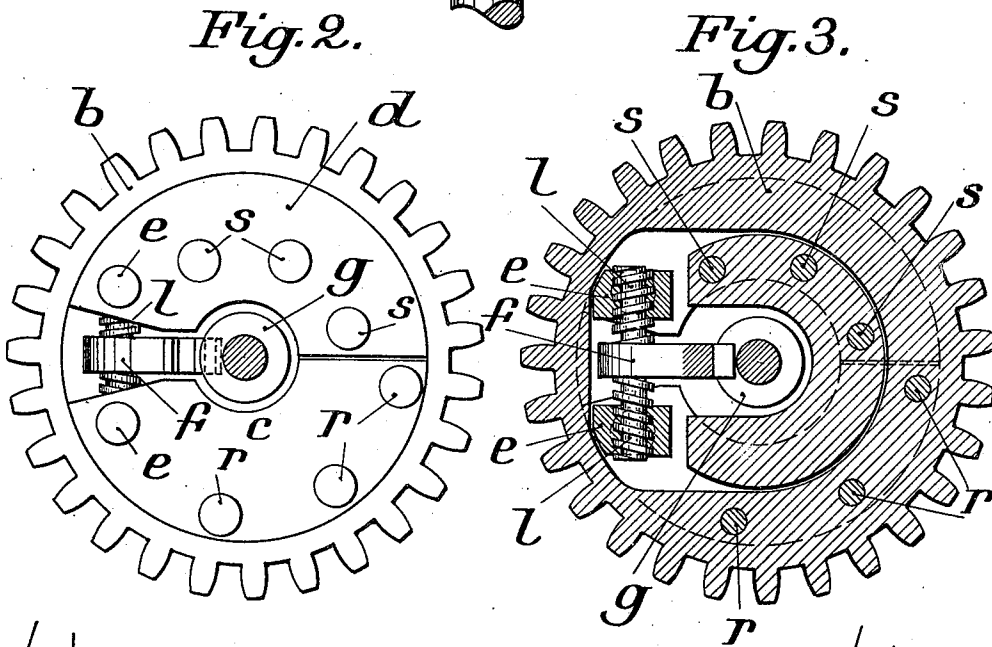
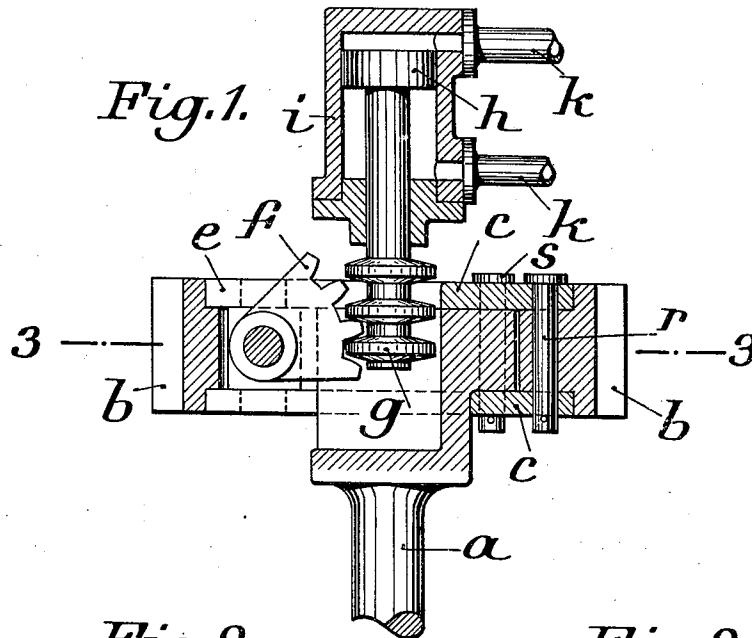


T. REUTER.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED AUG. 13, 1909.

968,690.

Patented Aug. 30, 1910.



WITNESSES
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UNITED STATES PATENT OFFICE.

THEODOR REUTER, OF WINTERTHUR, SWITZERLAND.

INTERNAL-COMBUSTION ENGINE.

968,690.

Specification of Letters Patent.

Patented Aug. 30, 1910.

Application filed August 13, 1909. Serial No. 512,696.

