

G. HANIQUET.
IGNITION APPARATUS.
APPLICATION FILED JUNE 11, 1908.

937,522.

Patented Oct. 19, 1909.
2 SHEETS—SHEET 2.

Fig. 3.

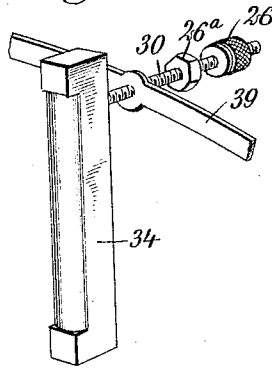


Fig. 4.

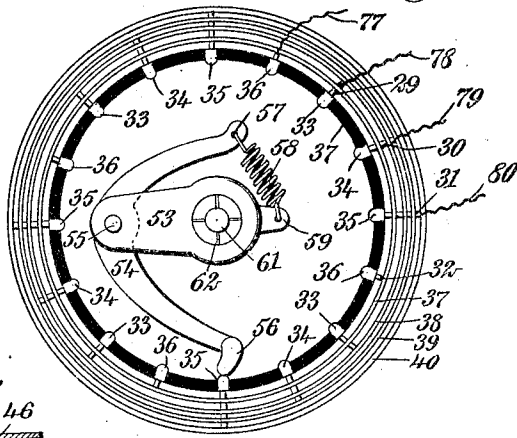


Fig. 5.

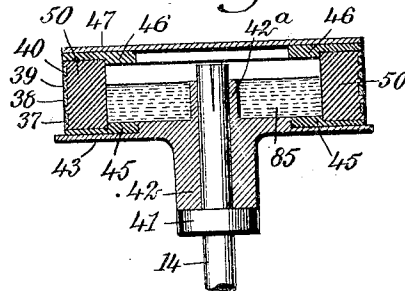
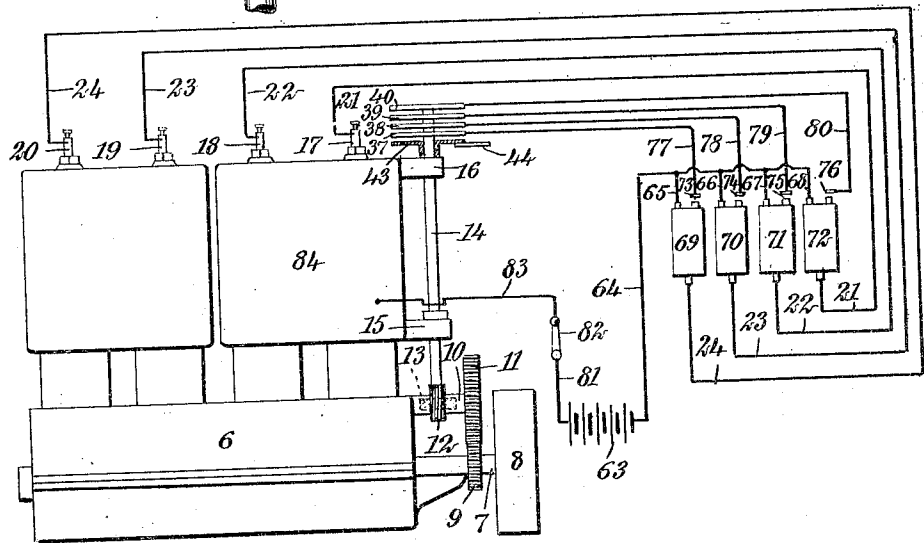


Fig. 6.



WITNESSES

Geo. Maylor
Walton Harrison

INVENTOR

George Haniquet

BY *Wm. Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE HANIQUET, OF LONGBEACH, CALIFORNIA.

IGNITION APPARATUS.

937,522.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed June 11, 1908. Serial No. 437,872.

To all whom it may concern:

Be it known that I, GEORGE HANIQUET, a citizen of the United States, and a resident of Longbeach, in the county of Los Angeles and State of California, have invented a new and Improved Ignition Apparatus, of which the following is a full, clear, and exact description.

My invention seeks to provide means for retaining a thin lubricating oil within a circuit closer. In addition my invention comprehends mechanism for reducing the electrical arcing as the contact shoe leaves the contact bar.

