Feb. 8, 1938. J. M. CRAWFORD ET AL 2,107,470

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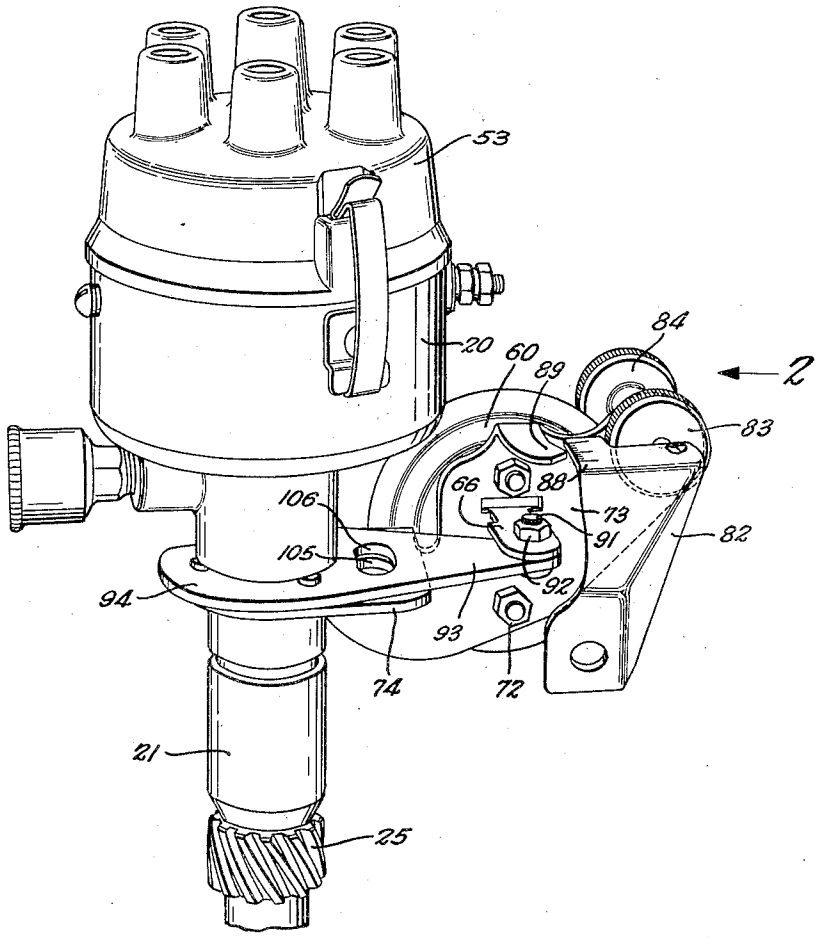


Fig. 1.

INVENTORS
James M. Crawford
Henry A. Schwager
By Spencer, Hardman & Fisher
ATTORNEYS

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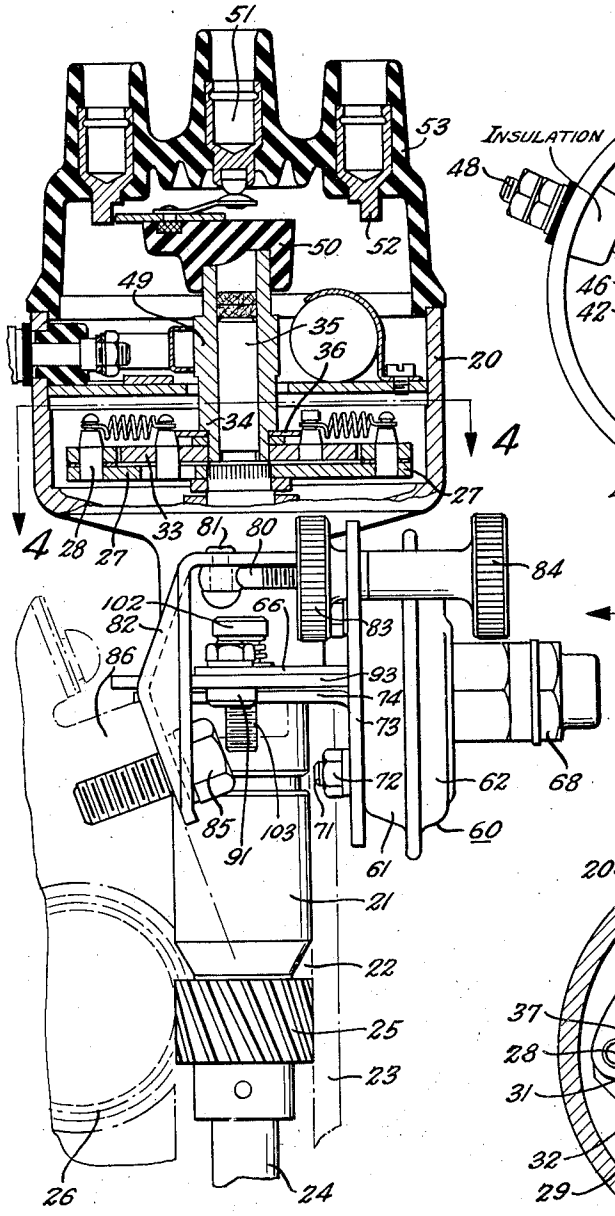


