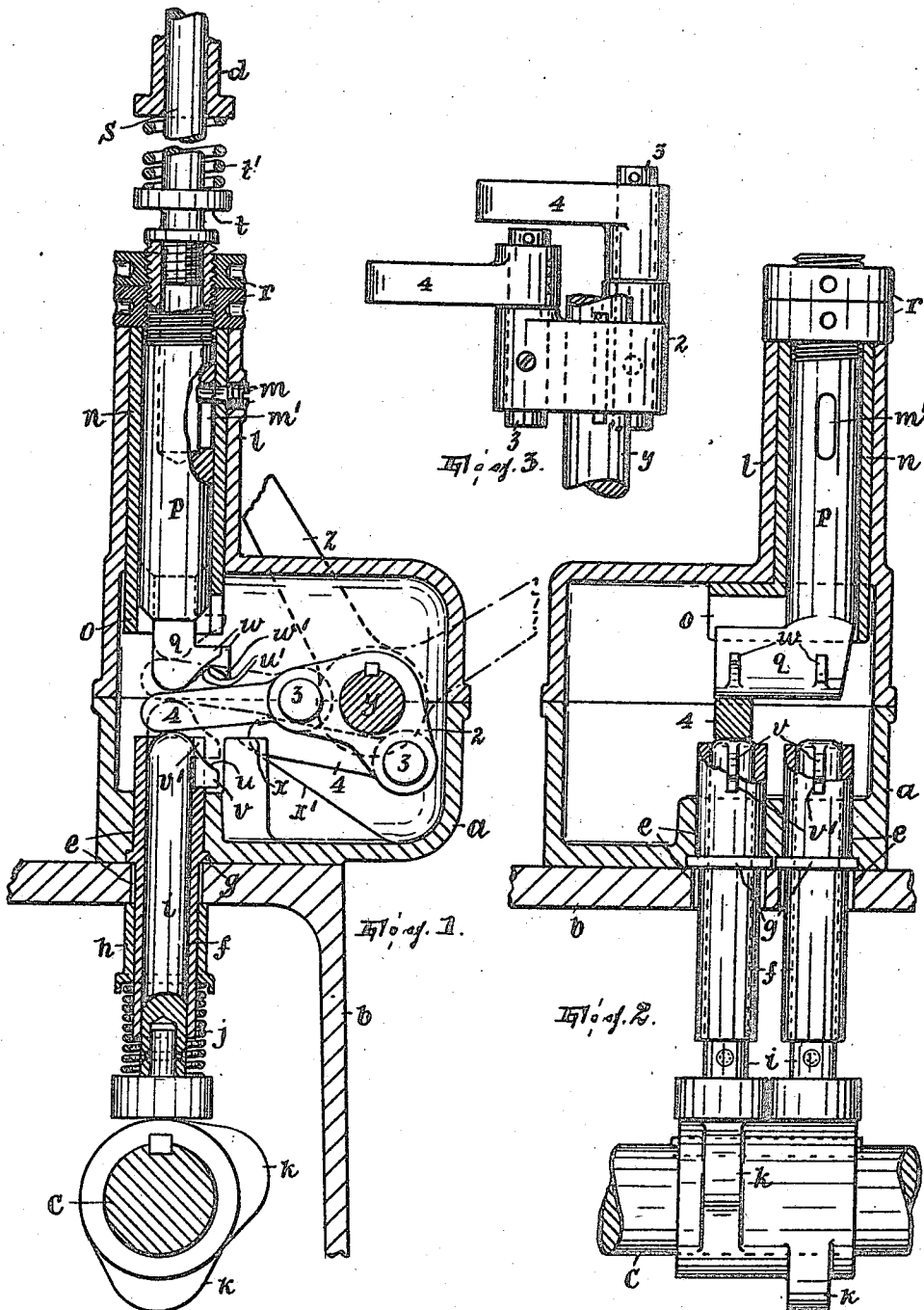


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 REVERSING MECHANISM FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED AUG. 11, 1920.

1,416,319.

Patented May 16, 1922.



WITNESS:

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REVERSING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

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Application filed August 11, 1920. Serial No. 402,929.

To all whom it may concern:

Be it known that I, ROBERT BARBOUR, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Reversing Mechanisms for Internal-Combustion Engines, of which the following is a specification.

This invention relates to engines, and it has for its object to provide, in combination with a rotary part of the engine and instrumentalities driven thereby for imparting impulses at two different points in its cycle, and with means to be actuated from said instrumentalities, improved mechanism for selectively transmitting the impulses of said instrumentalities to the means to be actuated. As herein shown and described my invention contemplates the means to be actuated to include a valve of an internal combustion engine of the type which is adapted to be driven either forward or backward, the aforesaid rotary part to be its cam-shaft and the aforesaid instrumentalities to include the cams on said shaft from either of which, according to the position of the aforesaid mechanism, the valve is actuated; my invention, however, is not correspondingly limited, as will be evident from the appended claim.

