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[54] **INTERNAL COMBUSTION ENGINE IGNITION
SYSTEMS**
3 Claims, 2 Drawing Figs.

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146.5 (A), 90.27, 90.31; 64/25; 74/243, 395

ABSTRACT: An ignition distributor is mounted on the front end of an overhead camshaft, the latter carrying a drive gear member which is recessed to house the centrifugal time control mechanism of the distributor and also having secured thereto a carrier member in which is journaled the housing of the distributor, the main shaft of which has a coaxial driving connection with the gear member and camshaft, and the housing being secured against rotation about the camshaft axis by a steady plate.

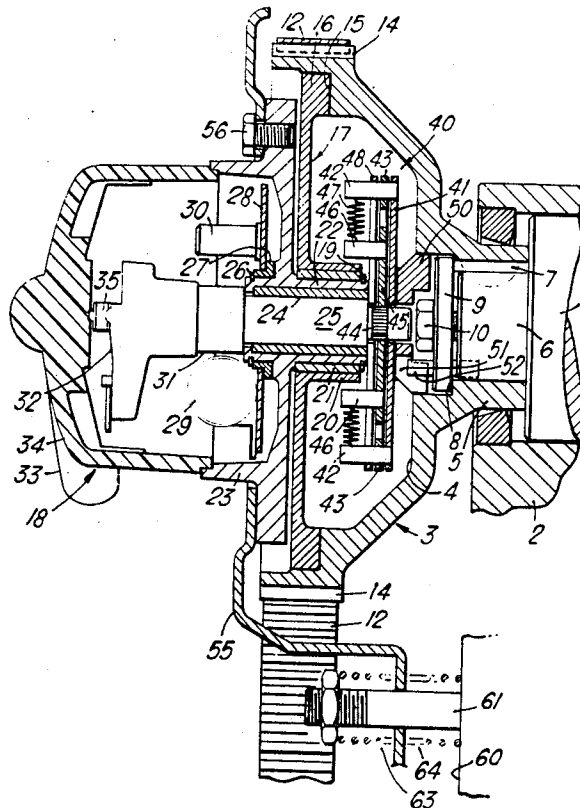
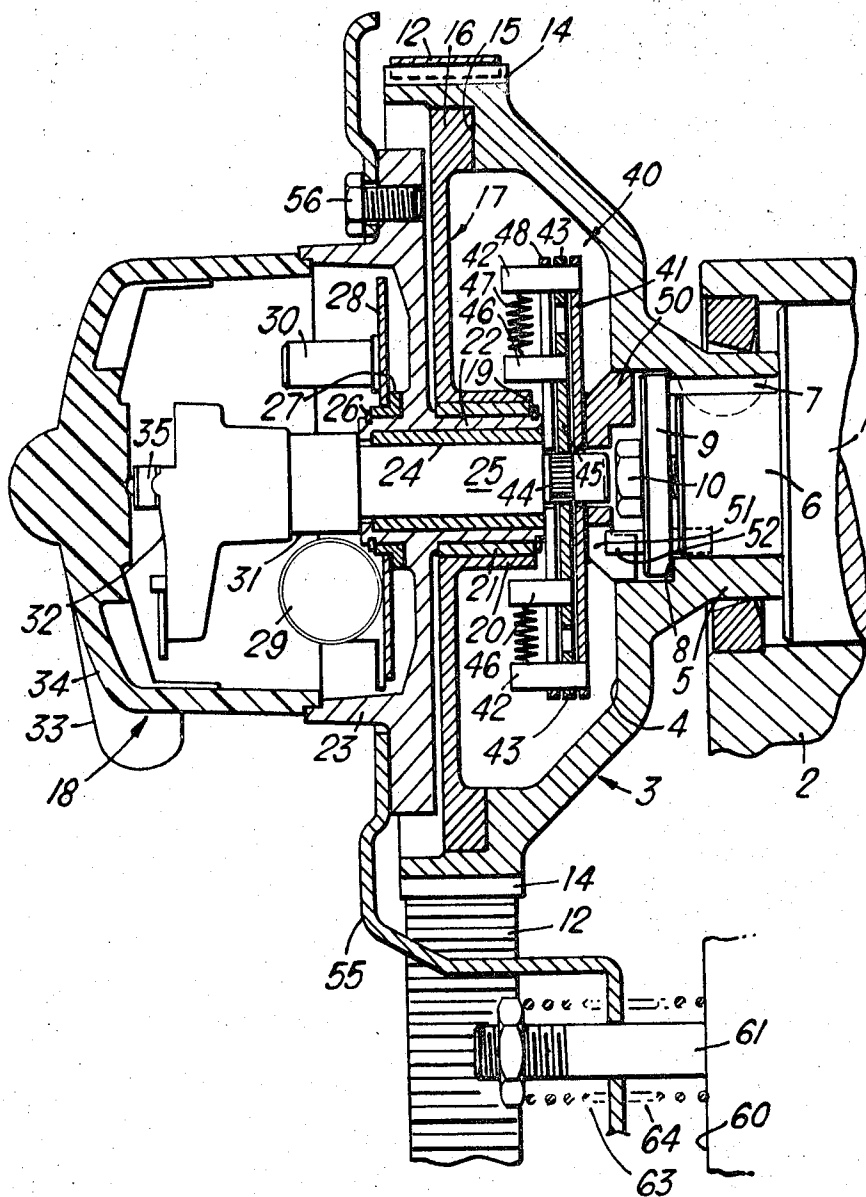
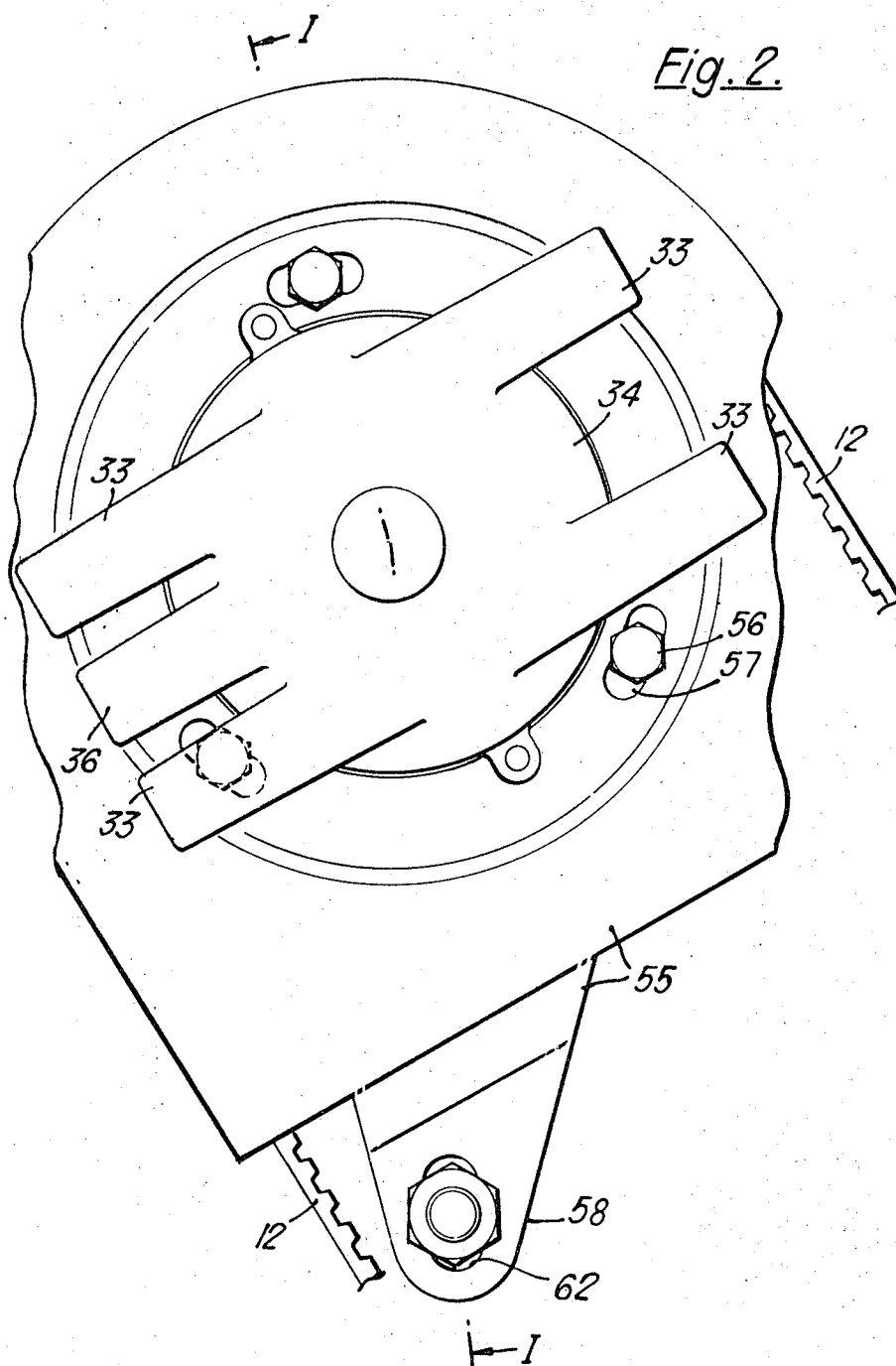


