June 5, 1934. A. A. GUZIEL ET AL 1,961,558

SPARK CONTROLLING AND INDICATING MEANS

Filed Dec. 14, 1932 2 Sheets-Sheet 1

FIG. 1

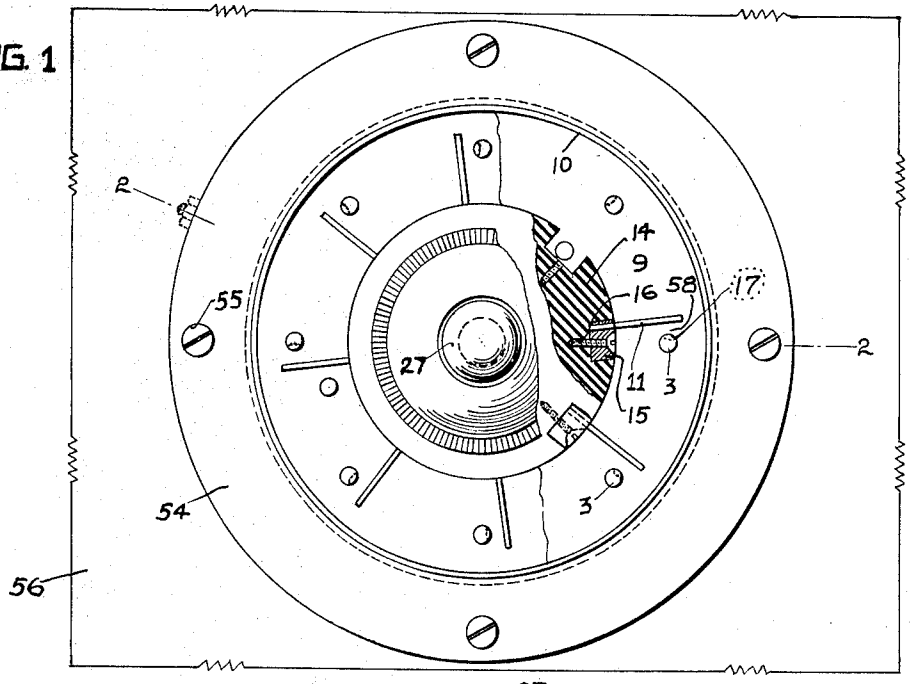
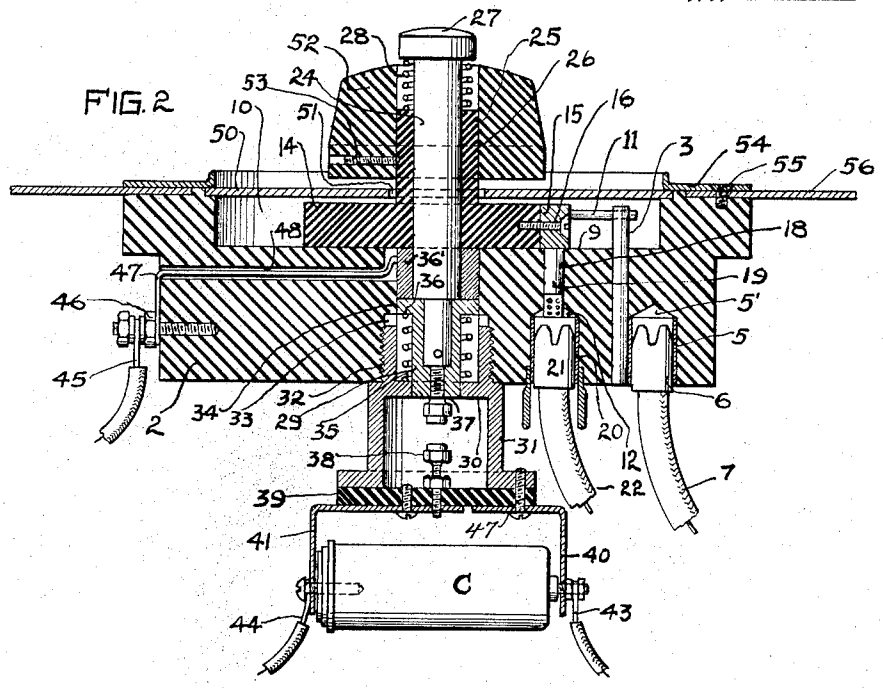


