Feb. 19, 1963 K. L. FREDERICK 3,078,357

CURRENT INTERRUPTER FOR AUTOMOTIVE DISTRIBUTORS

Filed July 31, 1961 2 Sheets-Sheet 1

Fig. 1.

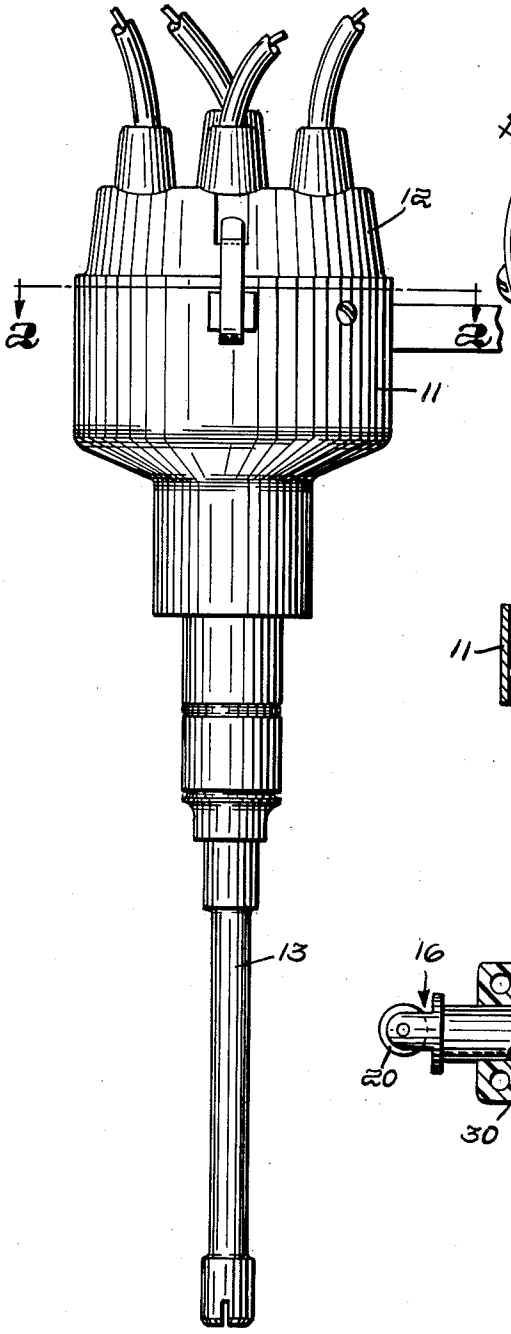


Fig. 2.

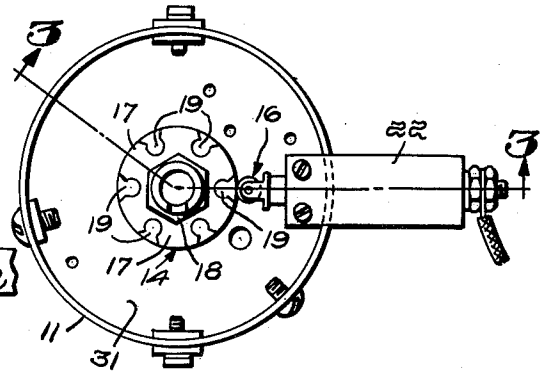


Fig. 3.

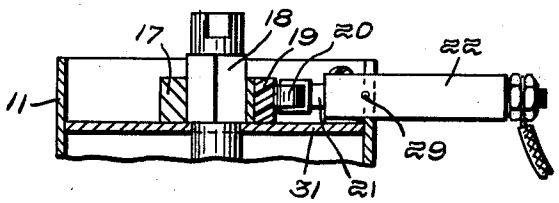
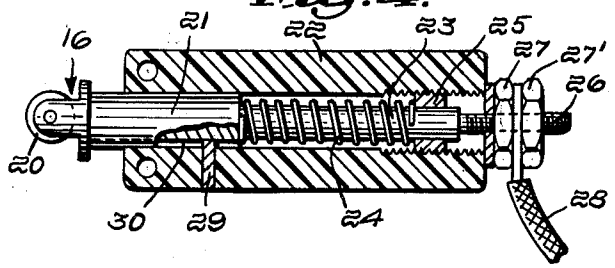


Fig. 4.



