Nov. 20, 1923. 1,474,970

A. A. KENT

IGNITION APPARATUS

Filed Dec. 20, 1920

Fig. 1.

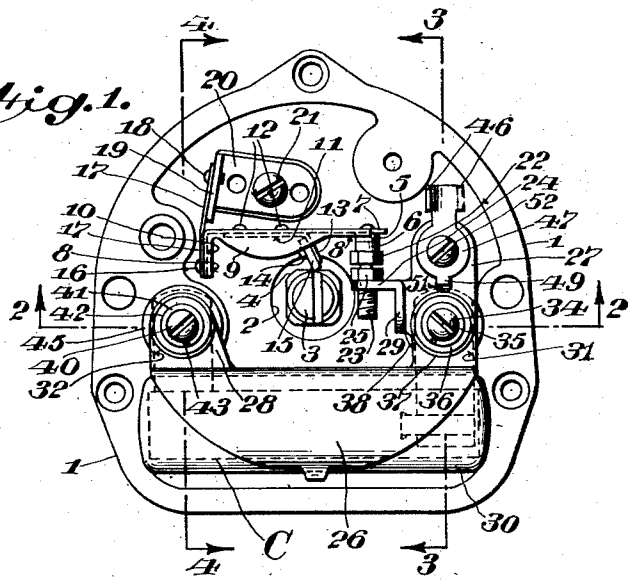


Fig. 2.

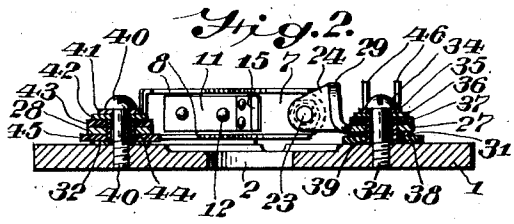


Fig. 3.

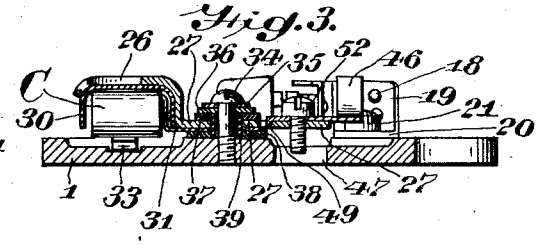


Fig. 4.

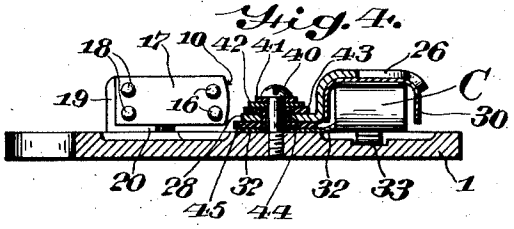


Fig. 7.

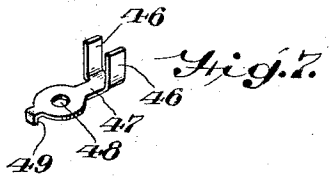


Fig. 6.

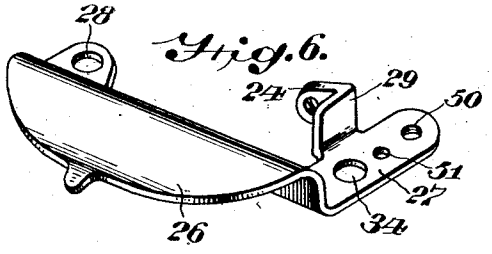
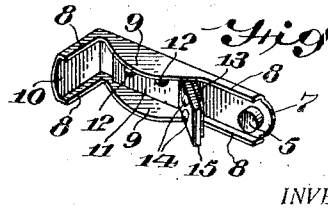


Fig. 5.



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Patented Nov. 20, 1923. 1,474,970

UNITED STATES PATENT OFFICE.

ARTHUR ATWATER KENT, OF ARDMORE, PENNSYLVANIA.

IGNITION APPARATUS.

Application filed December 20, 1920. Serial No. 431,964.

To all whom it may concern:

Be it known that I, ARTHUR ATWATER KENT, a citizen of the United States, residing in Ardmore, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Ignition Apparatus, of which the following is a specification.