My invention further contemplates slowing down the speed of the circuit closer shaft, as compared with the main shaft.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which drawings like characters of reference indicate like parts throughout the views, and in which—

Figure 1 is a substantially central vertical section through my improved circuit closer, this view showing the arrangement of the stationary contact bars and the revoluble brush, together with its guide and the parts associated therewith; Fig. 2 is a horizontal section upon the line 2—2 of Fig. 1, looking in the direction of the arrow, and showing the relative arrangement and distribution of the stationary contact bars within the circuit closer, and further showing how the revoluble contact brush and its accompanying parts are mounted; Fig. 3 is a fragmentary perspective showing one of the stationary contact bars removed from the circuit closer, this view showing one of the bolts provided with a binding post for supplying current to the distributing band; Fig. 4 is a diagrammatic view, otherwise somewhat similar to Fig. 2, and showing the electrical connections for the contact bars used to distribute the primary currents; Fig. 5 is a detail, showing in section certain parts of my improved circuit closer and showing particularly how the thin oil is retained for the purpose of keeping it in permanent and thorough engagement with the various wearing parts, and Fig. 6 is a front view, partly diagrammatic and partly in elevation, of an engine complete and provided with my improved circuit closer and further provided with gearing connected with the engine shaft and driven thereby, this gearing being so arranged as to drive the circuit closer shaft

at a speed slow as compared with that of the engine shaft, the view further showing the wiring of the system.

The general arrangement of the mechanism is indicated in Fig. 6. The engine is shown at 6 and is provided with a main shaft 7, carrying a fly wheel 8 and a pinion 9. Another shaft 10 carries a gear wheel 11, secured rigidly upon it, this gear meshing with the pinion 9. Mounted upon the shaft 10 is a spiral gear 12 which meshes with another spiral gear 13, the latter being mounted rigidly upon the lower end of a counter shaft 14. The counter shaft 14 is supported by stationary bearings 15, 16. The spark plugs are shown at 17, 18, 19, 20, there being in this instance four of them, as the engine shown is of the type employing four explosive charges to every two revolutions of the main shaft. Connected with the respective spark plugs are wires 21, 22, 23, 24, for supplying secondary currents to them.

Referring now more particularly to Figs. 1 and 2, the circuit closer mechanism will be described. Binding posts 25, 26, 27, 28 (there being four in this particular case) are connected respectively with bolts 32, 29, 30, 31. These bolts lead respectively to the contact bars 36, 33, 34 and 35. These contact bolts or bars are in electrical communication with distributing bands 37, 38, 39 and 40. Each of these last mentioned bands is in electrical communication with four, and four only, of the contact bars. The arrangement of one of the contact bars and the distributing band with which it is connected is shown in Fig. 3. The bolt 30, being rigidly connected with the contact bar 34 extends through the band 39. This bolt is threaded and is fitted with a revoluble nut 26^a which may be forced down upon the band (see Fig. 3.) The manner in which the contact bars are secured in position can be understood from Figs. 1, 2 and 4. The distributing band 40, for instance, is in the same plane as the bolt 31, which is provided with the binding post 28. In this same plane are also bolts 31^a which, together with the bolt 31, connect all of the contact bars 35 with the distributing band 40, and with no other distributing band. Similarly the bolt 32, carrying the binding post 25, is electrically connected with the distributing band 37, the latter being at all times in electrical communication with the contact bars 36, and with no other contact bars. The bolts 29

and 30, having binding posts 26, 27, are in like manner connected individually each with its own distributing band 38, 39. The contact bars 33, 34 35 and 36 are thus electrically arranged in groups, four bars (herein designated by the same numeral) being connected with each distributing band, the four bars in question being spaced equidistant. This arrangement can be observed in Fig. 2, wherein four bars each bearing the numeral 35 are severally connected with the band 40, and placed one at the top, one at the right, one at the bottom and one at the left according to this figure. The other contact bars are similarly arranged with regard to spacing and to their connections to the distributing bands. It will be understood, however, (see Fig. 1) that while the contact bars are thus somewhat independent of each other as regards their electrical connections, they are disposed symmetrically as regards their geometrical positions, and they are all of a common length as will be understood from Fig. 1.

Secured rigidly upon the counter-shaft 14 is a collar 41, held in position by a screw 41^a, as will be understood from Fig. 1. Mounted revolubly upon this collar 41 and encircling the counter-shaft 14 is a support comprising a hub 42 carrying a disk 43 of metal, and also carrying a cup-like portion 42^a, both of these parts being integral with the hub. Secured upon this disk is an arm 44, for the purpose of turning the disk slightly in order to adjust it to advance or to retard the spark as desired. A pair of rings 45, 46 of insulating material, preferably fiber or rubber, are disposed opposite each other and engaging the ring 46 is a disk 47 of metal. Bolts 48, 49 pass through the disks 43, 45, 46 and 47 for the purpose of clamping the disks and rings firmly together, and also through a large ring 50 of insulating material, the latter being disposed intermediate the rings 45, 46.