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Filed July 31, 1961 2 Sheets-Sheet 2

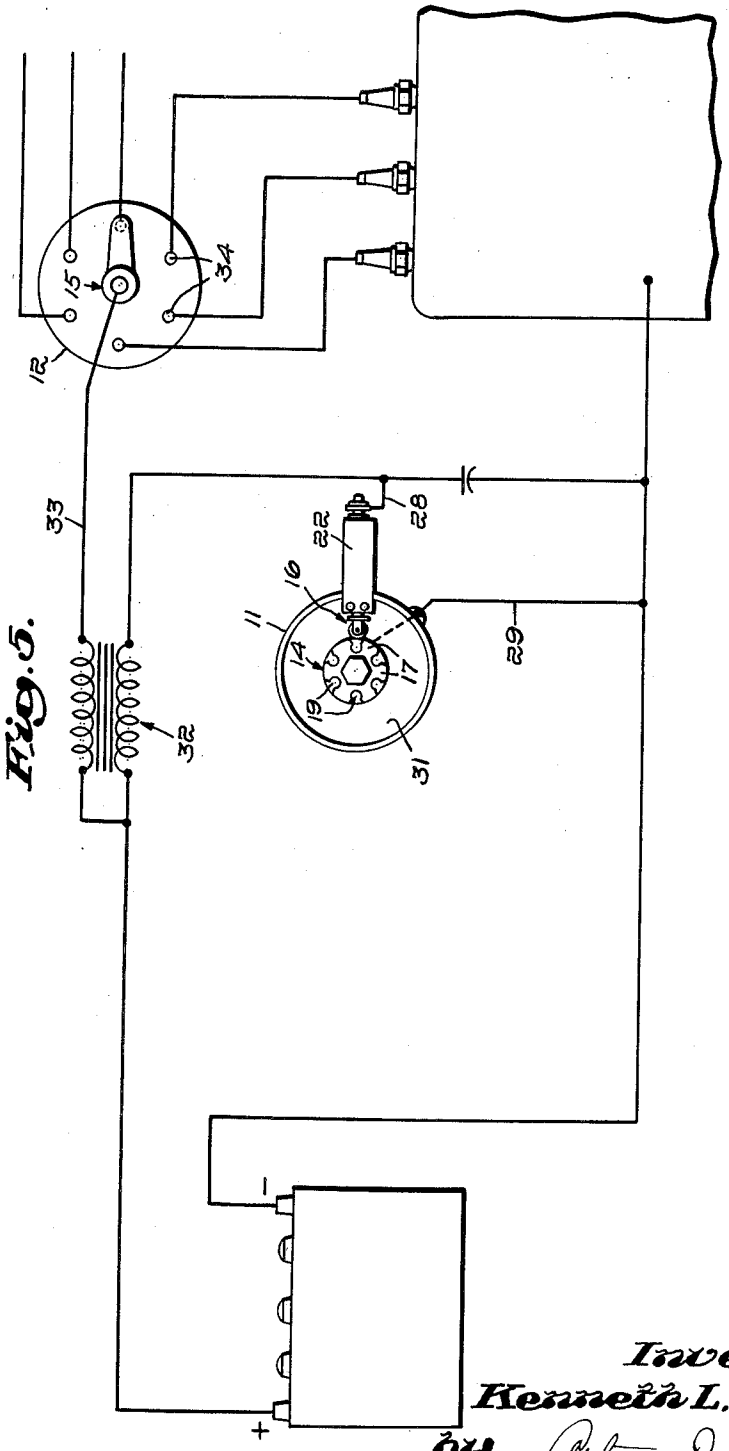


Fig. 5.

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United States Patent Office 3,078,357 Patented Feb. 19, 1963

3,078,357

CURRENT INTERRUPTER FOR AUTOMOTIVE DISTRIBUTORS

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Filed July 31, 1961, Ser. No. 128,113
1 Claim. (Cl. 200—28)

This invention relates to current interrupters or make-and-break devices in the ignition systems of internal combustion engines, and pertains more particularly to improvements in the interrupters forming part of automotive distributors for the ignition system of multicylinder motor vehicle engines.