In the drawing,

Figure 1 is a vertical sectional view showing the cam-shaft of an internal combustion engine, the impulse-imparting instrumentalities driven thereby, the means to be actuated, and the improved mechanism for selectively transmitting such impulses to said means;

Figure 2 is a sectional view taken at right angles to the plane of section of Figure 1 and showing the principal parts seen in Figure 1;

Figure 3 is a plan of the improved mechanism, detached.

a designates a suitable support in the form of a casing arranged on the crank-case *b* of the engine. The casing is conveniently formed in two parts, being divided horizontally. Its construction in other respects will be hereinafter set forth.

c designates the cam-shaft of the engine.

d is a guiding ferrule below and in alignment with the valve (not shown) to be actuated, being suitably held fixed in a part of the engine.

The lower part of the casing *a* and the crank-case *b* have a pair of holes *e* each of which receives a bushing *f* which is kept against vertical movement by a flange *g* 60 thereon held between the casing and crank-case, and on the lower end of this bushing is a sleeve *h* which upwardly abuts the crank-case. In the bushings are push-rods *i* which are held normally pressed down by 65 spiral springs *j* (abutting sleeves *h*) against two cams *k* fixed on the cam-shaft *c* in such relation to each other as to effect the proper opening of the aforesaid valve according as the engine is being driven forward or backward. Each cam and its corresponding push-rod form one of the aforesaid instrumentalities for imparting impulses at two different points in the cycle of the crank-shaft; it will be understood, however, that 75 my invention is not limited to the employment of intermediaries, such as the push-rods constitute, between the cams or other primary impulse-imparting members and the means to be actuated.

The upper part of the casing *a* has an upstanding hollow pillar *l*, and in this is held by a screw *m* a bushing *n*, the lower part of which (within the casing) has a lateral under-grooved or saddle portion *o*; 85 this bushing is alined with the guiding ferrule *d*. In it is arranged a push-rod constructed in two parts as follows: The lower part *p* has a lateral extension *q* straddled by the portion *o* of bushing *n* and it has a 90 stop-device *r* (shown as two nuts) screwed thereon and adapted to contact with the top of the pillar to limit the downward movement of the push-rod; the upper part is a stem *s* screwed into the upper end of part *p* 95 and having a shoulder *t* between which and the ferrule *d* a spring *t'* is interposed, acting normally to hold the push-rod to the downward limit afforded by contact of the stop-device *r* with the pillar. Screw *m* may 100 engage a slot *m'* in the push-rod, thus forming a spline and keeping the push-rod from turning.

The extension or head *q* of the upper push-rod *p-s* directly overlies the upper 105 ends of the two lower push-rods *i*. The adjoining end-portions of the push-rods, *i* and *p-s*, are rounded as viewed laterally (Figure 1), and at one side they have converging cam-faces *u-u'* formed preferably on 110 lateral projections *v-w*, the projections *v* being respectively on the lower push-rods

and the projections w being a pair on head g of the upper push-rod. One of the projections w is preferably formed with a depending toe w' for a purpose to be stated. The projections v may engage slots v' in bushings i to keep the lower push-rods from turning.

The bottom of the casing a at the side of the push-rods adjoining their cam-faces $u-u'$ is formed with two rests $x x'$, the top of each of which is about level with the upper ends of the lower push-rods when fully depressed.

Journalled in the case a at the same side of the push-rods and on a horizontal axis is a rocker including a shaft y , having a suitable handle z for manually rocking it, and a two-armed crank 2. On crank-pins 3 of this crank arranged at points in two different radii from its axis, that is, in the respective arms thereof, are pivoted fingers 4 constituting the aforesaid impulse-transmitters. Their free ends are rounded and they are adapted to slide on the rests $x x'$, the rest x' being preferably inclined upwardly for a purpose to be explained. They are respectively arranged in the same vertical planes as the lower push-rods and hence are respectively opposite them and also opposite the head g of the upper push-rod. Their length is such that when the rocker is turned one way or the other, one finger will wedge itself between the corresponding lower push-rod and the upper push-rod and the other (previously occupying that position with respect to the other lower push-rod and upper push-rod) be withdrawn.

The throw of the cams k is insufficient to raise the lower push-rods so that they will directly move the upper push-rod and hence the valve. Therefore, according to whether the rocker is moved to the one or the other of its limits, thus interposing one finger 4 between the corresponding push-rod i and push-rod $p-s$ and withdrawing the other

finger from a corresponding position, the valve will be actuated from whichever cam is rendered effective by the presence of the interposed finger, i. e., at one or the other of two points in the cycle of shaft c and hence of the engine. The valve will therefore be adapted for the running of the engine forward or back according to the position of the mechanism y , 2, 3, 4.

The incline x' allows the relatively lower finger 4 to perform its thrust without undue oscillatory movement, otherwise incident to its crank pin 3 being below the shaft y , and the toe w' insures the end of this finger being cammed downwardly along the cam-face u' as it performs its forward thrust movement.

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

The combination, with a pair of upward thrust-imparting members moving in alternation upward to substantially the same plane, a rocker arranged on a horizontal axis approximating said plane and equidistant from said members, and impulse-transmitters pivoted to said rocker one above and the other below said axis and having free ends projecting toward the respective members and each one rocking the rocker back and forth being movable over and into position to rest on the corresponding member and then clear the latter, of a supporting structure for said members and rocker having means to guide approximately in said plane the free end of the upper transmitter when clear of the member corresponding thereto and a rest for guiding the free end of the lower transmitter when clear of the member corresponding thereto, said rest being upwardly inclined to approximately said plane.

In testimony whereof I affix my signature.

ROBERT BARBOUR.