

(No Model.)

E. SHAY.
VALVE GEAR.

No. 301,528.

Patented July 8, 1884.

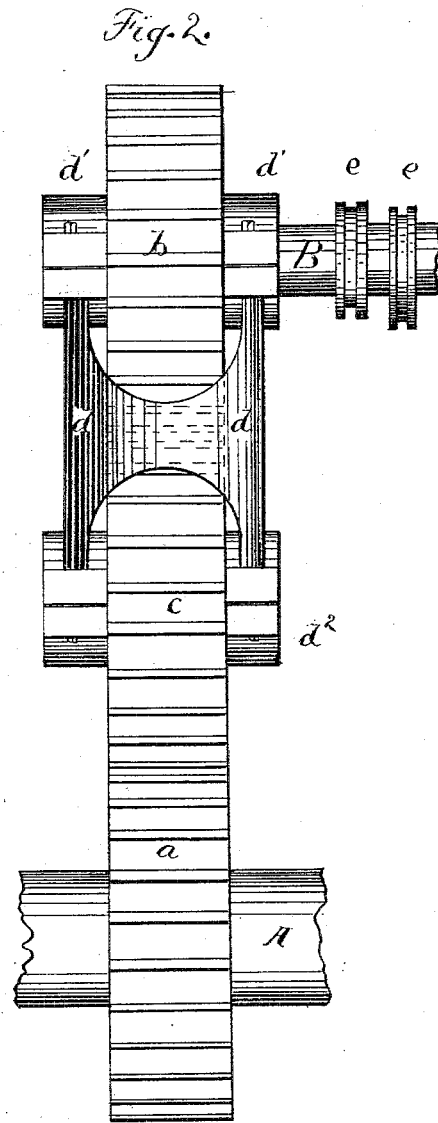
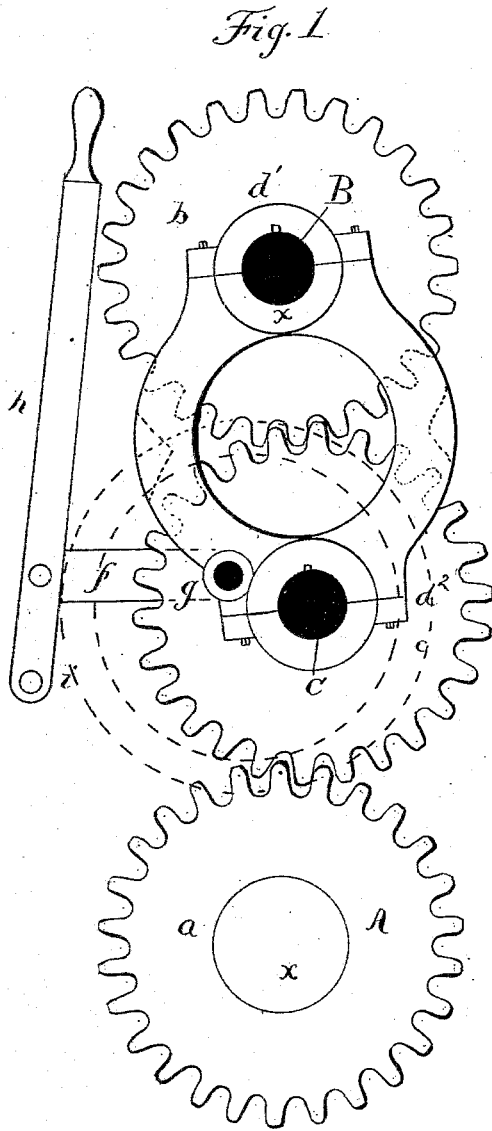
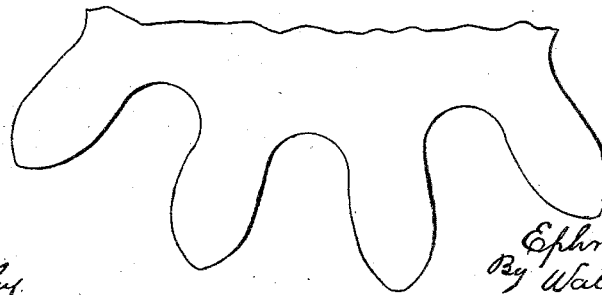


Fig. 3.



Witnesses:
G. W. Brown.
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UNITED STATES PATENT OFFICE.

