July 6, 1926. 1,591,032

E. E. FOPAY

INTERNAL COMBUSTION ENGINE

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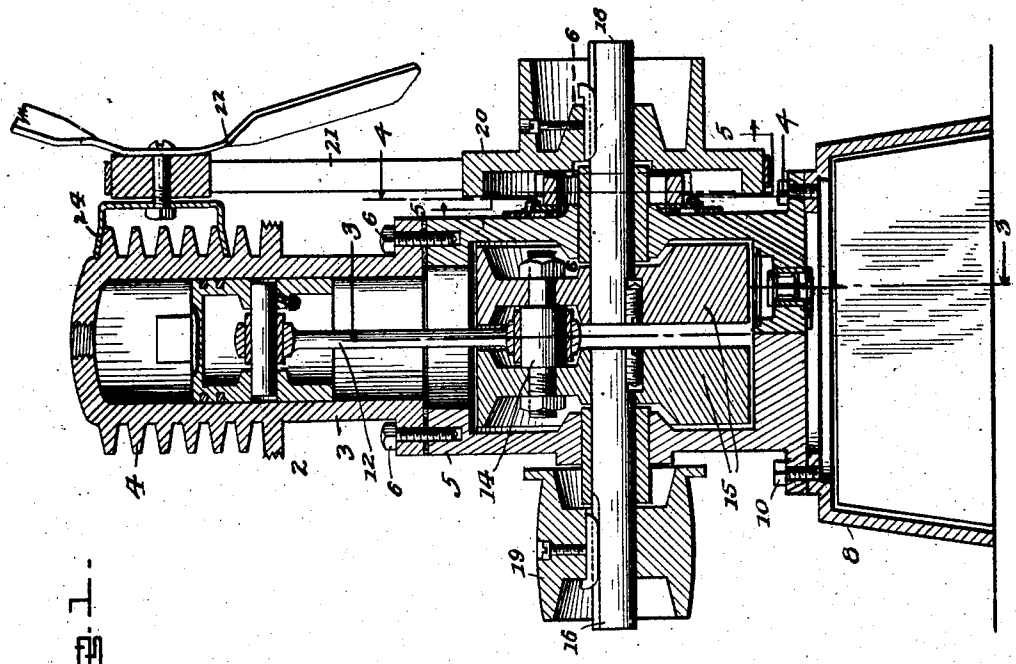


Fig. 1.

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Fig. 2.

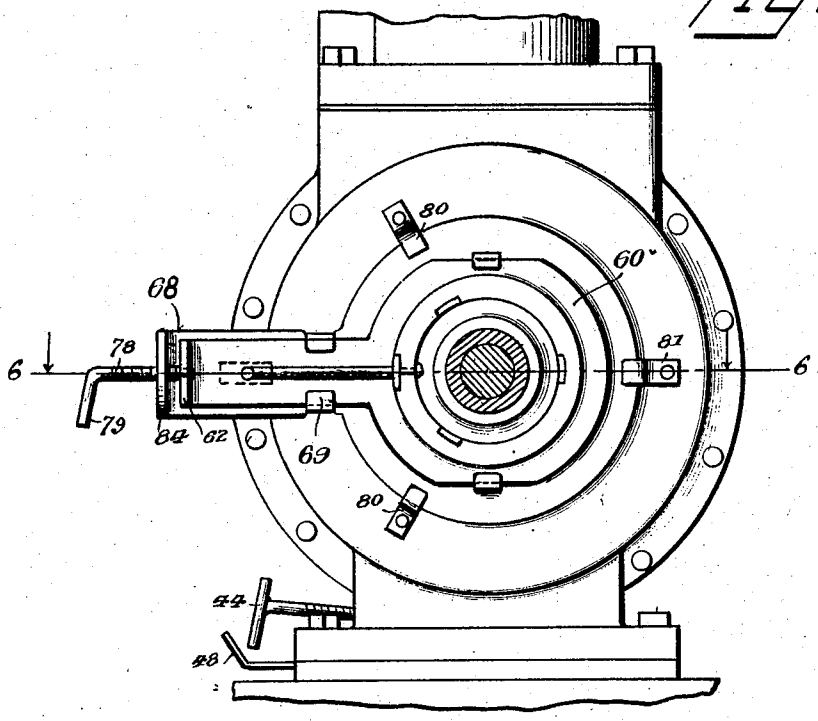


Fig. 4.