Fig. 2.

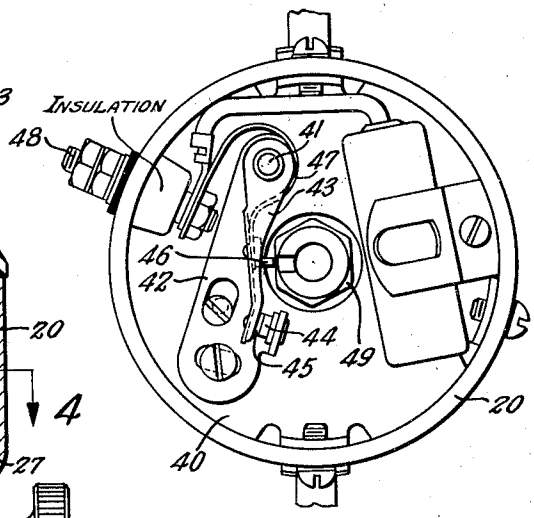


Fig. 3.

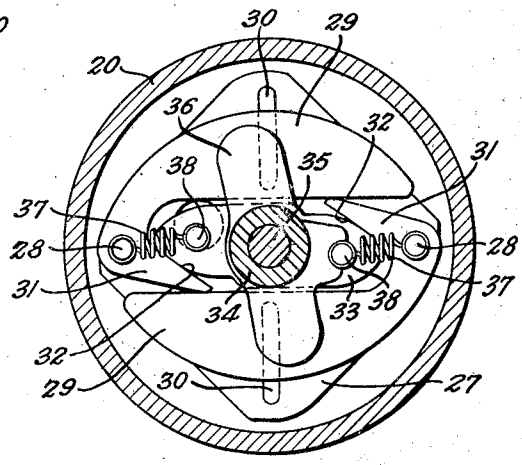


Fig. 4.

INVENTORS
James M. Crawford
Henry A. Schwager
By Spencer, Hardman & Fehr
ATTORNEYS

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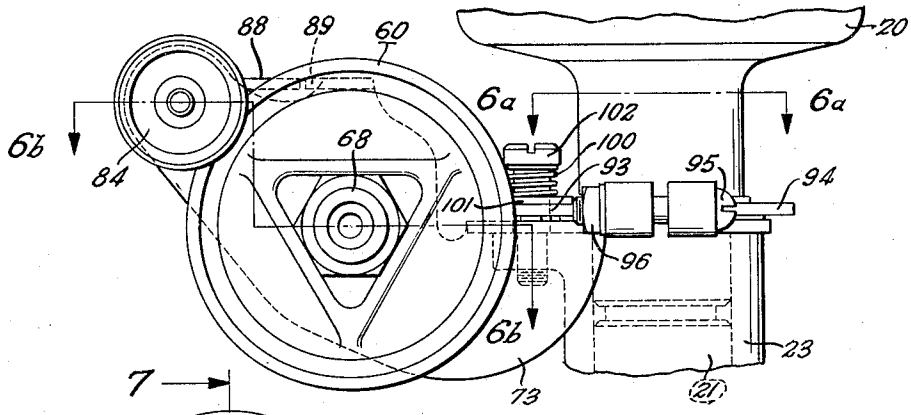


Fig. 5.

