N. E. NASH.

Reversible Valve Gear.

No. 165,682. Patented July 20, 1875.

FIG. I.

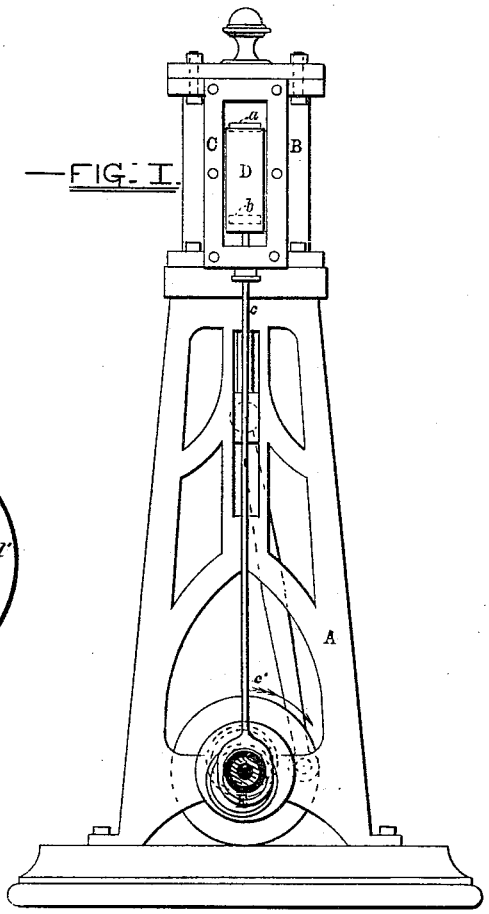


FIG. IV.

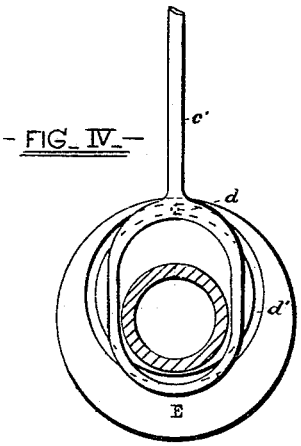


FIG. V.

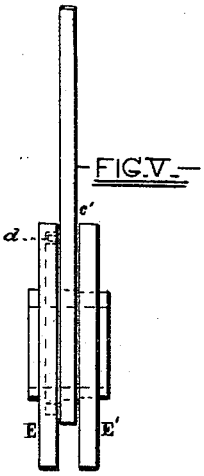


FIG. II.

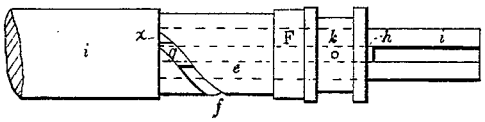
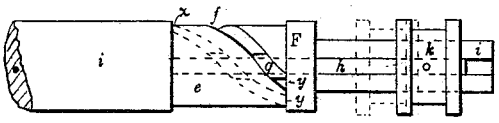


FIG. III.



WITNESSES.

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UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF WESTERLY, RHODE ISLAND.

IMPROVEMENT IN REVERSIBLE VALVE-GEARS.

Specification forming part of Letters Patent No. 165,682, dated July 20, 1875; application filed December 29, 1874.

To all whom it may concern:

Be it known that I, NATHAN E. NASH, of Westerly, Rhode Island, have invented certain new and useful Improvements in Reversible Valve-Gearing for Steam-Engines, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my invention, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

My invention relates to a combination of devices, hereinafter described, designed to effect a forward or backward movement of the rotating parts of the engine, the direction taken by said rotating parts being governed by the relative positions which certain of the parts are made to occupy with relation to the crank of the engine. This invention, as will be seen, admits of the attainment of a variable "lead" of the steam-valve, of a vertical movement of the stem attached to the said valve, without the use of a connecting-link, and also produces the forward or backward motion of the engine, without the complication of two eccentrics or any of the reverse motions ordinarily applied.

