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2,432,699

INTERNAL-COMBUSTION ENGINE

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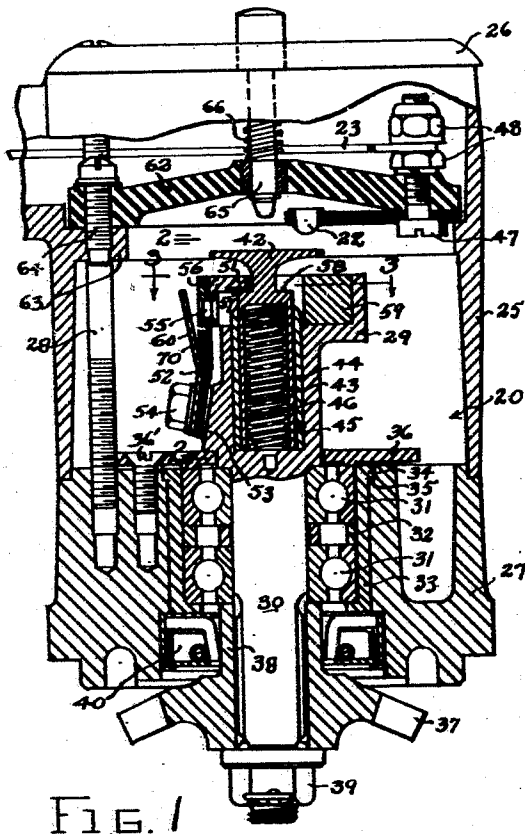


FIG. 1

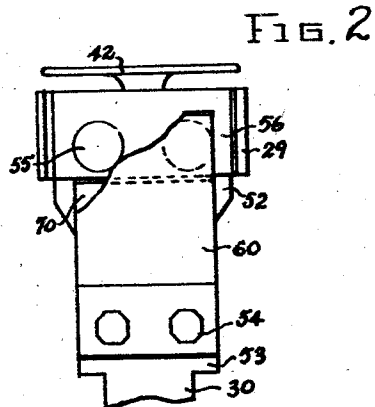


FIG. 2

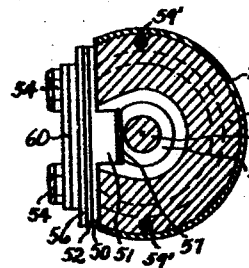


FIG. 3

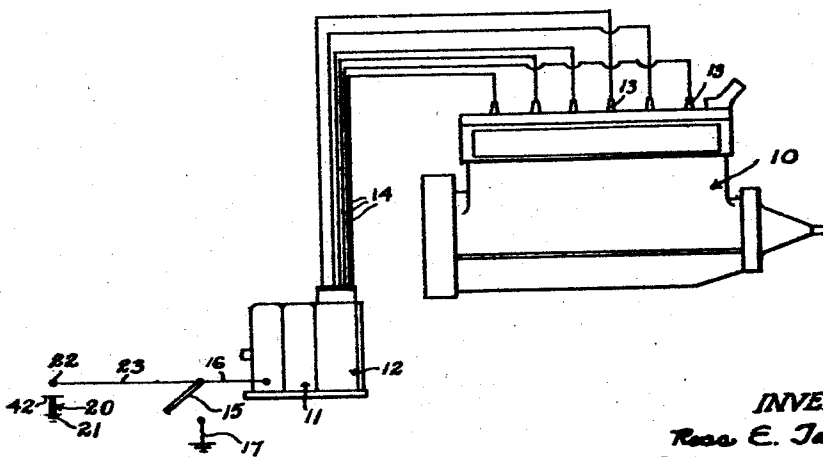


FIG. 4

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INTERNAL-COMBUSTION ENGINE

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10 Claims. (Cl. 200—80)

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This invention relates to internal combustion engines and more particularly to control of the electric ignition system for such engines.

