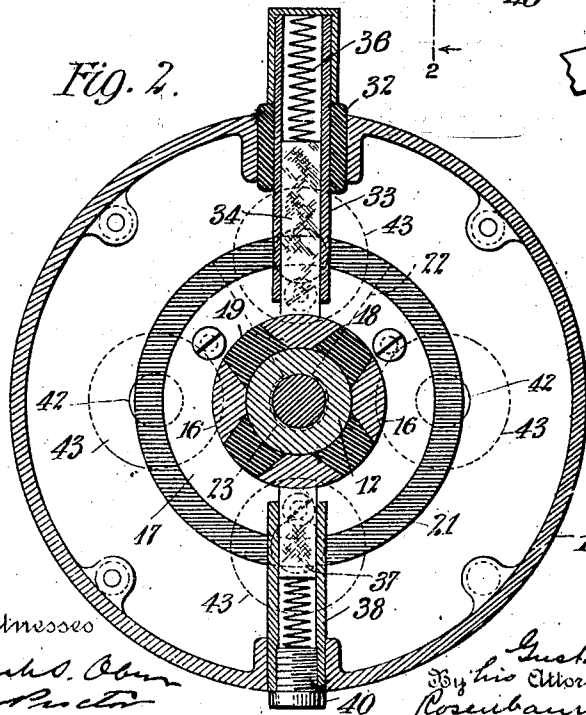
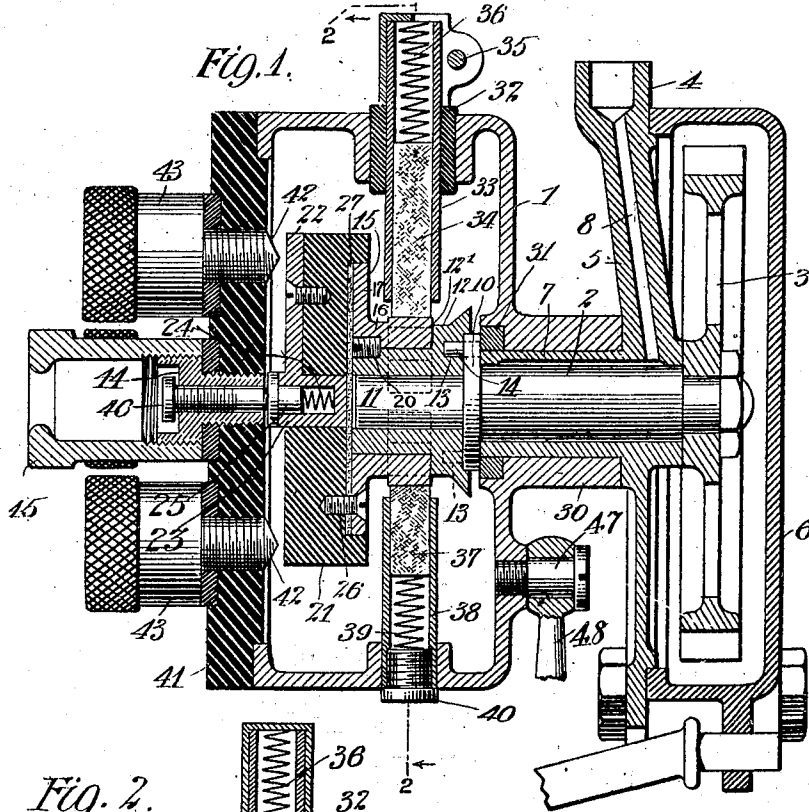


No. 820,636.

PATENTED MAY 15, 1906.

G. E. FRANQUIST.
ELECTRIC IGNITION APPARATUS.

APPLICATION FILED JUNE 24, 1905.



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ELECTRIC IGNITION APPARATUS.

No. 820,636.

Specification of Letters Patent.

Patented May 15, 1906.

Application filed June 24, 1905. Serial No. 266,751.

To all whom it may concern:

Be it known that I, GUSTAVE EDWARD FRANQUIST, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Electric Ignition Apparatus, of which the following is a full, clear, and exact description.

My invention relates to electric ignition devices for hydrocarbon-motors, and pertains to the mechanism ordinarily known as the "timer" or "commutator."

In the method of jump-spark ignition the low-tension circuit, including the battery or other source of electric current, is interrupted at suitable intervals of time, which impresses a high electromotive force in the secondary circuit, including the spark-plugs, so that sparks jump across the plugs and ignite the mixtures within the cylinders. Under the present methods of construction the primary circuit is broken by a rotating series of contacts and the secondary circuit is also provided with a form of rotary switch, which automatically directs the secondary current into the proper spark-plug. This rotating switch also has the effect of providing a minute supplemental air-gap in the secondary circuit, which increases the efficiency by preventing a premature leakage of the charge across the sooty terminals within the cylinder.

The object of my present invention is to devise a convenient and practicable form of mechanism for accomplishing the above-named functions, which shall be simple in operation, convenient and easy to manufacture, and having a minimum number of parts.

A further object of the invention is to provide a device which shall accomplish all the above-named functions and which shall be inclosed within a single dust-proof casing and operable from a single shaft connection.