EPHRAIM SHAY, OF HARING, MICHIGAN.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 301,528, dated July 8, 1884.

Application filed March 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIM SHAY, residing at Haring, in the county of Wexford and State of Michigan, have invented certain new and useful Improvements in Valve-Gear, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to valve-gear for steam-engines of the stationary or locomotive pattern.

The invention consists in certain details of construction, as hereinafter pointed out and claimed.

The object of the invention is to provide a valve-gear by which the eccentrics may be shifted without changing the relative position of the driving and eccentric shafts by the use of a single intermediate between the gear on the eccentric and that on the driving-shaft. This object is accomplished by the use of the mechanism hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of so much of the driving mechanism of my system of valve-gear as is necessary to illustrate my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a detail.

A represents the driving or crank shaft of a steam-engine, or it may be the axle of a locomotive. A gear-wheel, *a*, is splined, keyed, or otherwise firmly secured to this shaft, so as to partake of its rotation.

B indicates the valve-operating shaft—that is, the shaft by which the eccentrics, cams, or cranks which operate the valves are driven. Such eccentrics are indicated at *e e*; but it will be understood that any well-known form of eccentrics or their equivalents may be used, with suitable rods leading to the valves, whether located as shown or not. The eccentrics will have a definite relation to the shaft B. The shaft B carries a gear, *b*, in line with the gear *a*, and also serves as a bearing for the hangers or yoke *d*, which hangers support the short counter-shaft C in a position normally intermediate between the shafts A and B. The counter-shaft C carries a gear-wheel, *c*, which engages with the gear-wheels *a b*, which wheels *a* and *b* have the same number of teeth. The teeth on the gear-wheels *a b c* are quite long, and are of similar pitch, the points being

rounded, as shown clearly in Fig. 3, and intermeshing with each other so far that a slight change in the pitch-line will not practically affect the mesh of the teeth with each other on the different wheels. The hangers *d* are supported on the shaft B by suitable boxes, as *d' d'*, and retain the counter-shaft in the bearing-boxes *d''*. A draw-bar, *f*, connected to the hangers at *g*, may be operated by hand-lever *h*, which is pivoted at *i* to swing the hanger, and with it the counter-shaft C and pinion *c*, within the limits of its movement.

It will be apparent that the hanger *d* may be journaled on the shaft A with the same effect as on shaft B; also, that other mechanism than the hand-lever and draw-rod may be used to swing the hanger *d* and to shift the gear *c* from one side to the other of the center line, *x x*, or to an intermediate position centrally on that line.

The operation of the device is as follows: Assuming the gear *c* to be in the position shown in full lines, its teeth will intermesh with the gears *a b*, and as the shaft A revolves the shaft B will revolve uniformly therewith, the eccentrics carried by shaft B operating in the manner predetermined for them in such relation. When, now, the gear *c* is thrown into the position indicated in dotted lines, the two shafts A B will have a different relation, and the eccentrics carried or moved by shaft B, while making the same number of movements for a given number of revolutions of shaft A, will operate valves at different relative intervals than when the gear *c* was in the former position. It will be understood that the gear may be thus shifted while the engine is in motion, and that it may be shifted to any distance within the limit of its movement, thus giving complete control of the valves.

I claim—

1. The combination, in a valve-gear, with the driving-shaft and eccentric-shaft, arranged at a fixed distance apart, and each carrying a gear, of a single intermediate gear intermeshing with both those before mentioned, said intermediate gear being suspended by a pendulous yoke or hanger from one of the shafts, and capable of movement with reference to the driving and driven gear without disengagement therefrom, substantially as described.

2. In a valve-gear, the combination, with the

driving-shaft A, having gear *a*, driven shaft B, having gear *b*, and intermediate counter-shaft, C, having gear *c*, all the gears of uniform size and intermeshing, of the hanger *d*, journaled
5 on one of the shafts, A or B, so as to support the shaft C in position approximately intermediate between shafts A and B, substantially as described.

3. In a valve-gear, the combination, with
10 the shafts A, B, and C, of the gears *a*, *b*, and *c*, of uniform size, and arranged relatively to each

other as set forth, of the hanger *d*, journaled on shaft B, as described, the draw-rod *f*, connected to said hanger, and an operating-lever, *h*, connected to said draw-rod, substantially as set forth. 15

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

EPHRAIM SHAY.

Witnesses:

C. A. FORD,

E. F. SAWYER.