FIG. 2



Inventors

Alexander A. Guziel

and Arnold Rorff

By Percy H. Moore

Attorney

June 5, 1934. A. A. GUZIEL ET AL 1,961,558

SPARK CONTROLLING AND INDICATING MEANS

Filed Dec. 14, 1932 2 Sheets-Sheet 2

FIG. 3

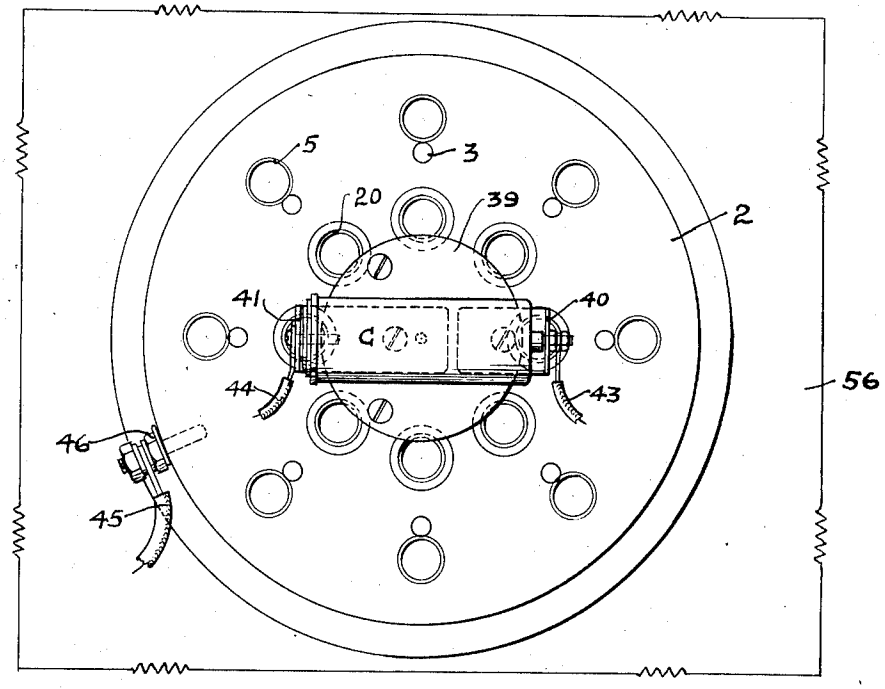
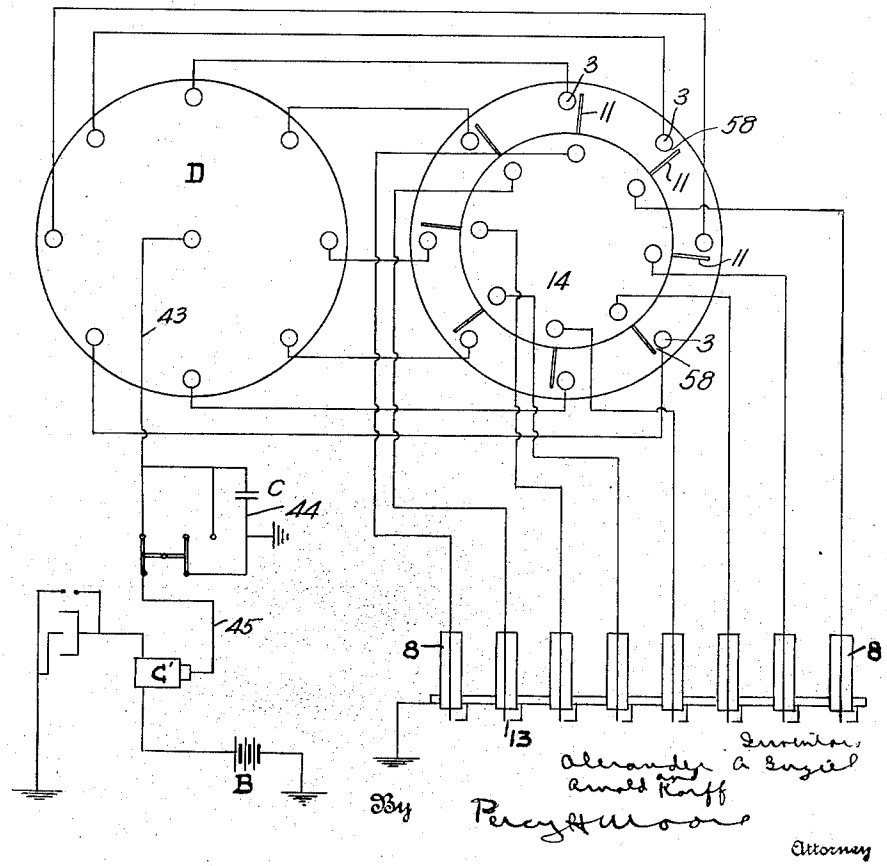