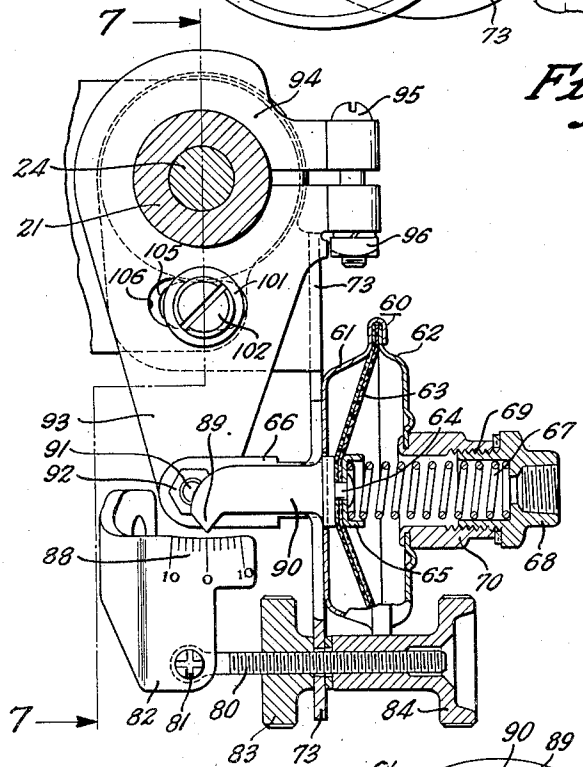


Fig. 6.

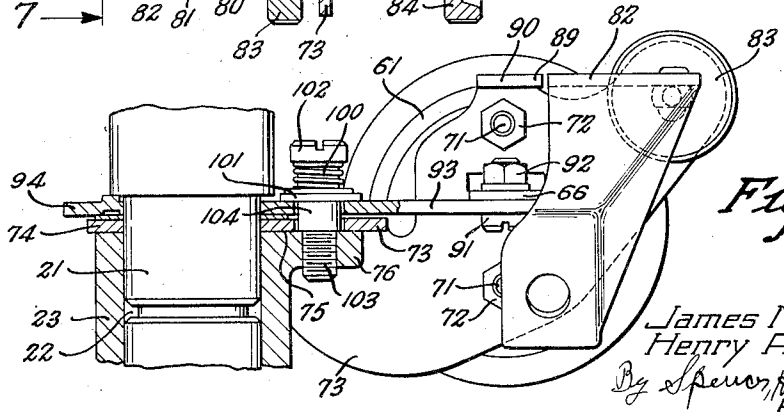


Fig. 7.

INVENTORS
James M. Crawford
Henry A. Schwager
By Spencer, Hardman & Fehr
ATTORNEYS

Patented Feb. 8, 1938

2,107,470

UNITED STATES PATENT OFFICE

2,107,470

IGNITION DISTRIBUTOR

James M. Crawford, Detroit, and Henry A. Schwager, Royal Oak, Mich., assignors General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application August 7, 1933, Serial No. 684,026

5 Claims. (Cl. 200—19)

This invention relates to ignition timers for internal combustion engines and more particularly to the type of ignition timer which comprises a housing enclosing the circuit interrupter and having a shank extending therefrom and providing a bearing for the shaft which drives the interrupter. This shank is usually received within an opening or well provided by the frame of the engine with which the timer is associated.

It is an object of the present invention to provide apparatus of simple, durable and economical construction for turning the shank of the timer housing within the well of the engine frame in order that the circuit interrupter within the timer housing will be adjusted angularly relative to the engine driven shaft which operates it. The apparatus embodying the present invention provides for manually and automatically adjusting the timer housing, the automatic means being responsive to suction produced by the engine and varying with conditions of engine operation.

This and other objects of the invention are accomplished in the described embodiment thereof by providing a bracket adapted to be fixed to part of the engine frame, a relatively movable bracket pivoted coaxially with respect to the shank of the timer housing and means for manually adjusting the second bracket relative to the first and for holding the second bracket in the desired position of adjustment. The second bracket carries the suction chamber member of the automatic means for controlling the ignition timing, and the suction chamber displacement member is connected with an arm attached to the shank of the timer housing.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

Fig. 1 is a perspective view of ignition timer equipped with apparatus embodying the present invention.

Fig. 2 is a side view thereof taken in the direction of the arrow 2 of Fig. 1 and is partly in longitudinal section.

Fig. 3 is a plan view of the ignition timer with the distributor cap removed.

Fig. 4 is a section view of line 4—4 of Fig. 2.

Fig. 5 is a fragmentary side view taken in the direction of the arrow 5 of Fig. 2.

Fig. 6 is a plan view of the apparatus shown in Fig. 5 and is partly in section, the section being taken substantially on the lines 6a—6a and 6b—6b of Fig. 5.

Fig. 7 is a view partly in section, said view being taken substantially on the line 7—7 of Fig. 6.

