Oct. 6, 1931. J. T. FITZSIMMONS 1,825,720

IGNITION TIMER

Original Filed Nov. 18, 1927

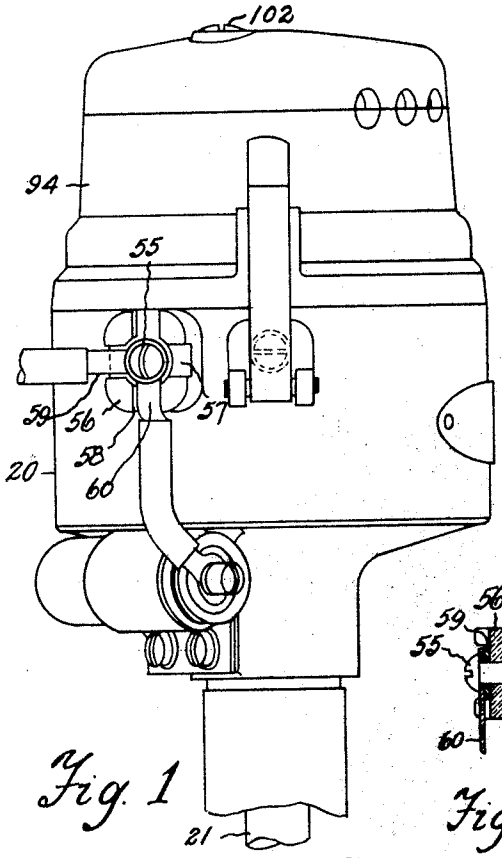


Fig. 1

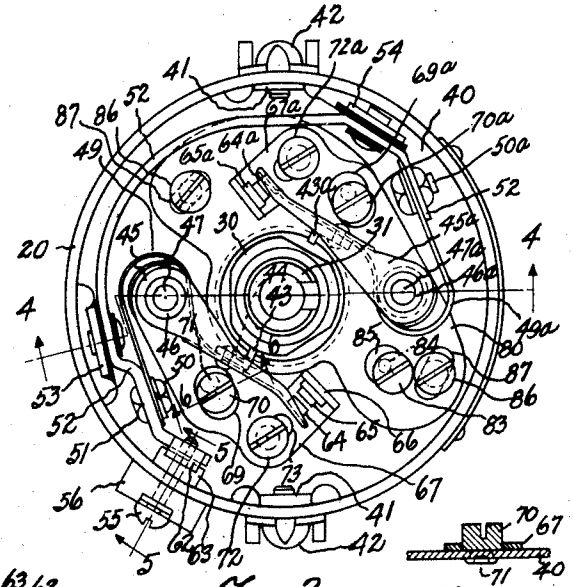


Fig. 2

Fig. 6

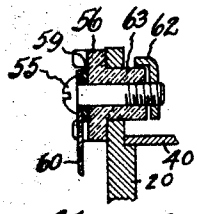


Fig. 5

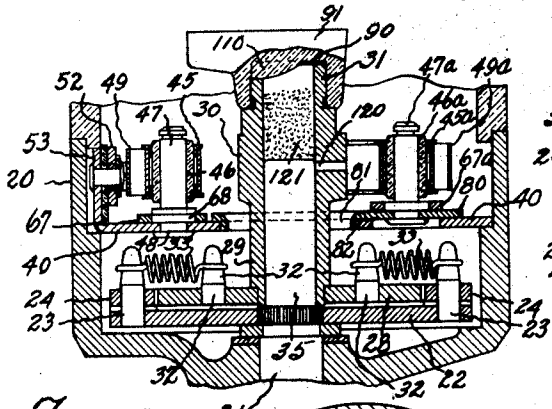


Fig. 4

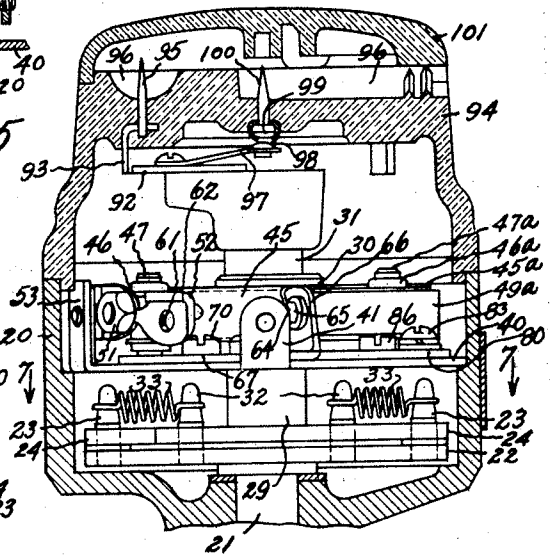


Fig. 3

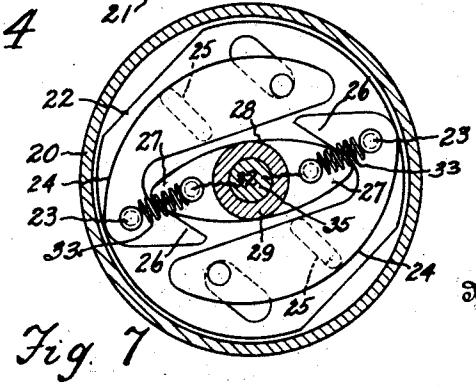


Fig. 7

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UNITED STATES PATENT OFFICE

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IGNITION TIMER

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This invention relates to an ignition apparatus for internal combustion engines and more particularly to the type of ignition timer which has two circuit interrupters operated by a single engine driven member.

One of the objects of the present invention is to provide improved means for adjusting one of the circuit interrupters relative to the other in order that they may operate simultaneously or in predetermined sequence.

Another object is to provide improved means for lubricating the timer.

Other objects of the invention are to provide a construction by which an ignition timer of this type may be manufactured at relatively low cost.

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 form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of an ignition timer embodying the present invention.

Fig. 2 is a plan view thereof with the distributor head removed.

Fig. 3 is a view showing the ignition timer housing and distributor head in cross section, and the circuit interrupter mechanism in side elevation.

Figs. 4, 5 and 6 are sectional views on the lines 4—4, 5—5 and 6—6 respectively of Fig. 2.

Fig. 7 is a sectional view on the line 7—7 of Fig. 3, this view being drawn to a slightly smaller scale.

The ignition timer housing 20 supports a drive shaft 21 to which is drivingly connected a weight carrying plate 22 carrying a plurality of weight pivot pins 23. Each pin 23 pivotally supports a weight plate 24 which slides across ridges or elevated portions 25 formed in the supporting plate 22. Each weight 24 has an arm 26 for engaging a cam arm 27 of a lever 28 which is drivingly connected with a sleeve or hollow shaft 29 which is formed to provide a cam 30 and a cylindrical extension 31. Each of the arms or cams 27 has a spring stud 32 connected by spring 33 with the weight pivot stud 23. These springs tend to maintain the weights 24 in innermost position adjacent the sleeve 29 which is rotatable upon an extension 35 of the shaft 21 and thus restrain rotation of the cam 30 relative to the shaft 35 in such direction as to advance the timing of the ignition spark as the weights move outwardly with increasing speed.

