J. D. HAZLET.

Valve-Gear for Steam-Engine.

No. 197,780. Patented Dec. 4, 1877.

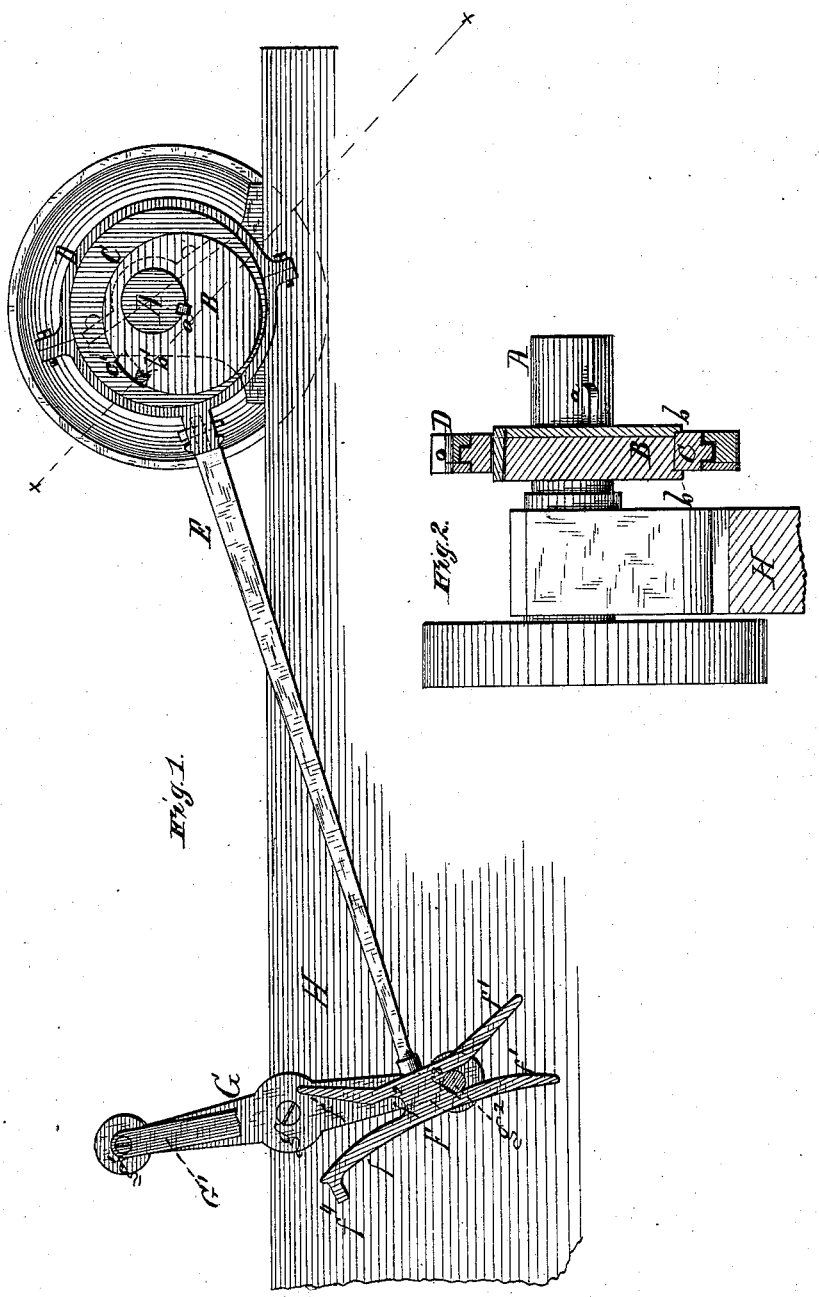

Fig. 1.

Fig. 2.

WITNESSES

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IMPROVEMENT IN VALVE-GEAR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **197,780**, dated December 4, 1877; application filed October 27, 1877.

To all whom it may concern:

Be it known that I, JOHN D. HAZLET, of Meadville, county of Crawford, State of Pennsylvania, have invented certain new and useful Improvements in Valve-Gear for Steam-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a side elevation of so much of a steam-engine as is necessary to show my improvement, and Fig. 2 represents a section through the double eccentric and strap on the line *x x*, Fig. 1.

Similar letters of reference denote corresponding parts in both figures.

My invention relates to a novel valve-gear for reversing the engine; and consists in the employment of a double eccentric, or rather of two eccentrics, one fitted and moving upon or over the other in the process of reversing the motion of the engine; and it further consists in a novel arrangement of rocking arm or lever, and of reversing-block, by means of which, in connection with the double eccentric, the reversing of the engine is effected, as hereinafter described.