The ignition timer-distributor comprises a housing 20 provided with a shank 21 adapted to be received within an opening or well 22 provided by the engine frame 23. The shank 21 provides a bearing for a shaft 24 carrying a gear 25 meshing with a gear 26 driven by the engine. The shaft 25 drives a weight supporting plate 27 carrying pivot pins 28 which pivotally support weights 29 which are free to move outwardly as they slide along ribs 30 provided by the plate 27. The weights 29 are provided with lever arms 31 engageable with cam surfaces 32 of a bar 33 which is attached to the lower end of sleeve 34 which is rotatable upon a reduced portion 35 of the shaft 24. The sleeve 34 carries a plate 36 which extends over the weights 29 in order to restrain lateral movement thereof. The pins 28 are connected by springs 37 with pins 38 carried by the bar 33. These springs tend to move the weights 29 inwardly toward the sleeve 34 as is well known to those experienced in the art, and as is disclosed in U. S. patent to Conklin 1,463,197.

The housing 20 supports an interrupter plate 40 carrying a pivot stud 41 upon which a contact bracket 42 and a circuit breaker lever 43 are pivoted. Bracket 42 carries a stationary contact 44 which cooperates with a movable contact 45 carried by the lever 43. A rubbing block 46 and one end of a leaf spring conductor 47 are attached to the lever 43, the other end of the spring 47 being attached to an insulated terminal 48. The rubbing block 46 is operated by cam 49 formed integrally with the sleeve 34. It is apparent that, if the housing 20 is rotated about the axis of the shaft 24, the angular relation between the rubbing block 46 and the cam 49 will be varied in order to vary the timing of the ignition. The timing of the ignition will be varied also by changing the angular relation between the sleeve 34 and the shaft 24, this change being effected centrifugally by the means responsive to engine speed including the weights 29 and the bar 33.

It will be understood that the circuit interrupter terminal 48 is connected to the primary winding of an ignition coil and that the distribution of sparking impulses generated by the coil is effected by distributor apparatus comprising a distributor rotor 50 which cooperates with the center terminal 51 and circular row of terminals 52, the former being connected with the second-

ary winding of the ignition coil and the latter terminals 52 being connected with the engine spark plugs. The terminals 51 and 52 are carried by a nonconducting cap 53 which cooperates with the housing 20 to enclose the ignition timing and distributing apparatus.

Other means for automatically controlling the timing of the ignition comprises a suction chamber member 60 made of sheet metal parts 61 and 62 and enclosing a flexible diaphragm 63 the edges of which are clamped between peripheral portions of the parts 61 and 62. The diaphragm 63 is connected by a rivet 64 with a cup shaped washer 65 and with a bar 66. The diaphragm 63 is held in the position shown in Fig. 6 by spring 67 which bears at one end against the washer 65 and at the other end against a coupling 68 threaded at 69 into a bushing 70 attached to the part 62. The coupling 68 is adapted to receive a pipe connected with the fuel intake passage of the engine in order to be responsive to suction produced by the engine. The part 61 of the suction chamber 60 is attached by studs 71 and nuts 72 to a bracket 73 having a portion 74 pivoting about the shank 21 of the ignition timer housing and resting upon a plane surface 75 provided by that portion 76 of the engine frame which provides the well 22. The bracket 73 is adjustable relative to some stationary part such as the engine frame by means which will now be described.

The manually operable means for adjusting the bracket 73, and hence the suction responsive means, with reference to the engine frame and consequently about the axis of the shank 21 comprises a screw 80 pivotally attached at 81 to a bracket 82 and passing through a plain hole in the bracket 73 and cooperating with nuts 83 and 84. The plate 82 is attached by a screw 85 to a portion 86 of the engine frame 23 as indicated in Fig. 2. The plate 82 carries graduations of an indicating scale 88 which cooperates with a pointer 89 provided by an arm 90 extending from the bracket 73. The bracket 82, being stationary, the bracket 73 can be adjusted relative to the bracket 82 by turning the nuts 83 and 84 disposed on either side of the bracket 73. As the bracket 73 is adjusted relative to the bracket 82 the pointer 89 will move relative to the scale 88 to indicate the position of the bracket 73 relative the bracket 82. When the desired position of adjustment has been made according to the indication, the nuts 83 and 84 are tightened in order to clamp the bracket 73 firmly in position.

The bar 66 is connected by a bolt 91 and screw 92 with an arm 93 having a hub portion 94 embracing the shank 21 of the ignition timer housing and clamped thereto by a clamp screw 95 and a nut 96. It is apparent, when the diaphragm 63 moves in response to variations in the engine intake suction, that the arm 93 and housing 26 will be moved relative to the shaft 24 thereby causing the ignition circuit interrupter to be displaced angularly relative to the cam 49. When the bracket 73 is adjusted relative to the bracket 82 the entire system comprising the suction chamber 60 the diaphragm 63 the bar 66 and the arm 93 will be rotated about the axis of shaft 24 in order to vary the angular relation between the circuit interrupter 43 and the cam 49.