In the further description of my invention which follows, due reference must be had to the accompanying drawing, forming a part of this specification, and in which—

Figure 1 is an elevation of parts of a steam-engine embodying my improvements. Figs. 2, 3, 4, and 5 are enlarged views of parts of the invention.

Similar letters of reference indicate similar parts in all the figures.

A represents the frame of the engine, upon which the cylinder B is fastened. The steam-chest is represented by C, and the upper and lower steam-ports, respectively, by *a* and *b*. D is the steam-valve, and *c* the valve-stem, an extension of which, *c'*, is stirrup-shaped, and connected by means of the pin *d* to the eccentric wheel E. The eccentric wheel consists of a disk, provided with a concentric hub on either side, and an eccentrically-shaped groove, *d'*, on the outer face, into which groove the pin *d* on the valve-stem extension *c'* is fitted to rest. The lower end of the valve-stem extension is enlarged and slotted to fit over the outer hub of the eccentric wheel, in which position it is secured by means of a guard-disk, E'. By this arrangement of parts a vertically-reciprocating motion only is imparted to the valve-stem, and the necessity of a connecting-link in said stem avoided. The eccentric wheel E rests upon and is secured to a sleeve, *e*, which has a spirally-formed groove, *f*, running the entire length thereof, into which a spiral block, *g*, is adapted to slide. The spiral block *g* is attached to a rod, *h*, embedded in a channel in the shaft *i*, and is susceptible of a longitudinal movement by means of said rod and sliding clutch *k* attached thereto. A lever or other moving device can be easily applied to the clutch to cause the longitudinal movement aforesaid. F is a collar, designed, in connection with the portion of shaft of increased diameter at the back of the eccentric wheel, to prevent any motion of the eccentric wheel upon the sleeve *e* other than the circumferential movement before alluded to. It will be understood that the eccentric wheel is moved directly by means of the spiral block *g*, which bears against the sides of the groove in the sleeve to which the said wheel is fastened.

In Fig. 1 the eccentric wheel is shown in the two positions which it occupies to cause the forward and backward motions of the rotating parts of the engine before alluded to, the full delineation representing its position necessary to give a movement of shaft in the direction indicated by the arrow, and the dotted delineation a reverse direction of the same. The pitch of the spirally-formed groove in the sleeve *e* is such as to give in the portion of the helix contained in said sleeve a circumferential variation or distance between the points *x* and *y* equal to the distance which the eccentric wheel is required to travel upon the sleeve to allow of the forward and backward direction of the rotating parts of the engine.

In Fig. 2 the relative positions of the parts are such as to give the eccentric wheel a position corresponding to the one shown in full delineation in Fig. 1, and in Fig. 3 a situation as indicated by the dotted lines.

It will be evident to those conversant with valve-motion that by the use of a single ec-

centric wheel, constructed as shown, and provided with the attachments forming a part of my invention, a forward and backward direction of the engine may be produced readily and easily without the complication consequent upon the use of two eccentrics in combination with an ordinary "Stephenson's" link, or in the use of any combination requiring two eccentrics.

One advantage I claim for my invention is, that by its use a variable lead can be obtained, as the lead increases as the clutch and attachments are moved from either extreme position toward a central one. It will be observed that a compromised position of the eccentric wheel, or one equidistant from those shown in Fig. 1, increases the lead to such an extent that upon the movement of the crank toward either center the opposite steam-port is opened, thereby causing either a vibratory motion of the crank in a limited path between the centers, or the crank to assume a fixed position near the half-stroke point.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The eccentrically-grooved disk E, guard-disk E′, sleeve *e*, shaft *i*, collar F, rod *h*, block *g*, and sliding clutch *k*, combined and operating substantially as and for the purpose herein specified.

2. In combination with the eccentrically-grooved disk E and guard-disk E′, secured upon the spirally-grooved sleeve *e*, the stirrup-shaped valve-stem extension *c′*, provided with the pin *d*, substantially as set forth, for the purpose designated.

In testimony whereof I have hereunto subscribed my name this 26th day of December, in the year of our Lord 1874.

NATHAN E. NASH.

Witnesses:
WM. T. HOWARD,
WM. S. MURPHY.