The cam 30 cooperates with a plurality of circuit interrupters supported by a main plate 40 having upright ears 41 by which the plate 40 is attached to the inside of the timer cup 20 by screws 42. Each interrupter includes an L-shaped rubbing block 43 adapted to be engaged by the cam 30, the rubbing block being attached by a rivet 44 to a breaker lever 45 having a non-conducting hub 46 pivoted upon a stud 47 attached at 48 to the plate 40. A leaf spring conductor 49 which is attached to the breaker lever 45 by the rivet 44 is connected by a screw 50 and a nut 51 with a conducting strap 52 which is insulatingly supported by ears 53 and 54 which stand upright from the plate 40 and are integral therewith. The strap 52 is electrically connected with terminal screw 55 insulatingly supported by non-conducting block 56 having transverse grooves 57 and 58 for preventing the rotation of terminal clips 59 and 60 respectively when the screw 55 is turned through a threaded hole 61 near one end of the conductor 52. Just above the threaded hole 61 the conductor 52 is provided with a lug 62 which engages the squared end 63 of the block 56 to prevent the latter from turning.

The breaker lever 45 carries a contact 64 engageable with a relatively stationary contact 65 attached to the upstanding ear 66 of a contact bracket 67. The bracket 67 as shown in Fig. 4, is pivoted about a shoulder 68 provided by the pivot stud 47 and is provided with a slot 69 which receives a screwdriver slotted disc 70 having an eccentric shank 71 pivotally connected with the plate 40. By turning the disc 70 with a screwdriver, the bracket 67 may be turned about the pivot stud 47 in order to secure the desired degree of contact separation when the

rubbing block 43 rides upon one of the lobes of the cam 30. This adjustment is made by using a shim of the proper thickness between the contacts 64 and 65. The bracket 67 is adjusted by turning the disc 70 until the contacts just clamp the shim between them; and, the bracket 67 is held in adjusted position by tightening a screw 72 which passes through an arcuate slot 73 in the bracket 67 and threadedly engages the plate 40.

The other circuit interrupter is constructed exactly like the one described, and reference numbers with the affix "a" have been applied to corresponding parts of the other circuit interrupter. The pivot stud 47*a* of the other circuit interrupter is not directly connected with the plate 40 but is riveted directly to an adjustable plate 80 having a central orifice 81 sufficiently large to clear the cam 30 and surrounded by an annular flange 82 which fits snugly within a hole in the plate 40 concentric with the hole 81. In this way, the plate 40 provides a bearing for the journal flange 82 of the plate 80.