A crank arm 53 is mounted upon the upper end of the counter-shaft 14. This crank arm 53 carries a smaller arm 54, the latter being journaled upon the arm 53 by aid of a pivot pin 55, as will be understood by Fig. 2. The arm 54 I designate as a contact arm, and it is adapted to swing upon the crank arm 53 because of its pivotal connection therewith. The outer or free end of the contact arm 54 is provided with a contact shoe 56, which may be brought successively into engagement with the various contact bars 33, 34, 35, 36. The end of the contact arm 54 opposite the contact shoe 56 is provided with a small hole 57 and by aid of this hole a spring 58 is connected with the bar 54. This spring is also connected with a lug 59 integral with the crank arm 53. A sleeve 60, also integral with the crank arm 53 partially encircles the upper end of the counter-

shaft 14. A screw plug 61 is inserted in the upper end of the counter-shaft 14, which is bored and threaded for this purpose and is provided with slots 62, the purpose of which is to allow the upper end of the counter-shaft to expand slightly when the screw plug 61 is forced into it, so as to open the slots 62. This arrangement enables the crank arm 53, and consequently the lug 59, to be adjusted relatively to the counter-shaft 14. The contact shoe 56, owing to the resilience of the spring 58, is free to yield slightly as it successively engages and disengages the contact bars. The inner faces of these contact bars are slightly rounded, as will be understood from Figs. 2 and 3.

A battery (see Fig. 6) is shown at 63. From this battery leads a wire 64, and connected in multiple with this wire are a number of shorter wires 65, 66, 67, 68, leading to the primary windings of a number of unit induction coils 69, 70, 71, 72. These induction coils are severally provided with interrupters 73, 74, 75, 76, these interrupters being connected each with a wire 77, 78, 79, 80. These wires (see Fig. 2) lead to the binding posts 25, 26, 27, 28, and through these binding posts and parts immediately associated therewith, as above described, the wires in question are connected with the various distributing bands 37, 38, 39, 40. Connected with the battery 63 is a wire 81, which leads to a hand switch 82, the latter being connected by a wire 83 with any convenient metallic portion 84 of the engine 6. A volume of thin oil 85 (see Fig. 5) is placed within the circuit closer for the lubrication of the various wearing parts. In Fig. 5 a considerable number of parts are removed for the purpose of indicating more clearly how the oil is retained.

The operation of my device is as follows: The hand switch 82 being closed, the various primary circuits will be closed in succession as the shaft 7 rotates, the opening and closing of each primary circuit being due to the engagement and disengagement of the contact shoe 56 relatively to the various contact bars 33, 34, 35, 36. Assuming, for instance, that the contact shoe 56 is in engagement with the contact bar 35, as indicated in Fig. 2, it is clear that, for the moment, the distributing band 40 is in electrical communication with the contact shoe, the following circuit being complete: battery 63, wires 64, 68, primary winding of coil 72, interrupter 76, wire 80, binding post 28 (see Fig. 2) distributing band 40, bolt 31, contact bar 35, contact shoe 56, circuit closer arm 54, crank arm 53, counter-shaft 14 to framework of engine; thence through wire 83, switch 82 and wire 81 back to battery 63. A secondary current now passes through the wire 21 to spark plug 17 and causes an explosion. The contact shoe 56 next engages the contact bar

34 (see bottom of Fig. 2). This completes the following primary circuit: battery 63, wires 64, 67, to primary winding of coil 71, interrupter 75, wire 79, binding post 27, distributing band 39 (see right of Fig. 4) bolt 30, contact bar 34, contact shoe 56, contact arm 54, crank arm 53, shaft 14, to framework of engine, thence through wire 83, switch 82 and wire 81 back to battery 63.

A secondary current being induced in the secondary winding of coil 71, flows through wire 22 to spark plug 18, thereby causing a second explosion. The commutator shoe 56 next engages the contact bar 33, thereby completing the primary circuit: battery 63, wires 64, 66, primary winding of coil 70, interrupter 74, wire 78, binding post 26 (see right of Fig. 2), distributing band 38, bolt 29, contact bar 33, contact shoe 56, arm 54, crank 53, shaft 14, to framework of engine, thence through wire 83, switch 82 and wire 81 back to battery 63. A secondary winding of the coil 70 thereupon induces a secondary current which flows through the wire 23 to the spark plug 19, causing a third explosion. The contact shoe 56 next engages the contact bar 36, completing the following circuit: battery 63, wires 64, 65, primary winding of coil 69, interrupter 73, wire 77 to binding post 25 (see upper portion of Fig. 2), distributing band 37, bolt 32, contact bar 36, contact shoe 56, arm 54, crank 53, shaft 14 to framework of engine, wire 83, switch 82, wire 81, back to battery 63. The secondary winding of the coil 69 thereupon induces a secondary current which flows through the wire 24 to the spark plug 20, thereby causing the fourth explosion. The contact shoe 56 next moves into engagement with the contact bar 35, and the several successive operations above described are repeated in the same order. Since the contact brush on each of its revolutions, engages and disengages four contact bars of the same kind, and having the same connection to a particular coil unit, it follows that the coil unit in question must be energized four times during each revolution of the counter-shaft 14. This means that each turn of the counter-shaft 14 controls the stopping and starting of sixteen spark discharges, representing eight turns of the main shaft. Of course, in a simpler engine where there are fewer spark plugs, the same principle is applicable.