With these and other objects in view my invention consists in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth as shown in the accompanying drawings, and finally particularly pointed out in the appended claims.

Figure 1 is a longitudinal sectional view of a timer or commutator mechanism embodying the principles of my invention. Fig. 2 is

a longitudinal sectional view on the line 2-2 of Fig. 1 looking in the direction of the arrows.

The mechanism which I have illustrated is designed for use upon a motor-vehicle having a four-cylinder hydrocarbon-motor and is provided with gear connections by which it can be operated from the rotating parts. It is to be understood, however, that my invention is applicable to use with hydrocarbon-motors in any relation or of any desired number of cylinders, and it may be driven by gears, chains, belts, direct connection, or in any other way.

Referring to the drawings, and to the views and reference-signs appearing thereon, in which like parts are designated by the same reference-signs wherever they occur, 1 denotes a circuit-controller casing in which is disposed the rotatable shaft 2, carrying the driving means 3 thereon, which I have shown in the form of a gear within a supplemental casing 4. In the preferred form of my invention I make the casing 4 in two parts 5 and 6, which can be clamped or secured together in any suitable way. The part 5 has a projecting fixed journal 7, which forms the journal-bearing for the shaft 2, previously mentioned.

8 indicates an oil-duct leading to any suitable point for the attachment of a usual form of oil-cup.

The part 4, with its fixed journal 7, forming the journal-bearing of the shaft 2, constitutes the main supporting-frame and is itself supported from the motor-vehicle chassis or from the engine-frame in any suitable way.

I have devised a convenient form of construction for the shaft 2, in which I form a collar 10 thereon, which abuts against the end of the fixed journal or journal-bearing 7 and forms a thrust-bearing to limit the endwise movement of the shaft.

11 indicates a stud upon the shaft 2, which forms a support for the battery-timer or circuit-controller proper. I have shown this battery primary timer in the form of a sleeve 12, loosely mounted on the stud 11 and having a series of recesses 13 in its end face, which may be engaged with a correspondingly-formed pin or projection 14 upon the face of the flange 10.

15 indicates the contact member of the battery-timer and is in the form of a collar

16, having a flange 17. The collar 16 has equidistantly-spaced notches 18 in its end face, each of which notches is preferably of a wedge-shaped form, extending inwardly, as clearly shown in Fig. 2, and within the notches or recesses I place insulating-blocks 19, of fiber or other suitable insulating material. The collar 16 slides over the sleeve 12 and is held in place thereon by a locking-screw 20, which acts as a combined key and fastening means. When the parts are assembled in this way, the insulating-sections 19 are firmly held between their containing-walls and the peripheral face and shoulder 12' of the sleeve 12. The battery primary timer is placed upon the stud 11, and the pin 14 is engaged with one of the recesses 13, so as to adjust the timer in proper angular relation with respect to the shaft 2.

I also provide means upon the shaft 2 for automatically switching the secondary current into the proper spark-plug, and in the practical construction which I have illustrated 21 indicates a block of hard rubber or other insulating material, in the face of which is inset a metallic plate 22, which constitutes a secondary switch, as hereinafter described. I have shown the metallic plate 22 as integral with a part of a metallic piece 23, having a recess 24 therein, in which is slidably spring-pressed outward a metallic plug 25. The insulating-plate 21 may be secured to the flange 17 of the sleeve 15 by screws 26, an intermediate packing material 27, of soft rubber or other similar substance, being used to permit a more perfect adjustment of the parts.

The above-described parts constitute the complete rotary element of the circuit-controller embodying my invention. It will be seen that the rotating element is completely journaled in and supported by the fixed journal 7, which constitutes part of the fixed frame.

I will now describe the features of the surrounding casing by which the rotating element is made operative in the circuit-controller. The casing 1 is formed with a portion 30, bored to rotatably surround and fit upon the studs 7, and is held in rotative but non-slidable relation thereon by the collar 10 on the shaft 2, previously described. 31 indicates a bearing-support for the collar 10, and all these parts are preferably made of hardened steel, so that the wear between them will be negligible and the shaft and casing will be held in a fixed relation to one another, which will later be more particularly described.

The casing 1 is designed to support brushes which bear upon the contacts 16 to make and break the primary circuit.

32 indicates an insulating-plug inserted in an orifice in the casing 1, and within this plug is fixed a metallic tube 33.

34 indicates a brush or electric contact of

any suitable description, formed to slide within the tube 33. In the preferred form of my invention I employ a brush of metallic gauze packed into a cylindrical form, so as to slide within the tube and make an efficient contact therewith.

35 indicates a cap upon the outer end of the tube 33, which also forms a contact-terminal therefor and a support for the pressure-spring 36, which normally presses the brush 34 into contact with the segments 16' of the primary timer.

37 indicates a brush generally similar to the brush 34 and slidably disposed in a tube 38, being spring-pressed outward by a spiral spring 39. The tube 38 is, however, directly fitted into the casing 1, so as to form a grounded connection therewith.