The principal purpose of the invention is to eliminate the make-and-break points which have been an essential element of automotive distributors for many years, and which have been so subject to wear, pitting and corrosion as to result in defective ignition, and to require relatively frequent adjustment and repeated replacement of the breaker points during normal life of the motor vehicle. As is well known, the distributor points control the ignition circuit to the several cylinders of a multicylinder automotive engine, so that none of the cylinders are operative when the points fail to function.

It is also recognized that breaker point failure is the major cause of ignition trouble; and that objectionable "point float" frequency occurs, even while the points are in good condition, when a high compression engine is operated at high speed.

In accordance with the present invention, the objectionable aspects of the old and long used make-and-break mechanisms, characterized by the impermanent breaker points, are completely obviated; the improved devices are durable and longlastingly effective; their use ensures continuous ignition at some of the cylinders of a multicylinder engine, even if the circuit to one cylinder should become ineffective; and the starting of the motor is easier because of their use.

More specifically, it is an object of this invention to provide a durable, efficient and substantially trouble-free and fool-proof current interrupter which does not require adjustment or replacement of worn elements during normal life of the engine, and which involves a rotary sleeve-like actuator mounted on the distributor shaft and comprising a number of spaced conducting segments and an equal number of intervening insulating segments around the periphery (the number preferably corresponding to the number of cylinders controlled by the distributor in which the interrupter is mounted); and a spring-pressed wiping contact constantly engaging the periphery of the rotating, cylindrical contactor, and intermittently interrupting the low tension circuit through the primary of the conventional ignition coil, to induce an intermittent high tension current in the secondary of the coil. The secondary circuit includes, as usual, the standard rotor of the distributor which supplies current to the spark plugs of the respective cylinders.

A recommended embodiment of the invention is shown on accompanying drawings, but it is understood that the structural details of the apparatus herein illustrated and described may be varied to suit particular conditions without departing from the essence of this invention as set forth in the appended claim.

In the drawings,

FIG. 1 is an elevation of a typical distributor case, cover and operating shaft, in which my improvements may be embodied;

FIG. 2 is a plan view, taken approximately on line 2—2 of FIG. 1, showing the distributor, with the cover or cap removed, and illustrating the improved circuit interrupting means in plan;

FIG. 3 is a fragmentary section taken on line 3—3 of FIG. 2, with parts in elevation;

FIG. 4 is an enlarged longitudinal section of the spring-pressed contact member shown in FIGS. 2 and 3; and

FIG. 5 is a typical diagram of an ignition circuit for a six cylinder engine, utilizing the improved interrupter means.

In the embodiment chosen for the purpose of illustration, the improved circuit interrupter mechanism forms part of a standard automotive distributor having a casing body 11 and removable cap 12, and the usual operating shaft 13 for the conventional cam and rotor in the distributor case. Pursuant to this invention, the rotating cam and associated breaker points are removed or omitted from a typical distributor, and the cam is replaced by the new sleeve-like actuator indicated generally at 14 in FIG. 2. The customary rotor, included diagrammatically at 15 in FIG. 5 (but omitted from FIGS. 2 and 3 for clarity) may be retained for its usual purpose. A wiping or brush-like contact member shown generally at 16 in FIG. 2, replaces the breaker points and associated arms.

The contactor 14 comprises a metal sleeve or body 17 having a substantially cylindrical periphery and a non-circular bore which may be hex-shaped as shown (FIG. 2) to fit non-rotatably on the hex-shaped hub 18 at the upper end portion of shaft 13, so that the contactor (like the removed cam which it replaces) rotates with the shaft. The metal body may be of rhodium-plated brass or other hard conductive metal which resists pitting and arcing in operation.

