a reverse direction so that its latch mechanism 28 engages within the notch 27, the link 13 will be accordingly lowered and the valve stem 35 initially moved for starting the engine for operating in a direction reverse to that indicated by the arrow. The further operation of the valve stem is automatic. As the controlling lever 20 may be employed to raise and lower the link 13 to any desired position, different points of cut-off may be obtained by placing said lever in positions whereby its latch mechanism 28 will engage within selected ones of the notches 26.

I wish it understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that certain changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In apparatus of the character described, an eccentric, arms mounted thereon, bell-crank levers pivotally connected with the arms and forming in effect a toggle joint therewith, a vertically movable link, reach-rods pivotally connected with the bell-crank

levers and crossing each other for pivotal connection with the link, means to raise and lower said link, a valve stem, and a member connected with the valve stem and slidably mounted within the link.

2. In apparatus of the character described, an eccentric, arms mounted upon the same, levers having pivotal connection with said arms, a link, reach-rods connecting said levers and link, means to raise and lower the link, a valve stem, and a member connected with the valve stem and slidably mounted within the link.

3. In apparatus of the character described, an eccentric, a link, driving connecting means between the eccentric and the link whereby the latter may be oscillated by the former, means for raising and lowering the link, a valve stem, and a member connected with the valve stem and slidably mounted within said link.

4. In apparatus of the character described, a pair of bell-crank levers having a common pivot point, means to operate the same, a link, reach-rods connecting the link and bell-crank levers, a valve stem, a member connected with the valve stem and slidably mounted within the link, and means to move the link transversely of the valve stem.

5. In apparatus of the character described, a single eccentric, a pair of arms having heads loosely mounted on the single eccentric, bell-crank levers each of which has arms of different lengths, common means for pivoting the bell-crank levers at their apices, means pivotally connecting the long arms of the bell-crank levers with said arms having the heads, a link, rods connecting the short arms of the bell-crank levers and the links, a valve stem, a block carried by the valve stem and disposed within the link, and means to shift the link.

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

OLIVER T. ISAACSON.

Witnesses:

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