

S. M. HALTON.
INTERNAL COMBUSTION ENGINE.
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1,404,366.

Patented Jan. 24, 1922.

Fig. 1.

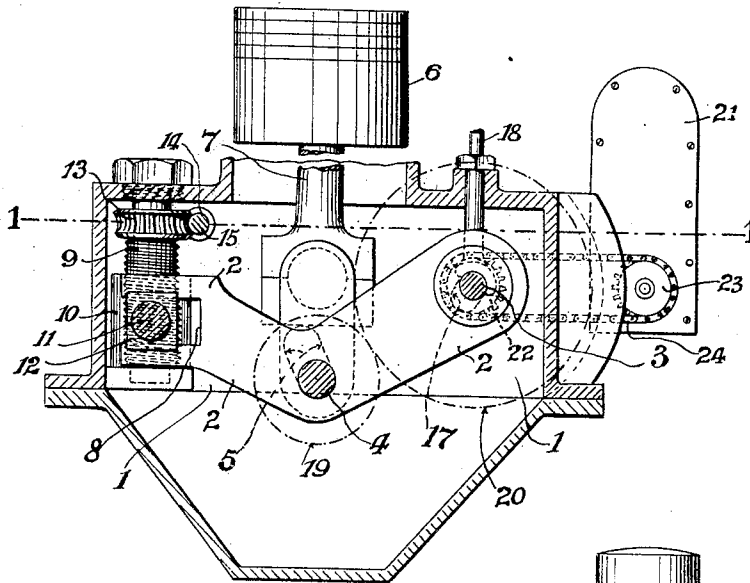
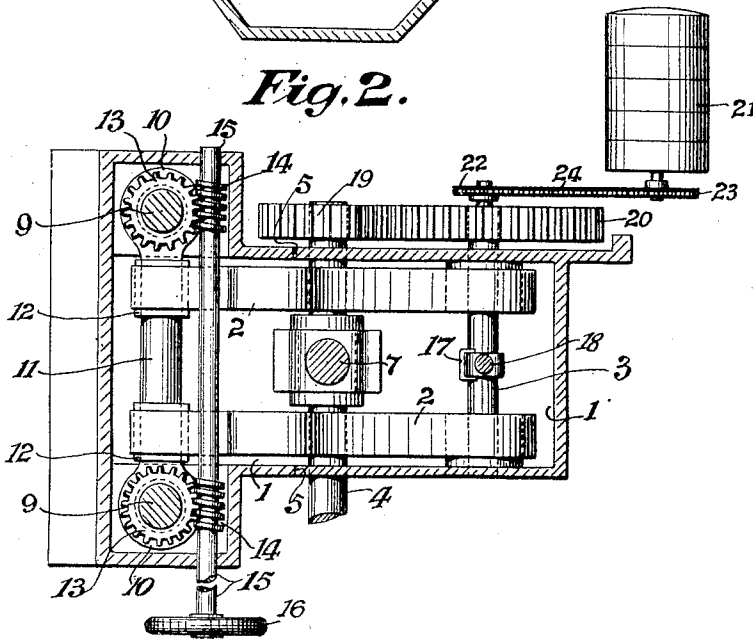


Fig. 2.



Inventor.
Stephen Mary Halton.
per Ferdinand Rosshardt
Attorney.

UNITED STATES PATENT OFFICE.

STEPHEN MARY HALTON, OF DUBLIN, IRELAND.

INTERNAL-COMBUSTION ENGINE.

1,404,366.

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Application filed November 8, 1920. Serial No. 422,728.

To all whom it may concern:

Be it known that I, STEPHEN MARY HALTON, a subject of the King of Great Britain, residing at Dublin, Ireland, have invented certain useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to means for varying the compression in internal combustion engines, the object being to enable the adjustment to take place in a simple and efficient manner, and the invention consists in means whereby the end positions of the piston or pistons relative to the cylinder or cylinders can be adjusted and thereby the amount of compression space available above the engine piston or pistons for compression of the working charge can be varied.

The invention also consists in the provision of means adapted to adjust the position of the engine crank shaft bodily towards or away from the engine cylinder or cylinders and thereby reduce or increase the compression space available in the cylinder or cylinders.

I attain the hereinbefore named and other objects by the means illustrated in the accompanying sheet of drawings, and hereinafter described and claimed. In the drawing—

Figure 1 is a detached sectional side view of the crank case and piston of an internal combustion engine.

Figure 2 is a horizontal section on line A—A of Figure 1.

Like numerals of reference refer to similar parts throughout both figures.