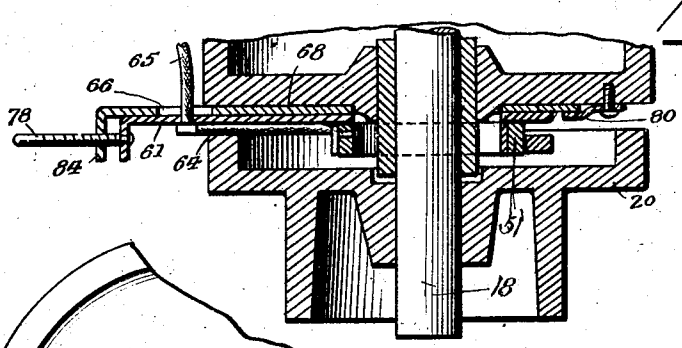
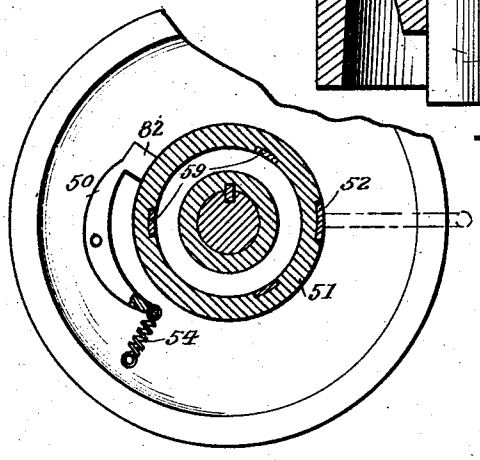


Fig. 3.



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Fig. 7.

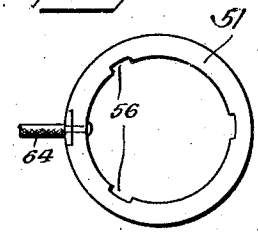


Fig. 5.

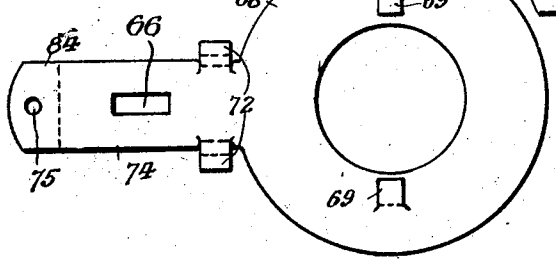
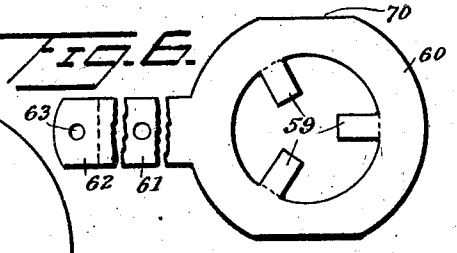


Fig. 6.



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UNITED STATES PATENT OFFICE.

ELMER E. FOPAY, OF DIETERICH, ILLINOIS.

INTERNAL-COMBUSTION ENGINE.

Application filed June 19, 1924. Serial No. 720,987.

This invention relates generally to internal combustion or commonly called gas engines, and particularly to engines of the two-cycle type wherein the combustible mixture is drawn into and compressed within the crank case, the intake of the mixture within the explosion space and the exhaust of the burned gases being controlled entirely by the position of the piston with respect to the intake and exhaust ports.

The predominating features of this invention are the peculiar construction and arrangement of the timing mechanism for controlling the ignition, and the objects of the invention are to provide, first, a timing mechanism which may readily be replaced as the case may be, and second, a timing mechanism for controlling the time at which the spark may occur in the period of the cycle of the engine and also for the purpose of regulating the speed at which the centrifugal controlling means moves out of engagement with its cooperating contact.

With these and other objects in view, my invention consists in the novel features of construction, combination and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claims.

With reference to the accompanying drawings,

Figure 1 is a vertical sectional view on the line 1—1 of Figure 2;

Figure 2 is a vertical sectional view taken on the line 4—4 of Figure 1;

Figure 3 is a detail enlarged sectional view taken on the line 5—5 of Figure 1;

Figure 4 is a sectional view on the line 6—6 of Figure 1; and

Figures 5, 6 and 7 are detail plan views of the timer track and its supporting and operating rings.

Referring more particularly to the drawings by numerals of reference, 2 designates generally the engine and 3 the cylinder thereof provided with the air cooling fins 4. The cylinder, in the present instance of the vertical type is mounted upon the crank case 5 to which it is secured by stay bolts 6, the crank case in turn being supported upon the base 8 being fastened to it by bolts 10.