In the design of internal combustion engines there is usually a maximum speed beyond which the engine should not be operated as to do so would subject it to undue vibration and perhaps to breakage or other injury. The conventional governor connected to the throttle, for the purpose of limiting the engine speed, is not satisfactory under some conditions since with such governor control full throttle opening is not always obtainable when needed.

The present invention is designed more particularly for use on marine engines where there may be several engines under the control of one operator and where a runaway engine could not be stopped in time to prevent injury to it.

The present invention therefore seeks to definitely discontinue operation of the engine immediately upon its reaching a predetermined maximum speed, and this is done by interrupting the ignition rather than by the less certain and slower method of throttling.

The present invention also contemplates means maintaining interruption of the ignition until the operator or engineer manually restores it.

It is therefore an object of this invention to provide means for automatically interrupting the engine spark ignition at a predetermined engine speed.

Another object of the invention is to provide an engine ignition system with automatic cutout means, effective at a predetermined engine speed, and one that must be manually reset to restore the ignition.

Another object of the invention is to provide an armature mounting in an engine ignition cut-out device that will be sturdy and positive in operation.

Another object of the invention is to provide a dual means for retaining a cutout mechanism in its normal non-cutout position to thereby make more certain the retaining of the ignition in its normal operating condition regardless of vibration and other disturbing elements on the engine until such time as the predetermined cut-out speed is reached.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of this specification, and in which:

Fig. 1 is a sectional view of an ignition interrupter device incorporating the invention;

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Fig. 2 is an enlarged fragmentary elevational view of the device taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view of the device taken on line 3—3 of Fig. 1;

Fig. 4 is a view showing an engine and the ignition wiring with the interrupter device associated therein.

In order to limit the maximum speed at which the engine can operate, I provide an interrupter device 20 that automatically cuts out the ignition system whenever a predetermined engine speed is reached. The device is such that it grounds the magneto at the predetermined engine speed. The interrupter device 20 is grounded at 21 and has its contact 22 connected by a wire 23 with the magneto wire 16.

The interrupter device is housed in a sectional casing comprising a hollow body 25, cap 26 and base 27, the sections being secured together by bolts 28. A carrier 29 is mounted in the casing and has a shaft extension 30 projecting through the base. Two ball bearings 31, separated by spacer 32, serve as a mounting for the carrier and such mounting is carried by cage 33 having an outwardly extending top flange 34 seated on a shoulder 35 in the base of the casing. Keeper plate 36 lies partly over the flanged end of the cage and is secured against the top face of the casing base as by screws 36'. Gear 37 is splined on the carrier shaft and is rotated by suitable mechanism (not shown) driven by the camshaft or some other rotating part of the engine. This gear has a hub extension 38 in contact with the lower bearing 31 and nut 39 secures the gear on the shaft. A conventional oil seal 40 surrounds the hub extension and is carried in the casing base adjacent the lower bearing 31.

The engine rotated carrier serves as a support for a movable contact member having a head 42 and a hollow stem 43 that has a sliding fit in sleeve 44 fixed in recess 45 in the carrier. A spring 46 in the stem seats against the carrier so that it urges the contact member upwardly to engage the contact 22. The movable contact member is grounded through the casing to the engine on which it is fixed.

Contact 22 is positioned above the head 42 of the contact member and is carried by terminal 47 on insulation member 62. Ignition wire 23 is fixed to terminal 47 by nuts 48.

Unless outward movement of the contact member is restricted, head 42 will be moved outwardly from the carrier by spring 46 and will engage contact 22 thereby interrupting the ignition. Means for normally restraining such movement

of the member is mounted on the carrier. Such restraining means comprises an armature 50 having a flange 51 extending therefrom forming a latch. This armature latch is supported on one side of the carrier some distance from the axis of rotation thereof so that it is acted upon by centrifugal force. It is so mounted that in its normal position the flange 51 will latch over a shoulder 58 on the contact member and thereby retain the contact member in the position in which it is shown in Fig. 1, that is, out of engagement with the contact 22. Preferably a hardened insert 57 is fixed to the underface of the latch where it engages the shoulder 58.