The principle of the device is also applicable in engines employing but eight contact bars in connection with a four-cylinder, four-cycle motor and having contact bars connected with each distributing band and having the contact brush turn one complete revolution for every four turns of the main shaft, the engine controlling eight spark discharges for each revolution of the circuit closer shaft. The timing of the sparks is governed by the handle 44 substantially in

the usual manner. The gearing connecting the main shaft 7 with the counter-shaft 14 serving as the circuit closer shaft is eight to one; the rotation of the circuit closer shaft and of the brush carried by it is, therefore, comparatively slow. It will thus be noted that in my device I slow down the speed of the circuit closer shaft and yet obtain an adequate number of sparks. The evils of rapid rotation in the circuit closer shaft are so well known as to need no description. In high speed engines it is necessary to have a rapid play of the spark plugs, but there is a speed limit beyond which the circuit closer shaft and brush cannot safely be carried, and in ordinary constructions this limit is soon reached. By my construction the limit in question is not reached so soon, the result being that the engine can maintain a greater speed and without any arcing at the contact points.

I call special attention to the construction of the circuit closer brush and parts accompanying it, for the purpose of engaging the contact bars, this brush being especially suitable for my purpose, although I do not in all instances limit myself to its use. I also call special attention to the construction of the mechanism shown in Figs. 1 and 5, the disk 43 being integral with the hub 42 and the cup 42^a encircling the upper end of the shaft 4, so as to form a non-leaking oil reservoir.

This circuit closer can be used on either two or four-cycle engines, or, in fact, any engine.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a support, a plurality of distributing rings carried by the support and insulated from each other, a series of contacts arranged in a circle and connected with the distributing rings in groups, each group being connected to a ring, electrical connections for the several groups of contacts, and a revoluble brush for successively engaging the contacts.

2. The combination of a support, distributing rings carried by the support and insulated from each other, a plurality of contact bars within the support and arranged in a circle, bolts connecting the contact bars in groups with the distributing rings, each group being connected to a distinct ring, separate electrical connections for the different groups, and a revoluble brush for successively engaging the contact bars.

3. The combination with a support comprising a hub having a flange, a ring like body of insulating material carried by the flange of the hub, and a cap plate, of distributing rings on the outer periphery of the insulating body, contact bars on the inner periphery of the insulating body, bolts con-

necting the contact bars in groups with the distributing rings, each group being connected to a distinct ring, electrical connections for the several groups of contacts, and a revoluble brush for successively engaging the contact bars.

4. The combination of a plurality of contact bars arranged substantially in the form of a circle, and occupying a common plane, a plurality of distributing rings, each distributing ring being electrically connected with a plurality of said contact bars, the contact bars connected with one distributing ring being interspersed among the contact bars connected with other distributing rings so that each distributing ring with its contact bars may be insulated from other contact rings with their contact bars, electrical connections for each contact ring, and a brush revolubly mounted and provided with a portion for engaging and disengaging said contact bars individually.

5. In an ignition device for explosive engines, the combination with a main shaft and spark plugs, of a shaft, a reducing gearing for driving the shaft from the main shaft, a support carried by the shaft, distributing rings carried by the support and insulated from each other, contact bars arranged in a circle within the support, means for electrically connecting the contact bars in groups with the distributing rings, each group being connected to a distinct ring, a wire connected with each group of contacts, an induction coil connected with each wire, a battery connected with the induction coils, a wire leading from each induction coil to

a spark plug, and a contact brush on the upper end of the said shaft.

6. In an ignition device for explosive engines, the combination of an insulating hub-like support, distributing rings on the periphery of the support, a plurality of contact bars arranged in a circle within the support, means connecting the contact bars in groups with the distributing rings, each group being connected to a distinct ring, electrical connections between the different groups of bars, and a revolving brush for successively engaging the contact bars.

7. In an ignition device for explosive engines, the combination with a shaft, a hub having a flange and a central cup-like portion, a ring like body of insulating material carried by the flange of the hub, oppositely arranged disks of insulating material, and a cap plate on the upper insulating disk, of distributing rings on the outer periphery of the insulating body, contact bars on the inner periphery of said body, means connecting the contact bars in groups with the distributing rings, each group being connected to a distinct ring, electrical connections for the several groups of contact bars, and a revolving brush adjustably mounted on the upper end of the shaft within the hub.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. HANQUET.

Witnesses:

FRED. E. SHIELDS,
FRANK E. STRONG.