Fig. 1



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INTERNAL COMBUSTION ENGINE IGNITION SYSTEMS

This invention relates to internal combustion engine ignition systems and, in particular, to the drive mechanism for the distributor of the ignition system.

In an internal combustion engine ignition system according to the invention a camshaft drive gear member secured on one end of the engine camshaft has fixed thereon a carrier member with a central opening in which the housing of the engine ignition distributor is journaled, the distributor main shaft having a coaxial driving connection with the gear member and camshaft, and the housing being secured against rotation about the camshaft axis.

The camshaft drive gear member, which may be a gear wheel or a toothed wheel adapted to be driven by a chain or by a toothed flexible belt, is preferably formed with a dish hub portion, said carrier member being secured, as by bolts, within the rim portion of the gear member so as to overlie the recessed hub portion and form therewith a hollow chamber in which the centrifugal ignition timing control mechanism carried on the distributor main shaft is free to rotate.

The centrifugal timing control mechanism is carried externally of the distributor housing, the base of which is parallel to, but slightly spaced from, the carrier member, the distributor housing containing an interrupter assembly and a rotor which cooperates with contacts carried in a cover detachably secured to the housing.

The housing of the distributor carries a steady plate or arm which is anchored to a fixed part of the engine so as to prevent rotation of the distributor housing about the axis of the coaxially aligned distributor mainshaft and the engine camshaft.

The scope of the invention is defined by the appended claims; and the invention and the method by which it is to be performed are hereinafter particularly described with reference to the accompanying drawings, in which:

FIG. 1 is a section through an internal combustion engine ignition system according to the invention, on line I-I of FIG. 2; and

FIG. 2 is an elevation of FIG. 1 as viewed from the left-hand side thereof.

In the ignition system shown in the drawings, an internal combustion engine camshaft 1 is rotatably journaled in a housing 2 which forms part of the engine.

A camshaft drive gear member 3 is formed as a toothed wheel with a dish hub portion 4 integral with a coaxial tubular neck 5 which fits over a reduced diameter portion 6 of the camshaft 1 and is secured against rotation thereon by a key 7.

The neck 5 is formed with an internal shoulder 8 and the periphery of a circular plate 9 abuts the shoulder 8, a bolt 10 which screws into the end of the reduced diameter portion 6 of the camshaft 1 drawing the end of the neck 5 of the gear wheel 3 into abutment with the end face of the larger diameter portion of the camshaft 1 to secure the camshaft drive member 3 against axial movement relative to the camshaft 1.

The camshaft drive gear member 3 is adapted to be driven by a toothed flexible belt 12, one portion of which extends around the drive gear member 3 in engagement with teeth 14 on the periphery thereof, and the other portion of which (not shown) is adapted to be driven by a toothed wheel mounted on or driven by the crankshaft of the engine.