In order to vary the angular relation between the rubbing blocks 43 and 43*a* relative to the cam 30, the plate 80 is turned around its bearing by turning a screw-driver slotted disc 83 having an eccentric shank 84 pivotally connected with the plate 40 and rotatable within a slot 85 in the plate 80. While the screws 86 passing through slots 87 in the plate 80 and having threaded engagement with the plate 40 are loosened, this adjustment is made in order that circuit interrupters will operate simultaneously or in predetermined sequence as desired. Then the screws 86 are tightened to retain the plate 80 in adjusted position. Obviously if a three lobe cam is used circuit breakers will be operated alternately to open and close the ignition primary circuit in recurrent sequence. If a four lobe cam were used the circuit breakers would be operated simultaneously and would divide the primary current somewhat equally between the two pairs of interrupter contacts.

It should be noted that all adjustments of the interrupters for contact separation and for synchronism can be made by the use of a single screw-driver.

The cam sleeve 29 has an extension 31 which is received by a cylindrical recess 90 in a rotor block 91 carrying a rotor segment 92 which rotates past a plurality of distributor posts 93 arranged in a circular row in a distributor head 94 supported by the housing 20 and providing a cover for the rotor and interrupters. Each post 93 is attached to a metal needle 95 projecting into a channel 96 for receiving an insulated stranded wire not shown. The segment 92 is connected by a leaf spring conductor 97 with a button 98 with a center button 99 attached to the head 94 and connected with a wire piercing needle 100. The secondary lead-wires not shown are laid in the various channels 96 of the head 94 and are clamped in position by a cover 101 retained by screws 102. The cover will force the conductors down over the insulation piercing members 95 and 100 to establish electrical connection between these conductors and the members.

The rotor block 90 is provided internally with a rib 110 which is received by a notch in the end of the sleeve 31 in order to locate the rotor correctly relative to the cam 30 and to provide a driving connection for the rotor.

The present invention provides for the lubrication of the cam surface and this is accomplished by providing the cam shaft 29 with a radially extending hole 120 which will be located slightly below the upper end of the drive shaft extension 35 when the parts are assembled as shown in Fig. 4. The cylindrical bore of the sleeve 29 above the end of the shaft extension 35 contains a wick of fibrous material 121 saturated with lubricating oil. By capillary attraction oil from the wick 121 is fed as needed to the cam shaft receiving surface of the shaft end 35 and some of this oil passes through the radial passage 120, and by centrifugal force finds its way to the outer surface of the cam 30 where it serves to lubricate the rubbing blocks of the interrupters and reduces wear on the cam and rubbing blocks. It is desirable that the passage 120 be located below the end of the shaft extension 35 so that the progress of oil from the wick 121 to the passage 120 will be retarded.

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. An ignition timer comprising two circuit interrupters each having a cam rubbing block, a rotatable cam for engaging the rubbing block, a stationary plate carrying one of the interrupters, an adjustable plate carrying the other interrupter, one of said plates providing a bearing coaxial with respect to the cam and the other plate providing a journal received by said bearing, and means for securing the adjustable plate in the desired position.

2. An ignition timer comprising two circuit interrupters each having a cam rubbing block, a rotatable cam for engaging the rubbing block, a stationary means for mounting one of the interrupters, adjustable means carrying the other interrupter, one of said means having an annular boss providing a journal coaxial with the cam, and received by a bearing provided by the other means, and means for securing the adjustable means

in the desired position with respect to the stationary means.

3. An ignition timer comprising two circuit interrupters each including a lever carrying a cam rubbing block, a rotatable cam for engaging the rubbing blocks of the levers, a stationary plate carrying one of the interrupters, an adjustable plate carrying another interrupter, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable in said bearing, one of said plates having a slot extending approximately radially with respect to said bearing, and adjusting disc having its head received by the radial slot in one plate and having an eccentric shank pivotally attached to the other plate, and means for securing the adjustable plate in position.

4. An ignition timer comprising two circuit interrupters each including a lever carrying a cam rubbing block, a rotatable cam for engaging the rubbing blocks of the levers, a stationary plate carrying one of the interrupters, an adjustable plate carrying another interrupter, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable in said bearing, the adjustable plate having a slot extending approximately radially with respect to said bearing, an adjusting disc having its head received by the radial slot in the adjustable plate and having an eccentric shank pivotally attached to the stationary plate, and means for securing the adjustable plate in position.

5. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, means for securing the adjustable plate in position, a bridging conductor insulatingly secured to the stationary plate at two spaced points near the edge of said plate, a terminal passing through the housing and connected to the bridging conductor, circuit interrupters each including a lever operated by the cam, each lever carrying a contact, said levers being mounted respectively upon the stationary plate and upon the adjustable plate, means respectively connecting the levers with the bridging conductor while permitting movement of the levers by the cam or movement of the adjustable plate, and stationary contacts carried respectively by said plates and engageable respectively with the contacts of said lever arms.

6. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, means for securing the adjustable plate in position, a bridging conductor insulatingly secured to the stationary plate at two spaced points near the edge of said plate, a terminal passing through the housing and connected to the bridging conductor, circuit interrupters each including a lever operated by the cam, each lever carrying a contact, said levers being mounted respectively upon the stationary plate and upon the adjustable plate, leaf springs each attached to a lever for respectively connecting said levers to said bridging conductor, while permitting movement of the levers by the cam or movement of the adjustable plate, and stationary contacts carried respectively by said plates and engageable respectively with the contacts of said lever arms, said springs urging the levers toward the cam and the contacts of the levers toward the stationary contacts.

7. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, means for securing the adjustable plate in position, pivot pins carried respectively by said plates, an adjustable stationary contact bracket pivoted on each of said pivot pins, means for adjusting each contact bracket with respect to its plate, and a cam operated contact carrying lever pivoted on each of said pivot pins so that the contact of each lever is adapted to engage the contact of its respective stationary contact bracket.

8. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, means for securing the adjustable plate in position, circuit interrupters supported respectively by said plates, each interrupter including an adjustable contact carrying bracket and a cooperating contact carrying lever operated by the cam, each cooperating lever and bracket being coaxially pivoted upon a plate, the levers being insulated from the plate, means for adjusting each contact bracket, and conducting means, each normally holding the movable contact of an arm in engagement with a contact of a bracket.

9. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and

the other plate a journal rotatable on said bearing, means for securing the adjustable plate in position, pivot pins respectively carried by and electrically connected with said plates, an adjustable stationary contact bracket pivoted on each of said pivot pins and electrically connected with a plate, means for adjusting each contact bracket with respect to its plate, a cam operated contact carrying lever pivoted on each of said pivot pins and insulated therefrom, and spring conductors each having one end fixed in the housing and the other end attached to a lever, said springs serving to conduct current to said levers and each adapted to urge the contact of a lever toward a contact of its respective bracket, while permitting adjustments of the contact brackets and adjustable plate.

10. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, the adjustable plate having a slot extending approximately radially with respect to said bearing, an adjusting disc having its head received by the radial slot and having an eccentric shank pivotally attached to the stationary plate, means for securing the adjustable plate in position, while permitting movement of the adjustable plate, and stationary contacts carried respectively by said plate and engageable respectively with the contacts of said lever arms, each contact bracket having a slot extending approximately radially with respect to its pivot pin, means for adjusting each bracket including an adjusting disc whose head is received by the slot of a bracket and having an eccentric shank pivotally connected with the plate carrying the bracket, means for securing each contact bracket in adjusted position, a cam operated contact carrying lever insulatingly pivoted upon each pivot pin and constructed so that the contact of each lever is adapted to engage the contact of its respective contact bracket, and spring conductors each having one end fixed in the housing and the other end attached to a lever, said springs serving to conduct current to said levers and each adapted to urge the contact of a lever toward a contact of its respective bracket, while permitting adjustments of the contact brackets and adjustable plate.

11. An ignition timer comprising, in combination, a housing, a cam located centrally of the housing, a stationary plate mounted in the housing, an adjustable plate mounted on the stationary plate, one of said plates providing a bearing coaxial with the cam and the other plate a journal rotatable on said bearing, the adjustable plate having a slot extending approximately radially with respect to said bearing, and adjusting disc having its head received by the radial slot and having an eccentric shank pivotally attached to the stationary plate, means for securing the adjustable plate in position, while permitting movement of the adjustable plate, and stationary contacts carried respectively by said plate and enagageable respectively with the contacts of said lever arms, each contact bracket having a slot extending approximately radially with respect to its pivot pin, means for adjusting each bracket including an adjusting disc whose head is received by the slot of a bracket and having an eccentric shank pivotally connected with the plate carrying the bracket, means for securing each contact bracket in adjusted position, a cam operated contact carrying lever insulatingly pivoted upon each pivot pin and constructed so that the contact of each lever is adapted to engage the contact of its respective contact bracket, a bridging conductor insulatingly secured to the stationary plate at two spaced points near the edge of said plate, a terminal passing through the housing and connected to the bridging conductor, and spring conductors each having one end attached to the bridging conductor and the other end attached to a lever, said springs serving to conduct current to said levers and each adapted to urge the contact of a lever toward a contact of its respective bracket, while permitting adjustments of the contact brackets and adjustable plate.

In testimony whereof I hereto affix my signature.

JOHN T. FITZSIMMONS.