To all whom it may concern:

Be it known that I, THEODOR REUTER, engineer, a citizen of the Swiss Republic, residing at 24 Obere Wielandstrasse, Winterthur, Switzerland, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to internal combustion engines, more especially to the change over gear of two stroke cycle-engines, and consists in mechanism to connect the cam shaft with the valve gear, whereby the cam shaft may be rotated in either direction with reference to the crank shaft.

According to my invention a gear wheel is mounted loosely on the cam shaft, and two pairs of disks, one of which is fixed to the cam shaft and the other to the driving gear wheel, are connected by a worm gearing. The worm gearing is controlled by a toothed segment fixed on it, and meshing with an axially arranged racked piston rod, said piston being actuated by any suitable means, such as for instance compressed air or a fluid under pressure.

In the accompanying drawings:—Figure 1 is a longitudinal section through an embodiment of my invention, Fig. 2 is a plan view of the gear wheel, Fig. 3 is a cross section on line 3—3 of Fig. 1.

In all the figures similar parts are indicated by the same letters of reference.

Referring to Fig. 1, *a* is the cam shaft, *b* the gear wheel mounted loosely on said shaft and driven from the crank by means of any suitable gearing not shown in the drawing. On each side of the gear wheel are arranged two half disks *c* and *d*. The two disks *c* are fixed by bolts *r* to the gear wheel, the two disks *d* by bolts *s* to the cam shaft. Both half disks are cut away to a certain extent as shown in Figs. 2 and 3, whereby it is possible to rotate the disks against each other to a certain extent. Between each pair of disks a nut *e* is pivoted, one of these being threaded lefthandedly, the other righthandedly. The two nuts *e* are connected by a screw threaded spindle *l*, the ends of which are also right and left handedly threaded. On the spindle is fixed a toothed segment *f*, which meshes with the racked piston rod *g*. The piston rod is connected to the piston *h*

adapted to slide in the cylinder *i*. Both ends of the cylinder are provided with feed pipes *k* for the actuating fluid or gas.

The action of the mechanism described is as follows: Whenever the piston *h* and its rod are moved in either direction the screw *l* is rotated by means of the toothed segment *f* and the nuts *e* thereby moved apart or approached nearer to each other. The nuts being pivotally mounted on the disks *c* and *d*, these disks are rotated by the movement of the nuts and the gear wheel *b* is at the same time rotated to a certain extent with respect to the cam shaft.

By the mechanism above described, I am enabled to dispense with any more complicated change over gear for each single valve. In two stroke engines it is most advantageous to open the scavenging and charging valves unsymmetrically to the position of the piston on the dead center, by actuating the air valves from the cam shaft. This is accomplished in a simple and efficient manner by the mechanism according to my invention.

Another important advantage of the invention is that as the gear wheel is countersunk at its side faces, the pairs of disks *c*, *d*, which have a relative angular movement with respect to each other, can be made to lie substantially within the lines of the gear wheel, as shown, whereby the device is made very compact and need occupy only very little space. As the racked piston rod *g* is located concentrically with respect to the gear wheel and in axial alinement with the cam shaft, the rotation of the gear wheel and cam shaft does not affect the engagement of the rack on said rod with the gear segment *f*, and it will be noted that as the rack operates within the hollow central portion of the gear wheel, the segment will always occupy a position substantially within the lines of the gear wheel. This is a further feature which increases the simplicity and compactness of the device, and the arrangement described is also factitive in making the construction very durable, as the parts are well housed and protected and therefore not liable to breakage.

I wish it to be understood, that I do not limit myself to the details of the modification of the mechanism above described. Other suitable means may be employed to connect the rotatable cam shaft with the driving gear, without departing from the spirit of my invention.

What I claim is:

1. In change over mechanism for internal combustion engines, a cam shaft, a gear wheel thereon, a pair of disks fixed to the gear, a second pair of disks fixed on the cam, and means to turn said pairs of disks in opposite directions.

2. In change over mechanism for internal combustion engines, a cam shaft, a gear wheel thereon, angularly movable disks connected with the gear wheel and cam shaft respectively, a threaded connection to move said disks angularly with respect to each other, and means to operate said connection.

3. In change over mechanism for internal combustion engines, a cam shaft, a gear wheel thereon, angularly movable disks connected with the gear wheel and cam shaft respectively, and rack operated mechanism to effect the relative angular movement of the disks.

In testimony whereof I have affixed my signature, in presence of two witnesses.

THEODOR REUTER.

Witnesses:

WILHELM BACHMANN,
WALTHER REINHART.