My invention relates to interrupter structure and associated parts utilizable for periodically interrupting a circuit, and more particularly such as is utilized for producing electrical ignition for internal combustion engines.

My invention resides in novel structure of a contactor arm or arm carrying the movable interrupter or timer contact; it resides further in structure for shielding the associated condenser and correlating the condenser with the interrupter or timer structure; and it resides further in novel structure for supporting the stationary interrupter or timer contact.

My invention resides in the structure hereinafter described and claimed.

For an illustration of one of the various forms the invention may take, reference is to be had to the accompanying drawing, in which:

Fig. 1 is a plan view of apparatus embodying my invention.

Fig. 2 is a sectional view, partly in elevation, taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view, partly in elevation, taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view, partly in elevation, taken on the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the contactor arm.

Fig. 6 is a perspective view of one of the members embodied in my structure.

Fig. 7 is a perspective view of a conductor terminal.

Referring to the drawing, 1 is a support or base plate of any suitable material; in the example illustrated it is of conducting material, as iron or other suitable metal. Through an aperture 2 in the plate 1 projects, as indicated in Fig. 1, the cam shaft 3, which may be driven by any suitable means as by the internal combustion engine with which the disclosed apparatus is associated, the shaft 3 being driven by and in definite relation with respect to the engine shaft through the usual intervening gears or equivalent driving mechanism. Upon the shaft 3 is the cam 4 having a point for each cylinder of the engine.

As well understood in the art, the function of the cam is to periodically actuate the movable interrupter or timer contact to control the instant at which the ignition circuit is broken to produce a spark for igniting a combustible mixture in an engine cylinder.

The movable interrupter contact is indicated at 5, and its co-acting stationary interrupter contact is indicated at 6.

The contact 5 is secured upon the movable contact arm or lever 7 of sheet metal, as steel, which has the lateral flanges 8, 8 accentuated at 9, 9, the arm 7 being, at the end opposite the contact 5, bent at substantially right angles, whereby there is formed the abutment or projection 10 which may also be flanged at 8, 8. Disposed within the channel between the flanges 8, 8 of the arm 7 is the sheet metal member 11, preferably of spring steel, secured to the arm 7 by rivets 12. At one end the member 11 is bent forwardly, as indicated at 13, to which there is secured, as by rivets 14, the cam follower or shoe 15, of fibre or other suitable material for engaging the surfaces of the cam 4.

Secured, as by rivets 16, to the outer side of the abutment or extension 10 of arm 7, and preferably adjacent the end of the abutment 10 remote from the arm 7, is one end of the sheet or leaf spring 17 whose other end is secured, as by rivets 18, to the upstanding abutment or bracket 19, the point of attachment of the spring 17 being preferably remote from the front end or edge of the abutment 19, as indicated. The abutment 19 is integral with or carried by the plate 20 secured by screw 21 to the plate or base 1. The spring 17, with the parts in the position indicated in Fig. 1, that is, with the contact 5 in engagement with contact 6, is under stress or tension, holding the contact 5 against contact 6 and resisting its separation therefrom by actuation of the arm 7 by the cam 4 through the medium of the shoe or cam follower 15.

The stationary interrupter contact 6 is secured upon the head 22 of the bolt 23 threaded through the bracket or supporting member 24, the contact 6 being held in adjusted position by tightening the lock nut 25.

The member 24 is part of an integral sheet metal structure, Fig. 6, comprising the condenser holding member 26 having the integral laterally extending lugs 27 and 28. Formed on the lug 27 is the upwardly bent bracket or standard 29 bent laterally from which is the aforesaid support 24.

Secured to the under side of the member 26, as by welding, is the sheet metal member 30 in the form of an elongated cup within which is disposed the condenser unit C suitably covered with insulating and water proofing material and having the laterally extending sheet metal terminals 31 and 32. Between the under side of the condenser unit C and the base 1 intervenes a leaf spring 33, which may be secured to the plate 1, or to the condenser unit.