The armature 50 has two independently operating means tending to retain it in its normal latching position. One of these means is also its means of support on the carrier. Thus the armature is carried at the free end of a cantilever spring 52 which has its lower end fixed as by a screw 54 to a boss 53 on the carrier. This spring 52 is of the reed type and the armature is secured to its free end as by rivets 55 which also extend through the backing plate 56. The outward movement of the armature is limited by an abutment member in the form of a plate 60 also secured by the screw 54 above referred to and a damping means is provided in the form of a plate spring 70 mounted between the reed spring 50 and the abutment 60. This plate spring lies below the armature and acts as a resilient backing for the reed spring as the armature is moved outwardly by centrifugal force.

The other means tending to retain the armature in its normal latching position is a permanent magnet 59 mounted at the upper end of the carrier just below head 42 of the contact member and with its legs straddling the contact member and extending adjacent the armature. The magnet may be secured to the carrier as by pins 59'.

By reason of the fact that the force of the magnet 59 can be nicely calibrated it is possible to predetermine the speed at which centrifugal force will overcome the tendency of the reed spring 52 and the magnet to retain the armature in latching position and when those two factors are overcome the armature flies outwardly and disengages the flange 51 from the shoulder 58 of the contact member allowing the spring 46 to move the head 42 of the contact member into engagement with contact 22, thereby grounding the magneto, interrupting the ignition system and stopping the engine.

When the contact member is released and is caused to engage contact 22 to ground the magneto, it must be reset before engine ignition is restored. Insulation member 62 extends across the upper interior of the casing body and rests on a flange 63 and is secured thereto by bolts 64. This member supports an actuator 65 in alignment with the contact member 42 and such actuator projects through the cap of the casing for manipulation by the engine attendant. A coil spring 67 surrounds the actuator 65 and normally holds it in its upper position. To restore the ignition, the actuator is pressed down against the head 42 thus returning the contact member to a position where the armature latch 50 will engage over the shoulder 58 under the influence of spring 52 and magnet 59. This disengages the head from the contact 22 and thus breaks the ground of the magneto and restores the ignition.

With the above construction there are a num-

ber of advantages over prior art devices. In the first place the fact that the permanent magnet may be calibrated makes it possible to readily predetermine the speed at which the cutout will operate and this predetermined speed cannot be charged or modified by the attendant, which change or modification, sometimes tempting to an operator, might result in serious damage to the engine.

In high-powered, light-weight marine engines such as this invention is particularly designed for, there is of necessity more or less vibration and when such engines are used in relatively small boats they are roughly used. Hence the sturdy character of this cutout and the dual means for retaining the armature in latched position are of importance. This rugged and positive acting construction is also most useful in overcoming any tendency of the latch to disengage by reason of the play in the driving gears and the torsional deflection of the driving shafts which produce more or less irregular velocity of the rotating carrier. Also, the fact that the attractive force of the magnet on the armature varies inversely as the square of the distance therebetween is of distinct advantage in that it causes a quick breakaway of the latch the moment the rotating carrier reaches its predetermined speed for cut-out operation.

It will be understood that various forms of the invention other than that described above may be used without departing from the spirit or scope of the invention.

What is claimed is:

1. An ignition interrupting device comprising a driven carrier, a grounded contact member mounted on the carrier, means urging the member into engagement with a contact to be grounded, a latch engageable with said member to prevent its movement by said means, an armature carrying the latch, a magnet mounted on the carrier, said magnet attracting the armature in a direction to retain the latch in engaged relation with the contact member, and a resilient member fixed on the carrier and supporting the armature, said armature being movable by centrifugal force to disengage the latch from the contact member at a predetermined speed of the carrier.