The peripheral margin of the contactor is provided with a plurality of plugs or inserts 19 of insulating material, such as a suitably hard plastic tightly fitting complemental cavities in the conductive metal body. The non-conductive inserts 19 extend radially inward from the periphery of the contactor 14, preferably from top to bottom thereom. They are of uniform peripheral width and are spaced uniformly around the periphery of the conductive body 17. The number of spaced inserts, and the equivalent number of intervening conductive segments or contacts, correspond to the number of cylinders to be serviced by the distributor. The cross-sectional contour of the insulating inserts may be shaped, as shown in FIG. 2, so that they are key-locked in the complemental cavities of the metal body 17.

Thus, the contactor provides a smooth, annular peripheral surface composed of intermittent segments of uniformly spaced conductive material and uniformly spaced non-conductive material. Hence, a circuit through the contactor body will be opened and closed at uniform time intervals when a cooperating stationary contact wipes over that surface of the rotating contactor. The width of the respective peripheral insulating areas 19 depends upon the predetermined dwell of the engine for which the improved interrupter is designed. The contactor illustrated provides a dwell of approximately 32° which is within the normal range for the typical automobile engine.

In accordance with this invention, the low tension circuit through the contactor is intermittently closed and interrupted by the wiping contact 16 which preferably comprises (FIG. 4) a roller contact 20 disposed at the end of a spring-pressed plunger 21 which is slidable longitudinally in a block or casing 22 of insulating material; plunger 21 having a reduced stem 23 encircled by a coiled spring 24 confined by a threaded bushing 25 which serves to adjust the tension of the spring.

Stem 23 has an outer terminal 26, threaded to receive nuts 27 and 27'. Nut 27 bears against the end of block 22, through an intervening washer, if desired, and limits inward movement of the plunger 21. Nut 27' serves to attach lead wire 28 to the terminal, as well as to lock

nut 27 in adjusted position. Plunger 21 is restrained from rotation in block 22 by a key 29 or other detent which fits in a complemental keyway 30 of the plunger so that the axis of the roller 20 is maintained parallel to the axis of the actuator 14.

The casing 22 may be suitably attached to distributor case 11, and may be disposed radially thereof, as shown, or at a slight angle to the radius, to relieve pressure of the wiping contact 20 on the periphery of rotating contactor 14. In either case, the wiping contact of the roller 20 avoids excessive friction and reduces wear.

It will be appreciated that block 22 insulates the wiping contact 16, and its terminal and lead wire, from the distributor case 11 and its floor plate 31 (FIG. 3). It will also be understood, as indicated by the circuit diagram of FIG. 5, that lead 28 is in the primary, low tension circuit of ignition coil 32, said circuit including lead 29, on the ground side, which communicates through the distributor case and shaft 13 with rotary contactor 14; and that the high tension circuit 33 from the secondary of the coil leads to the conventional rotor 15, and thence through spaced contacts 34 on distributor cap 12 to the respective spark plugs of the engine.

The ignition coil thus operates in the customary fashion when the primary circuit is interrupted by the improved current interrupter mechanism which successively shorts the primary circuit in timed sequence to induce an intermittent high voltage surge in the secondary for successively firing the plugs of the respective cylinders. Operation of the engine is thus assured, even though one of the segments of the contactor 14, or one of the distributor cap contacts 34 should become defective.

However, due to the anti-friction contact or spring-pressed roller 20 on the smooth peripheral surface of the contactor 14, failure resulting from wear or moisture at any area would be an unusual condition during the expected life of the ignition circuit.

As previously indicated, the improved interrupter requires no gap adjustments or replacement of worn or defective breaker points; the conventional cam as well as the conventional points are absent so that point float and dwell problems at the points are avoided; and correct and positive contact, for each cylinder of a multi-cylinder engine is assured.

I claim:

A distributor for an automotive ignition system comprising a distributor body, a shaft rotatably mounted in said body, a sleeve-like contactor carried by said shaft and having a peripheral surface with alternate uniformly spaced segments of electrically conductive material and non-conductive material, respectively, a housing of insulating material attached to said body, an electrically conductive plunger slidable longitudinally of the housing, a spring normally urging said plunger toward said contactor, a roller carried by said plunger and bearing on said peripheral surface to form an electrical contact with said segments of conductive material, said contactor and roller rotating on parallel axes, and keying means restraining rotation of said plunger in said housing, thereby maintaining the axes of the contactor and roller parallel.

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