The member 26 is secured by its lugs 27 and 28 to the base 1. The lug 27 is secured by the screw 34 threaded into the base 1 and extending through the lock washer 35, metal washer 36, washer 37 of insulating material, thence through the lug 27 and condenser terminal 31, and thence through the washer 38 of insulating material into the base 1, the apertures in the lug 27, terminal 31 and washer 38 being large enough to accommodate the insulating bushing 39 surrounding the screw 34. By this construction the lug 27 is mechanically secured to, but electrically insulated from, the base 1, and at the same time electrical connection is effected between the condenser terminal 31 and the lug 27, and therefore with the stationary interrupter contact 6.

The other lug 28 is secured to the base 1 by screw 40, which extends through the lock washer 41, metal washer 42, insulating washer 43, through an insulating bushing 44 surrounding the screw 40, the bushing 44 extending through registering holes in the lug 28 and the insulating washer 45, the screw 40 extending also through a hole in the condenser terminal 32 and thence into the base 1. By this structure the lug 28 is mechanically secured to but electrically insulated from the base 1, whereby the member 26 and all parts conductively connected therewith are insulated from the base 1. But the condenser terminal 32 is clamped against the metal base 1 and makes electrical contact therewith, with the result that in effect the condenser terminal 32 is in electrical communication with the movable interrupter contact 5, the condenser C being therefore shunted across the interrupter contacts, as well understood in the art.

Referring to Fig. 7, there is shown a conductor or cable terminal having the lugs 46, 46 between which the ends of a conducting cable or conductor are disposed and then secured by bending the lugs over and by soldering, whereby the conductor is connected to the terminal 47 proper. The terminal is provided with a screw hole 48 and a downwardly extending lug 49, the screw hole 48 registering with the hole 50 in the lug 27, and the downwardly extending lug 49 projecting into the hole 51 in lug 27, thereby preventing rotation of the terminal 47 as the screw 52 is fastened or loosened, the screw 52 threading into the lug 27 and so connecting the cable and cable terminal to the lug 27.

The conductor connected to the lug 27, as by terminal 47, may be in the primary circuit of the ignition induction coil, such primary circuit including the induction coil primary and a battery, one end of the primary circuit being grounded or connected to the metallic mass of the engine, and the other terminal is accordingly grounded through the structure herein illustrated through the movable interrupter contact 5, which is in electrical connection with the base 1, which may be and generally is in electrical connection with the mass or frame of the apparatus and is therefore grounded.

By the contact arm structure described, the movable contact is farther from the end of the arm 7, about which pivotal movement takes place, than the cam follower 15, whereby wide separation of the contacts 5 and 6 is effected by the cam, the wide and rapid separation assisting in making a clean sharp break in the primary circuit. The arm structure is such that while very light, and therefore capable of readily and faithfully following the cam at high speed, it is nevertheless stiff or rigid in virtue of the flanges 8 and accentuated flanges 9.

The condenser holder or cover structure serves at once to protect the condenser unit against mechanical injury, and serves also to shield it from moisture or water. And the same structure serves for supporting the stationary interrupter contact and its adjusting means.

What I claim is:

1. Ignition timer arm structure comprising a lever arm, an interrupter contact carried thereby adjacent one end thereof, a member disposed between said contact and the other end of said lever arm and having a face projecting at a substantial angle with respect to the longitudinal extent of said lever arm, and a cam following shoe consisting of non-metallic sheet material secured flatwise to said face and adapted to engage a cam at its end.

2. Ignition timer arm structure comprising a lever arm, an interrupter contact carried thereby, and cam follower structure comprising a plate secured to said lever arm and having a portion extending at a substantial angle with the longitudinal extent of said lever arm, and a shoe secured to said portion of said plate.

3. Ignition timer arm structure compris-

ing a lever arm, an interrupter contact carried thereby adjacent one end thereof, a cam follower secured to said lever arm between said contact and the other end of said lever arm, an abutment at the other end of said lever arm, and means supporting said abutment and allowing movement of said lever arm by said cam follower.

4. Ignition timer arm structure comprising a lever arm of channel section, a member within the channel extending at a substantial angle with respect to the longitudinal extent of said arm, and a shoe secured to said member and projecting beyond the sides of said channel.

5. Ignition timer arm structure comprising a lever arm, an interrupter contact carried thereby, and cam follower structure comprising a strip having a flat face secured against a flat face of said lever arm, a bent up end on said strip, and a shoe secured to said bent up end.