The rim portion of the drive gear member 3 has at its inner periphery an annular shoulder 15 within which is secured the peripheral portion 16 of a carrier member 17 which supports an ignition distributor 18 and is secured, as by bolts (not shown) to the drive gear member 3.

The carrier member 17 is formed with a coaxial hub portion 20, a bearing sleeve 21 being mounted in the central opening of the hub portion 20.

Journaled in the bearing sleeve 21 is a tubular neck 22, one end of which extends coaxially from one side of a baseplate 23 which forms part of a housing for the ignition distributor 18. Mounted within the tubular extension 22 is a bearing sleeve 24 in which is journaled the main shaft 25 of the distributor 18.

A circlip 19 on the neck 22 secures the bearing sleeve 21 thereon.

The other end of the tubular portion 22 of the baseplate 23 extends from the other side of the baseplate 23 and is formed with a coaxial annular shoulder on which is secured, as by a circlip 26, a bearing member 27 for a contact breaker plate 28 of the distributor 18. The contact breaker plate 28 carries the customary parts of the normal circuit breaker mechanism of an ignition distributor, and for the sake of simplicity the drawing shows only the condenser 29 and the contact breaker mounting post 30 of the circuit breaker mechanism, as these parts are not essential to the understanding of the present invention, and their construction and arrangement will be well understood by those skilled in the art.

A contact breaker cam 31 which actuates the contact breaker mechanism carried on the post 30 is secured on the main shaft 25, and the cam 31 has fitted on the end thereof, in known manner, an ignition rotor assembly 32 by which electrical energy to fire the engine spark plugs is distributed to spark plug leads (not shown) connectable to contacts mounted in bosses 33 moulded in a plastic cap 34 of the distributor housing. The rotor 32 carries a spring contact 35 engageable with a central contact in the cap 34 which is connected to a contact in a further boss 36 in the cap to which a low tension lead (not shown) of the ignition system is adapted to be connected.

The carrier member 17 forms with the recessed hub portion 4 a hollow chamber within which a centrifugal ignition timing control mechanism 40, carried on the distributor main shaft 25, is free to rotate.

The ignition timing control mechanism comprises a centrifugal weight plate 41 which is coaxial with but rotatable relative to the shaft 25, and carries a pair of diametrically opposed pins 42 on which are pivotally mounted a pair of flyweights 43. Secured on a knurled portion 44 of the main shaft 25 is a centrifugal advance cam 45, which is engaged by the centrifugal weights during rotation of the main shaft 25 and is rotated by the weights as they pivot about the pins 42 under centrifugal force during rotation. The advance cam 45 carries a pair of diametrically opposed pins 46, and the ends of a pair of helical springs 47 are respectively secured to each of the pairs of pins 46, 42 so as to restrain angular movement of the advance cam 45 and main shaft 25 relative to the weight plate 41. A retainer plate 48 is secured to the baseplate as by rivets (not shown), so as to retain the weights but permit pivotal movement thereof on the pins 42.

The drive of the main shaft 25 is effected by means of a centrally apertured drive plate 50 which is coaxially secured, as by welding, to the weight plate 41. The drive plate 50, which has a clearance from the lower end of the main shaft 25, is recessed to accommodate the head of the bolt 10 and is formed with a radial slot in which is engaged one end of a dowel 52 which is fixed in the plate 9 and the other end of which is located in a recess in the end of the smaller diameter portion 6 of the camshaft 1.

Thus, on rotation of the camshaft drive gear member 3 by the drive belt 12, the camshaft 1, which is keyed to the drive gear member 3, is driven thereby and the dowel 52 carried on the end of the camshaft 1 transmits drive to the drive plate 51, which is secured to and rotates with the weight plate 41, the latter being resiliently coupled by the springs 47 to the advance cam 45 and the main shaft 25. The main shaft 25 will thus rotate at the same speed as the camshaft 1 but, depending on the resistance of the springs 47 and the speed of rotation of the weight plate 41, the advance cam 45 and the main shaft 25 will be angularly displaced relative to the weight plate 41, when the camshaft speed exceeds a predetermined value, to give the desired advance of the ignition timing at predetermined engine speeds. Such centrifugal ignition advance mechanisms are well known in the art and the operation of the mechanism described above will not, therefore, be further described.