In the accompanying drawings, A represents the crank-shaft; B, the inner eccentric, rigidly connected with said shaft by means of a key, *a*, or other equivalent device which will insure its movement therewith. This eccentric B is represented as made in two parts, which are united by transverse bolts, each part being provided on its outer side or face with a peripherical flange, *b*, forming a groove between them, in which is placed the outer eccentric C, surrounding the eccentric B, as shown. The inner eccentric B is provided at one point on its periphery with a key, *b'*, which enters a key seat or recess, *c'*, cut in the inner adjacent face of the eccentric C. The relation of the key and key-seat to the eccentrics may be reversed, if preferred. The seat *c'* is elongated, to allow sufficient relative movement of the eccentric C upon the eccentric B when the motion of the engine is reversed to give the required lead in the reverse direction. The outer eccentric C has the strap D, to which the connecting-rod E is attached, applied to it in any usual or preferred manner. The opposite or forward end of rod E has what I term the "shifting" or "reverse" block F, rigidly connected with it, said block being forked at both ends, with the arms $f\,f^1$, by preference, made diverging from the wrist-pin seats $f^2\,f^3$, for the purpose of adapting the ends of the block to be readily engaged with their respective wrist-pins. G is a rocking arm or lever, pivoted midway of its length at *g* in the bed-plate H, or on any suitable support, said arm being provided at each end with a wrist-pin, $g^1\,g^2$, with either of which the forked block F may be engaged.

To the outer ends of these wrist-pins, or to other suitable points of support on the ends of the arm G, is secured a strap, G', partly broken away in the drawing to show the block F and lower wrist-pin, said strap serving to prevent lateral movement of the block F in being shifted from one to the other of the wrist-pins $g^1\,g^2$.

The arm *f* of the upper fork of block F is provided with a perforated lug or ear at f^4, with which a cord is to be connected in practice, said cord running up over suitable guides or pulleys, and thence to any convenient point and to any required distance from the engine, for placing the engine under the control of the party making use of it. The point of attachment of the cord can, of course, be changed to any other suitable point on either the block F or connecting-rod E. The upper end of the vibrating arm or lever G, on the reverse face to that shown in the drawing, is provided with a stud or pin, to which one end of the valve-rod is to be attached, the other end of said rod being connected with the valve in any usual manner.

By the arrangement of the parts as shown and described, it will be seen that with the parts in the position shown in Fig. 1, with the reverse-block engaged with the lower wrist of the rocking arm G, a forward movement of the connecting-rod E, acting through the rocking arm, will impart a backward or reverse reciprocation to the valve-rod, whereas when the block is at the upper end of said arm, the valve-rod will form virtually an extension of the rod E, and its movement will be in the same direction.

In operation it will be seen that by simply drawing upon the cord referred to, the block

F will be drawn up out of engagement with the lower wrist-pin of the vibrating lever G, and into engagement with the upper wrist-pin, thus reversing the engine, and by releasing the cord the block will, by its own gravity, fall back into engagement with the lower wrist-pin, again reversing the engine.

As soon as the block is raised or lowered, the friction of the eccentric-strap D on the outer eccentric will be sufficient to cause the latter to slip on the inner eccentric to the extent permitted by the elongated key-seat c', thus giving the required lead to the valve; or, if the friction should be insufficient for the purpose, the required change in the relation of the eccentrics will be automatically effected as soon as the shaft commences its movement in the opposite direction. When the block F is held at a point intermediate between the wrist-pins g^1 g^2, and out of engagement therewith, the valve, of course, will be thrown out of action, and the engine stopped.

The valve-gear described is more particularly designed for use in the oil regions, and in other localities where the attendant is required frequently to be at work at some considerable distance from the engine, and in such case, by the use of the cord as explained, he is enabled instantly to reverse the engine from where he stands, according to the requirements of his work; but it will be apparent that the gear may be applied with advantage to other engines.

The form of the block F, and also of the vibrating arm or lever G, may, of course, be changed; and I therefore do not wish to be restricted to the particular forms of those parts shown and described; but,

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

1. The combination, in a valve-gear for reversing engines, of an inner eccentric, B, and an outer eccentric, C, the one moving automatically upon the other in reversing the engine, substantially as described.

2. The combination, with the inner and outer eccentrics, having an automatic movement relatively to each other, of a shifting-block adapted to engage with either of two wrist-pins, for the purpose described.

3. The combination, with the inner and outer eccentrics, operating as described, of the shifting-block F, attached to the connecting-rod, and the vibrating arm or lever G, to which the valve is connected, substantially as described.

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Witnesses:

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