2. An ignition interrupting device comprising a driven carrier, a grounded contact member mounted on the carrier, means urging the member into engagement with a contact to be grounded, retaining means operable to engage and hold said member out of engagement with said contact, an armature carrying the retaining means, a magnet mounted on the carrier in relation to draw the armature in a direction engaging the retaining means with the contact member, and a resilient member having one end fixed to the carrier and the other end fixed to the armature, said armature, retaining means and resilient member being movable by centrifugal force to disengage the retaining means from the contact member at a predetermined speed of the carrier.

3. An automatic cutout device for an engine ignition system comprising a movable contact member, means for moving said contact member into cutout position, a latch device for retaining said member in non-cutout position, dual means tending to retain said latch device in latched position, and means acting by centrifugal force to withdraw said latch device from latched position.

4. An automatic cutout device for an engine

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ignition system comprising a movable contact member, a magnetic means and a spring means acting together to normally retain said movable contact member in non-cutout position, means urging said member toward cutout position, said magnetic means and said spring means being calibrated to be overcome by a predetermined centrifugal force acting in opposition to them to thereby release said member from its retained position, and manually operated means for restoring said movable contact member to non-cutout position.

5. An automatic cutout device for an engine ignition system comprising a movable contact member, a magnetic means and a spring means for normally retaining said movable contact member in non-cutout position, said magnetic means and said spring means being calibrated to be overcome by a predetermined releasing centrifugal force acting in opposition to them, and a means for manually restoring said movable contact member to non-cutout position.

6. An interrupter device for an engine ignition system comprising an engine rotated carrier, a grounded contact member movably mounted on the carrier, means urging the member into interrupting relation with the system, an armature latch mounted on the carrier and operable to engage the member and restrain movement thereof into such interrupting relation, and a permanent magnet mounted on the carrier and exerting a magnetic force sufficient to hold the armature latch in restraining relation with the contact member, said armature latch being movable away from the contact member in response to centrifugal force at a predetermined speed of the carrier.

7. A cutout device for an electric ignition system for an engine comprising a carrier driven by the engine, a grounded contact member mounted on the carrier, means urging said member into cutout relation with the system, latch means on the carrier for restraining movement of the member into such cutout relation, and means on the carrier having a portion supporting the latch means and movable by centrifugal force to release the latch means from the member when the carrier is driven at a predetermined speed.

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8. An interrupter device for an engine ignition system comprising an engine driven carrier, a grounded contact member mounted on the carrier and movable in an axial direction to ground an interrupter circuit, means urging the contact member outwardly into circuit grounding position, a reed spring fixed at one end to the carrier, an armature fixed to the other end of the reed spring, a latch on the armature for restraining the contact member from outward movement, a magnet fixed on the carrier in relation to move the armature and latch to restrain the contact member from outward movement, and a vibration damper for the reed spring fixed on the carrier, said armature being responsive to a predetermined centrifugal force to release the latch portion from restraining relation with the contact member.

9. A contact device for an electric system comprising a stationary contact member, a rotating carrier, a movable contact member on the carrier, means urging the movable contact member into contact with the stationary contact member, a latch restraining the movable member, centrifugal operating means to move said latch to non-restraining position, and a permanent magnet mounted on the carrier in relation to the latch tending to hold the latch in restraining position and against the action of the centrifugal means.

10. An automatic cutout device for an engine ignition system comprising a movable contact member, means for moving said contact member into cutout position, a latch device for retaining said member in non-cutout position, magnetic means and spring means tending to retain said latch device in latched position, and means acting by centrifugal force to withdraw said latch device from latched position.

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The following references are of record in the file of this patent:

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Disclaimer

2,432,699.—*Ross E. Taylor*, Detroit, Mich. INTERNAL-COMBUSTION ENGINE. Patent dated Dec. 16, 1947. Disclaimer filed Apr. 14, 1948, by the assignee, *Packard Motor Car Company*.

Hereby enters this disclaimer to claims 3 to 7 inclusive, and claims 9 and 10 of said patent.

[*Official Gazette, May 18, 1948.*]

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