40 indicates a metallic plug which constitutes a pressure abutment for the spring 39.

The purpose of the brush 37 is merely to form an efficient ground connection from the timer 15 in order to avoid reliance on the imperfect electrical connections through the journal-bearings of the rotating part. It will be understood that the brush 37 might contact with any portion of the peripheral surface of the rotating part or primary timer 15; but I prefer that it should be on the segments 16', through which it makes electrical connection at all times when such connection is required.

At the end of the casing 1 I secure an insulating plate or block 41, and spaced around the inside face thereof I arrange a plurality of metallic points 42, which constitute terminals of a plurality of circuits, each including a separate plug on one of the cylinders. I have shown the terminals 42 in the form of screws threaded into the insulating-block 41 and having binding-posts 43, by which the connection of the terminal wires is secured.

44 indicates a screw-threaded plug which is screwed into a threaded aperture at the center of the insulating-plate 41, and 45 indicates a binding-post upon the stud by which electrical connection is made from a common wire to all the spark-plugs, also including in the circuit the secondary winding of the induction-coil.

46 indicates a screw within the plug 44, and this screw 46 can be adjusted in and out, so as to contact with the plug 25, previously described. As previously stated, the plug 25 is spring-pressed outward with relation to the shaft 2, by which means the pressure of the plug 25 on the screw 46 is transmitted to the shaft 2 and maintains the bearing-collar 10 closely against the bearing-support 31 under all conditions.

47 indicates a stud upon the casing 1, to which a chain or link 48 may be attached for the purpose of rotatably adjusting the casing. When the casing is rocked backward and forward, the time relation of the sparks

within the cylinders is changed with reference to the engine cycles.

The operation of my circuit-controller will be understood from the preceding description by those skilled in the art. The shaft 2 is rotated continuously by means of the gear 3 and any other intermediate connection from the main engine-shaft. The contact 35 is connected to one terminal of the primary circuit of the induction-coil, the other terminal being grounded on the casing 1. The secondary terminals are connected in a manner which has already been described, and the points 42 are adjusted so as to lie in intimate proximity to but not actually touching the face of the rotating block 21. The rotation of the circuit-controller is now effective to make and break the primary circuit of the induction-coil, and whenever this occurs there is impressed in the secondary coil a high electromotive force, which tends to throw a shower of sparks across its terminals. The circuit includes the segment or secondary switch 22, and from this segment the sparks leap to the point 42, which happens to be nearest, and from thence are conducted to one of the spark-plugs of the hydrocarbon-motor. It will be seen that in the construction which I have illustrated the primary circuit is made and broken four times in a single revolution, and at each time the secondary switch 22 is opposite a different point 42. The sparks are accordingly led to four different spark-plugs in regular succession. In the practice of my invention I arrange the segment 22 so that it will be opposite a point as long as sparks are passing. It is obvious that it is not absolutely necessary to employ my circuit-controller with a coil having an interrupter, since the break in the primary circuit caused by the segments 16 would be sufficient to cause successive sparks without any other interrupter in the primary circuit.

What I claim is—

1. A circuit-controller for hydrocarbon-motors comprising a frame or support having a fixed journal, a shaft journaled in said journal and having a collar thereon, a primary timer and a rotating secondary switch on said shaft, a casing having an annular collar disposed to engage said first-named collar and journaled on said fixed journal, a brush mounted in said casing and bearing on the

timer, and conductors supported adjacent to said switch.

2. In a circuit-controller for hydrocarbon-motors, a frame or support having a fixed journal, a shaft having a collar thereon journaled in said journal, a casing revolubly supported on said fixed journal and having a part engaging said first-named collar, and spring means for maintaining said collar and part in engagement.

3. In a circuit-controller for hydrocarbon-motors, a frame or support having a shaft journaled therein, a casing revolubly supported on said frame or support and having a shoulder to limit the endwise movement of said shaft, and spring means for maintaining said shaft in engagement with said shoulder.

4. In a circuit-controller for hydrocarbon-motors, a shaft having a stud and a pin thereon, a sleeve formed to slide upon said stud and engage said pin, a collar having notches formed to slide upon said sleeve, and trapezoidal-shaped insulating-sections in said notches engaging the same on their inclined faces, the end faces being square or normal thereto.

5. In a circuit-controller for hydrocarbon-motors, a shaft having a stud and a projection or pin thereon, a primary timer, carrying a rotating secondary switch, disposed upon said stud and engaging said projection, and spring means for retaining said timer in position.

6. In a circuit-controller for hydrocarbon-motors, a collar having wedge-shaped notches in its face, trapezoidal insulating-sections in said notches, and a part formed to fit within said collar and having a shoulder to abut against the end faces of said insulating-sections and hold them in position.

7. In a circuit-controller for hydrocarbon-motors, a shaft having a stud and a pin thereon, a sleeve upon said shaft engaging said pin, and a collar having notches with intermediate insulating-sections, fitted upon said sleeve, and a screw for holding said parts together.

In witness whereof I subscribe my signature in the presence of two witnesses.

GUSTAVE EDWARD FRANQUIST.

Witnesses:

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