While the bracket 73 and the arm 93 are rotatable with respect to the shaft 24, they are maintained upon the surface 75 of the portion 76 of the engine frame by a spring 100 bearing downwardly against a washer 101 which in turn bears against the arm 93 and the bracket 73, and also bears upwardly against the head 102 of a stud 103 screwed into the portion 76 of the engine frame. The stud has a plain cylindrical portion 104 passing through arcuate slots 105 and 106 provided by the bracket 73 and the arm 93 respectively.

The present ignition apparatus is provided with three means for controlling the ignition timing, namely; means for controlling in accordance with variations in engine speed, means for controlling in accordance with variations in engine load, and means for manually controlling in order to suit other variables in operation.

The manually operable adjusting means may be used to take care of variations in engine performance due to the use of various grades or brands of engine fuels. It has been found that various grades of engine fuel require slightly different settings of the ignition timer. The graduations 88 of the bracket 82 may be arranged so as to read in degrees of flywheel timing thereby permitting a definite adjustment to be made when tuning the engine. The zero or central graduation may represent the proper setting for the average grade of fuel. Then the markings on the scale will indicate 10 degrees of advance or 10 degrees of retard from the central position, these markings being provided to make adjustments for fuels requiring greater advance of spark or requiring less advance than normal for satisfactory operation.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In ignition apparatus for internal combustion engines comprising a housing having a shank and a shaft extending through said shank and into the housing for operating an interrupter, means for oscillating the housing relative to the shaft, comprising in combination, an arm attached to the shank, a bracket pivotally supported by the shank, means carried by said bracket and connected with said arm for varying the angular relation of the bracket and arm, a second bracket adapted to be fixed to the engine frame, and means for manually adjusting the first bracket relative to the second bracket and for securing the first bracket in the desired position of adjustment.

2. In ignition apparatus for internal combustion engines comprising a housing having a shank rotatably supported, and a shaft extending through said shank and into the housing, means for oscillating the housing relative to the shaft, comprising in combination, an arm attached to the shank, a bracket pivotally supported by the shank, means carried by said bracket and connected with said arm for adjusting the arm relative to the bracket, a second bracket adapted to be fixed to the engine frame, means for manually adjusting the first bracket relative to the second bracket and for securing the first bracket in the desired position of adjustment, and graduations provided by one of the brackets and a pointer carrier by the other of the brackets.

3. In ignition apparatus for internal combustion engines comprising a housing having a shank, and a shaft for rotation in and extending through said shank and into the housing, means for altering the angular relation of the

shaft and housing, comprising in combination, an arm attached to the shank, a bracket pivotally supported by the shank, means carried by said bracket and connected with said arm for oscillating the arm relative to the bracket, a second bracket adapted to be fixed to the engine frame, a threaded rod attached to one of the brackets and extending through a plain hole in the other of the brackets for varying the angular relation of the brackets, and adjusting and securing nuts threaded on said rod, a nut being on each side of the bracket through which the rod passes.

4. In ignition apparatus having a housing with a shank oscillatably mounted in a frame, a rotary shaft with bearings in the shank, and which housing supports a circuit interrupter periodically actuable by the rotary shaft, means for predetermining a basic angular relation between the interrupter and the frame, comprising in combination, an index bearing bracket pivoted about the shank, and extending in close proximity to the frame, a scale bearing bracket extending from the frame, and means connecting the brackets so that the index of one may be variably positioned with respect to the scale of the other, and means for altering the angular relation between the brackets comprising actuating means carried by the index bearing bracket, a clamp arm for oscillating the shank, and a link operatively connecting the actuating means and clamp arm, said altering means being independently operable to control the ignition timing irrespective of the basic angular relation determined.

5. Ignition apparatus comprising, a timer housing provided with a shank adapted to be rotatably supported, an adjustable bracket plate pivoting about the shank, an arm fixed to the shank of the housing and adjacent the bracket plate, said arm and bracket having arcuate slots in alignment, a stud threaded into the top of the support and passing through the slots and adapted to yieldably secure the arm and bracket to the engine frame, actuating means carried by the bracket and provided with means adapted to vary the angular relation between the arm and bracket, the assembly of said housing, bracket, arm and actuating means being oscillatable as a unit, and means for oscillating the unit and for securing the unit in the oscillated position.

JAMES M. CRAWFORD.
HENRY A. SCHWAGER.