The piston 11 is connected by pitman rod 12 with the crank 14 of the two-part counterbalancing head 15 of the divided crank shaft, the latter comprising shafts 16 and 18, one of which 16, carries a splined drive pulley 19. The opposite shaft 18 has splined thereto a belt pulley 20, which through a belt 21 drives a fan 22 journaled in a bracket 24 on the cylinder.

One of the principal features of this invention resides in the particular construction and arrangement of the governor mechanism and spark control, and to this end, there is pivotally mounted on the inner wall of the belt pulley 20 a centrifugally actuated contact arm 50 normally urged into contact with a normally fixed timer track 51 having a contact 52 through a coil spring 54, the tension on which may be regulated by suitable means. The timer track comprises a ring of insulating material, the inner wall of which is provided with a series of spaced recesses 56 for the reception of a series of tongues 59 formed on and bent at right angles to the plane of a supporting ring 60, said ring having a radial arm 61 terminating in a lip 62 having an aperture 63. To the contact member 52 is electrically connected, one end of a conductor 64, the other end 65 of which passes through an elongated opening 66 in the radial arm 61.

The supporting ring 60 is in turn carried by a flat ring 68 through the medium of opposed tongues 69 which engage over diametrically opposed flattened portions 70 of the track supporting ring 60, and tongues 72 arranged on opposite sides of a radial arm 74 formed with the flat ring 68. The outer end of the arm 74 is bent at right angles to its plane as at 84 and provided with a threaded aperture 75 for the reception of a screw 78, the inner end of which latter is swiveled in the opening 63 of the radial arm 61. The screw 78 is turned by a handle 79 to shift the track supporting ring 60 radially of the flat ring 68 for the purpose of adjusting the position of the contact 52 with relation to the brush 82, and thereby regulating the speed of the motor. The entire assembly, comprising the timer track 51, and rings 60 and 68 is supported on the side of the crank case through the medium of an annular series of spring clips 80 secured by suitable fastening screws 81. The clips 80 engage over the outer periphery of the ring 68 and permit it, with the ring 60 and track 51 to be oscillated so that the relation of the contact in the cycle of movement of the piston with respect to the contact arm 50 having contact brush 82 may be adjusted to advance or retard the timing of

the spark. The contact arm is, of course, grounded, while the ignition circuit is completed through the conductor 64 which also is arranged to pass through the elongated opening 66 in the arm 74 of the flat ring 68.

The operation of the engine should be thoroughly familiar to those skilled in the art in view of the foregoing specification.

From the foregoing description of the construction of my improved apparatus, it will be seen that I have provided a simple, inexpensive and efficient means for carrying out the objects of the invention, and while I have particularly described the elements best adapted to perform the functions set forth, it is obvious that various changes in form, proportion, and in the minor details of construction may be resorted to, without departing from the spirit or sacrificing any of the principles of the invention.

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

1. An internal combustion engine comprising in combination with a rear compression crank case and its crank shaft, a pulley splined on said crank shaft, a centrifugally actuated contact arm carried by said pulley, a timer track having a contact mounted on the side of said crank case and concentric with the crank shaft, means for moving said timer track radially of said crank shaft and means whereby said track may be oscillated on its axis.

2. In an internal combustion engine of the class described having a crank case and crank shaft, means for controlling the ignition of said engine comprising a wheel splined on said crank shaft, a radially pivoted contact arm mounted on said wheel and centrifugally controlled, a normally stationary timer track arranged concentrically of said shaft, a carrier ring for said track, a supporting ring for said track carrier ring, means for mounting said supporting ring on the side of said crank case, means for moving said timer track radially of said track carrier supporting ring, and means for oscillating said timer track, and said carrier and mounting rings as a unit.

3. Ignition control mechanism for internal combustion engines comprising in combination with an engine having a crank case and crank shaft, a pulley splined on said shaft, a centrifugally actuated radially movable contact arm pivoted on the side of said pulley, a timer track having an electrical contact for periodic engagement with said contact arm, a ring having means for supporting said track, said ring having a radial arm, a second ring also having a radial arm, and supporting said timer track carrier ring, interlocking means between said first and second rings preventing lateral displacement, means carried by said radial arms for moving said track carrier ring radially of said second ring, and means for supporting said second ring on the crank case whereby said track and said rings may be unitarily oscillated.

In testimony whereof I affix my signature.

ELMER E. FOPAY.