Referring to the drawing which illustrates one construction of my invention as applied to a four-stroke single cylinder engine, 1 is the crank casing in which arms 2, 2 are oscillatably mounted on a shaft 3 parallel with the crank shaft 4. The crank shaft 4 is rotatably mounted in the two arms 2, and slots 5 are provided in the casing for the ends of the crank shaft to project through. The crank shaft 4 and the piston 6 connected thereto by the rod 7 can therefore be raised or lowered by raising or lowering the arms 2 about their pivotal centre. By this means the end position reached by the piston at the end of its compression stroke can be varied and the available compression space remaining in the cylinder at the end of the compression stroke can be thereby

adjusted, to vary the compression of the charge.

A suitable method of simultaneously varying the position of the arms 2 consists in forming in the free end of each arm 2 an open ended slot 8 and in vertically mounting two screw-threaded spindles 9 in the crank casing 1, two nuts 10 connected together by a cylindrical tie rod 11 being screwed onto the spindles and serving to move the arms 2 by engagement of their tie rod 11 with bearing blocks 12 sliding in the slots 8. Worm wheels 13 are secured to the spindles 9 and gear with worms 14 provided on a shaft 15 rotatably mounted in the crank casing 1. The shaft is provided with a hand wheel 16 or connected by suitable shafting and gearing to a hand wheel situated in a convenient place for operation.

In order to simultaneously and automatically adjust the timing of the valves, if such are provided on the engine, the shaft 3 may be provided with a timing cam 17 adapted to actuate a rod 18 which operates the valves, the arms 2 being arranged free to oscillate on the shaft 3. This shaft is geared to the crank shaft 4 by toothed gear wheels 19 and 20 and is rotated thereby. If the arms 2 are lowered to reduce the compression, the shaft 3 is turned by the gearing 19 and 20, the direction of angular displacement of the shaft 3 relative to the crank shaft 4 being such that the timing of the valves is retarded. If the arms 2 are raised to increase compression, the shaft will be angularly displaced in the opposite direction and the timing of the valves will be advanced.

It will be appreciated that the timing cam may be arranged on any other suitable shaft in lieu of on the shaft 3, for example on a shaft at an angle to the crank shaft 4, and be connected up to the shaft 3 by suitable gearing in order to obtain automatic timing of the valves to correspond with the adjustable compression. It will also be understood that chain gearing may be employed in lieu of the gears 19 and 20 with a corresponding change in position of the shaft 3.

If desired the ignition timing may also be automatically adjusted to suit the compression by operatively connecting the same to the shaft 3 or a similar shaft; one suitable arrangement consists in driving a mag-

neto 21 by means of sprockets 22 and 23 connected together by a driving chain 24.

It is to be understood that my invention is equally applicable to multi-cylinder engines and that I desire to claim it for such engines also.

What I claim is:—

1. In an internal combustion engine, a working cylinder; a working piston therein; 10 a crank shaft operatively connected to said piston; a crank case rigidly connected to the working cylinder; arms oscillatably mounted in said crank case; crank shaft bearings provided on said arms; screw 15 mechanism in said crank case operatively connected to said arms to raise and lower said arms; and slots in said crank case through which the crank shaft projects, adapted to permit bodily displacement of 20 the crank shaft relative to the crank case.

2. In an internal combustion engine, a working cylinder; a working piston therein; a crank shaft operatively connected to said working piston; angularly adjustable arms 25 oscillatably mounted on the engine and carrying the crank shaft bodily; a valve timing shaft operatively connected to said arms; and driving means connecting said shaft to the crank shaft, whereby angular 30 adjustment of the arms to vary the end positions of the piston simultaneously and automatically varies the timing of said valve timing shaft to suit the variation in compression.

3. In an internal combustion engine, a 35 crank shaft; angularly adjustable and oscillatable arms mounted on the engine; crank shaft bearings formed on said arms;

a valve timing shaft on the engine; driving means between said shaft and the crank 40 shaft; an ignition magneto on the engine, and driving means between said valve timing shaft and the magneto, whereby the timing of the ignition is simultaneously and automatically adjusted to suit a variation in 45 compression due to adjustment of said arms on their axis of oscillation.

4. In an internal combustion engine, a working cylinder, a control valve on said cylinder; a working piston therein; a cas- 50 ing at one end of the working cylinder; a pair of arms oscillatably mounted inside said casing; a crank shaft carried by said pair of arms and connected to the working piston; a screw and nut device connected to 55 said pair of arms and adapted to adjust their angular position on their axis and to thereby move the crank shaft and piston bodily in relation to the working cylinder and said casing; a shaft mounted on said 60 casing coincident with the axis of said pair of arms; a valve cam on said shaft adapted to govern said control valve; toothed gears on the cam shaft and crank shaft gearing 55 said shafts together; an ignition magneto for igniting the mixture in the working cylinder; gearing between said cam shaft and the magneto operatively connecting the two together; all for the hereinbefore specified purposes. 70

Signed at Dublin, Ireland, this 21st day of October, 1920.

STEPHEN MARY HALTON.

Witnesses:

ANNIE D. JONES,
POLLY DAVIS.