W. WINSTANLEY.

ENGINE VALVE-GEAR.

No. 184,453. Patented Nov. 14, 1876.

Fig 2

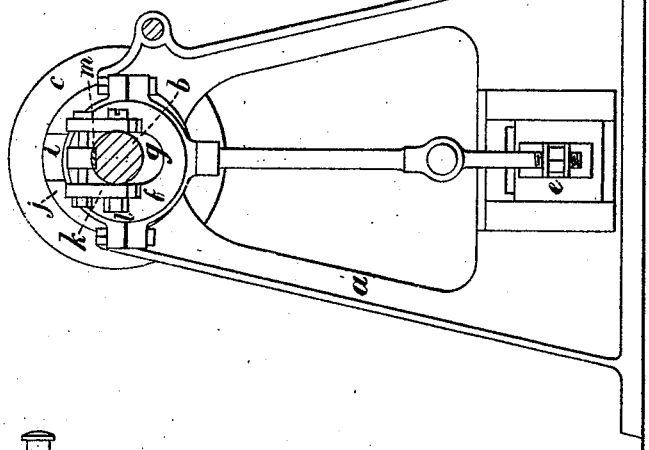

Fig 1

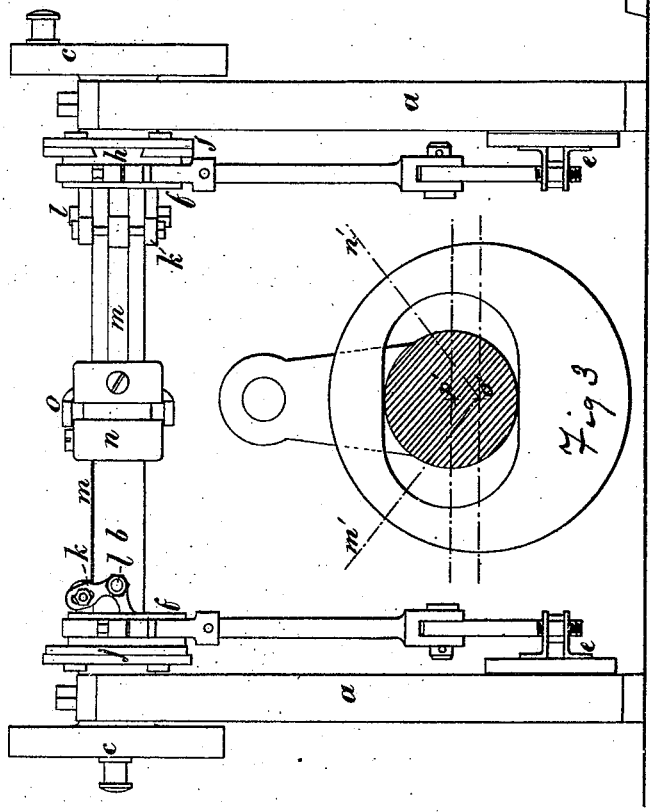

Fig 3

Witnesses

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WILLIAM WINSTANLEY, OF LIVERPOOL, ENGLAND.

IMPROVEMENT IN ENGINE-VALVE GEARS.

Specification forming part of Letters Patent No. **184,453**, dated November 14, 1876; application filed May 11, 1876.

To all whom it may concern:

Be it known that I, WILLIAM WINSTANLEY, of Liverpool, in the county of Lancaster, England, engineer, have invented a new and useful Improvement in Reversing-Gear for Engines, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation of devices embodying my invention. Fig. 2 is an end section, and Fig. 3 is a sectional view, showing the position and shape of the slot in the eccentric.

Like letters refer to like parts wherever they occur.

This invention relates to reversing-gear in which stoppage or change in the direction of motion of engines, and also the variation in the point of cut-off, and lap and lead of the slide-valves is obtained from one eccentric. For the above purposes I employ for each engine and slide-valve an eccentric, having a straight slot cut therethrough out of the center of such eccentric, and at right angles to a line passing through the said center. I affix the eccentric on its driving-shaft, which passes through the said slot in such manner that the to-and-fro motion allowed by the slot shall be at right angles, or nearly so, to a line passing through the centers of the crank-pin and crank-shaft.

Each eccentric fits against a disk secured on the eccentric-shaft, which may be the crank or an intermediate shaft, and is connected thereto by means of a piece or pieces working in a straight groove or grooves, so that the rotation of the disk causes the rotation of the eccentric, and at the same time allows of to-and-fro motion in the eccentric in the direction of the slot cut therein. The to-and-fro motion of the eccentric is controlled by a bell-crank lever and levers, or like means.

I will now proceed to describe my invention specifically, so that others skilled in the art to which it appertains may apply the same.

a represents the frame-work; *b*, the driving-shaft; *c*, cranks at right angles, operated by a pair of engines; *e*, slide-valves; *f*, eccentrics, each formed with a straight slot, *g*, through which the driving-shaft passes, and connected to the slide-valves by ordinary gear. The said eccentrics are, further, fitted with long straight guide-pieces, *h*, working in straight slots *i* in the disks *j*, secured to the shaft *b*. To give motion to the said eccentrics across the shaft, I employ the bell-crank levers *k*, pivoted to the shaft *b*, as at *l*, the arms at one end being connected to the eccentrics, and at the other to the sliding pieces *m*, let into the said shaft *b*. The said sliding pieces are in turn connected to the grooved collar *n*, free to slide along the shaft *b*. Motion is given to the collar *n* by means of the forked lever *o*, held in position by the pin *p*.

In Fig. 3 the position and shape of the piece cut out of the eccentric are shown. The lines *m' n'* show the position of the eccentric with regard to the crank when the engine is moving in one direction or the other. In the position shown the engine is at rest. *o'* indicates the center of the eccentric, and *p'* the center of the shaft.

It will be observed that no strain or wear comes on the driving-gear during the motion of the engines, except at the time of reversing or stopping, the eccentrics being carried round on the shaft by means of the pieces *h* and disks *j*; further, when the centers of the eccentric slots *g* and the shaft coincide the motion of the engines will be arrested; and that the said engines will move in one direction or the other according as the eccentrics are moved across the shaft toward one or other of the ends of the said slots *g*.

It will be obvious that a rack and pinion, or quadrant, or like means, might be used instead of the bell-crank lever to give to-and-fro motion to each eccentric.

I am aware that attempts have been made to obtain the above results by giving motion to the eccentric in a curved or bent line running in a direction parallel to a line joining the centers of crank-pin and shaft, and do not herein claim such subject-matter, for in such an arrangement, to allow for the curved path, the eccentric is weakened by a large portion thereof being cut away, by the bearings between the said eccentric and its driving-disk being necessarily small, and by the moving mechanism being complicated. It will be seen that by my invention the several objections specified are overcome.

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

1. In combination with reversing-gear of the class specified, the eccentric having the straight slot at right angles to the direction of the crank, and out of the center of the said eccentric, for the purposes set forth.

2. The combination of the straight guide-pieces *h* on the eccentrics with the straight slots *i* on the disks, substantially as and for the purposes set forth.

3. The combination of the eccentrics, having the straight slots at right angles to the direction of the crank, and out of the centers of said eccentrics, with the disks *j*, levers *k*, sliding pieces *m*, collar *n*, and levers *o*, substantially as and for the purpose specified.

WILLIAM WINSTANLEY.

Witnesses:
W. H. HORROCK,
J. JOHNSON.