6. Ignition timer arm structure comprising a lever arm, an interrupter contact carried at one end thereof, an abutment on said lever arm at the other end thereof, a cam follower secured to said arm between said contact and said abutment, and a leaf spring secured to said abutment for supporting and allowing movement of said lever arm.

7. Ignition timer structure comprising a lever arm, an interrupter contact carried thereby adjacent one end thereof, a cam follower carried by said arm intermediate said contact and the opposite end of said arm, an abutment at said opposite end of said arm, a cam for actuating said follower, a condenser holder having lugs disposed on opposite sides of said cam, and a stationary interrupter contact in the path of said first named contact supported by said condenser holder on the side of the cam opposite to that of said abutment.

8. Ignition timer structure comprising a timer arm, an interrupter contact carried thereby, a cam for actuating said arm, a stationary interrupter contact, a condenser shunted across said contacts, a condenser holder supporting said stationary contact, and a condenser shield secured to said holder for receiving said condenser, said shield covering the ends of said condenser.

9. Ignition timer structure comprising a base member, interrupter structure carried thereby, a condenser shunting the interrupter contacts, a holder secured to and spaced from said base member, and a condenser shield secured to said holder for receiving said condenser between itself and said base member, said shield covering the ends and sides of said condenser.

10. Ignition timer structure comprising a base member, interrupter structure carried thereby, a condenser shunting the interrupter contacts, a holder secured to and spaced from said base member, and an inverted cup-shaped member secured to said holder and receiving said condenser.

11. Ignition timer structure comprising a base member, interrupter structure thereon, a condenser shunting the interrupter contacts, a metallic holder member having a portion spaced from said base member, means securing said holder member to and insulating it from said base member, a cup-shaped member secured to said portion of said holder member, said condenser disposed in said cup-shaped member between the same and said base member.

12. Ignition timer structure comprising a base, interrupter structure thereon, a metallic member secured to and insulated from said base member, a stationary interrupter contact carried by said metallic member, said metallic member having an aperture, and a conductor terminal secured to said metallic member and having a lug extending into said aperture.

13. Ignition timer structure comprising a base member, a condenser holder of metal secured to said base member in speced relation thereto, a condenser disposed between said base member and said holder, lug structure upstanding from said holder, a member projecting laterally from said lug structure, and an interrupter contact carried by said laterally projecting member.

14. Ignition timer structure comprising a metal base member, a condenser holder of metal secured to and insulated from said base member, lug structure upstanding from said holder, a member projecting laterally from said lug structure, and a screw carrying an interrupter contact threaded through said laterally projecting member.

15. Ignition timer arm structure comprising a lever arm provided with laterally extending flange structure intermediate its ends, a contact carried by said arm adjacent an end thereof, a member having a flat face extending at a substantial angle to said arm disposed between the ends of said arm adjacent said flange structure, and a cam follower shoe of non-metallic sheet material secured flatwise to said face and having a cam-engaging end projecting beyond said flange structure.

16. Ignition timer arm structure comprising a lever arm, an interrupter contact carried thereby, an abutment on one end of said lever arm extending transversely thereto at a relatively great angle, and flanges on said arm and said abutment.

17. Ignition timer arm structure comprising a lever arm of channel section, an interrupter contact carried thereby, and an abutment of channel section on one end of said lever arm extending transversely thereto at a relatively great angle.

18. Ignition timer arm structure compris-

ing a lever arm provided with laterally extending flange structure intermediate its ends, a contact carried by said arm adjacent an end thereof, a plate secured to said arm and having a portion extending at a substantial angle with respect to said arm, and a cam follower shoe of non-metallic sheet material secured flatwise to said portion of said plate and having a cam-engaging end projecting beyond said flange structure.

19. Ignition timer arm structure comprising a lever arm, an interrupter contact carried thereby, an abutment of channel section on one end of said lever arm extending transversely thereto at a relatively great angle, and a leaf spring secured to said abutment.

In testimonv whereof I have hereunto affixed my signature this 17th day of December, 1920.

ARTHUR ATWATER KENT.