The baseplate 23 of the housing of the distributor 18 is secured against rotation by means of a steady plate 55 which is secured to the baseplate 23 by bolts 56 which extend through arcuate slots 57 in the steady plate 55 and are secured in the baseplate 23. An integral arm 58 of the steady plate 55 is

anchored to a fixed part 60 of the engine by a bolt 61, which is secured thereto and which extends through a slot 62 in the arm 58, springs 63 and 64 being mounted on the bolt on either side of the arm 58 to minimize the transmission of vibrations to the steady plate 55.

When installing the ignition system, the baseplate 23 can be rotated within the limits permitted by the slots 57 before the bolts 56 are tightened to secure the steady plate and baseplate 23 together.

With the above-described arrangement, the overall length of the distributor and the drive gear member assembly 18, 3 is relatively small, the centrifugal advance mechanism 40 of the distributor being housed in the space within the carrier member 17 and the drive gear member 3, and only the distributor housing 23 and cover 34 extending axially beyond the camshaft drive gear member 3.

We claim:

1. An internal combustion engine ignition distributor assembly, comprising a drive gear member with a dished hub portion adapted to be secured coaxially on one end of an internal combustion engine camshaft; a carrier member secured coaxially within a rim portion of said drive gear member so as to overlie said dished hub portion and form therewith a hollow chamber, said carrier member having a central opening therein; an ignition distributor housing journaled in said opening; a distributor main shaft journaled in said housing, one end of the main shaft within said housing having thereon cam surfaces to operate an ignition interrupter mechanism arranged within said housing, and said one end of the main shaft carrying a distributor rotor, the other end of said main shaft extending into said chamber and carrying a centrifugal ignition timing control mechanism which is freely rotatable in said chamber; said timing control mechanism having a pair of resiliently interconnected but relatively rotatable members, one of which is secured to said main shaft and the other of which is arranged for rotation with said drive gear member; and a steady plate secured to said housing adapted to be anchored to a fixed part of the engine to secure the housing against rotation.

2. In a reciprocatory internal combustion engine with a ro-

tary camshaft; a drive gear member secured coaxially on one end of said camshaft, said drive gear member having a dished hub portion; a carrier member secured coaxially within a rim portion of said drive gear member so as to overlie said dished hub portion and form therewith a hollow chamber, said carrier member having a central opening therein; an ignition distributor housing journaled in said opening; a distributor main shaft journaled in said housing, one end of the main shaft within said housing having thereon cam surfaces to operate an ignition interrupter mechanism arranged within said housing, and said one end of the main shaft carrying a distributor rotor; the other end of said main shaft extending into said chamber and carrying a centrifugal ignition timing control mechanism which is freely rotatable in said chamber, said timing control mechanism having a pair of resiliently interconnected but relatively rotatable members, one of which is secured to said main shaft and the other of which is drivingly connected with said drive gear member and camshaft for rotation thereby and in synchronism therewith; a steady plate secured to said housing adapted to be anchored to a fixed part of the engine to secure the housing against rotation; and a flexible drive coupling between said drive gear member and the crankshaft of said engine.

3. In a reciprocatory internal combustion engine, a rotary camshaft; a drive gear member with a recessed hub portion fixed on said camshaft; a flexible drive belt member which drivingly couples said drive gear member to a gear driven by the engine crankshaft; a carrier member fixed on said drive gear member, said carrier member having a central opening therein; an ignition distributor housing rotatably journaled in said housing; a distributor main shaft journaled in said housing and having a coaxial driving connection with said drive gear member and said camshaft, said housing being secured against rotation about the camshaft axis and said carrier member being secured within the rim portion of said drive gear member so as to overlie said recessed hub portion and form therewith a hollow chamber; and a centrifugal ignition timing control mechanism carried on said main shaft and rotatable within said chamber.

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