FIG. 4



Inventor,
Alexander A Guziel
Arnold Ruff
By Percy H. Moore
Attorney

Patented June 5, 1934 1,961,558

UNITED STATES PATENT OFFICE

1,961,558

SPARK CONTROLLING AND INDICATING MEANS

Alexander A. Guziel and Arnold Korff,
Hollywood, Calif.

Application December 14, 1932, Serial No. 647,122

6 Claims. (Cl. 175—183)

The present invention relates in general to spark controlling and indicating means for internal combustion engines and more particularly to a spark indicating detector for automobiles.

The primary object of the invention is to provide a simple adjustable spark detecting and intensifying device, which visibly indicates the action of the individual spark plugs of an engine, while running, and permits the starting of the engine by causing sparking of the plug of that cylinder of the engine which is ready to fire.

Another object of the invention is to provide a simple, adjustable spark detecting and intensifying device with condenser means to increase the capacity of the ignition circuit and promote and more readily permit starting of the engine in the manner described above.

A further object of the invention is to provide a simple, adjustable spark detecting and intensifying device of the type referred to above with means to interrupt the coil distributor line for effecting starting of the engine in the manner described above without change in the setting of the spark gaps of the device.

With these and other objects in view the invention consists in the construction and novel combination of parts more fully described hereinafter, illustrated in the accompanying drawings, and pointed out in the claims appended hereto, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit of the invention.

In the drawings, wherein we have shown an exemplified form of the spark controlling and indicating device according to the invention:

Figure 1 is a front elevation of the spark controlling and detecting device with parts partly broken away to more clearly illustrate the device;

Figure 2 is a sectional view on line 2—2 of Figure 1;

Figure 3 is a rear view of the detecting device shown in Figure 1;

Figure 4 is a view of an electrical diagram showing the hook up of the spark controlling and detecting device, according to Figures 1 to 3, with the ignition circuit of an automobile.

The form of construction illustrated in the drawing is designed for indicating and controlling the spark plug action of an eight-cylinder engine. The instrument comprises a circular hard rubber or bakelite base plate 2 carrying eight circularly arranged contact members 3 equally spaced from each other and the central axis of said plate. These contact members are fully extended through said base plate and at their rear ends welded to hollow tubular contact members or connecting tubes 5 sleeved within recesses 5' formed in the rear face of base plate 2 and adapted to frictionally embrace and support metal contact shoes 6, which shoes are sleeved upon and electrically connected with lead wires 7 for the spark plugs 8, see Figure 4. The front ends of contact members 3 project beyond the bottom wall 9 of a circular recess 10 within the front portion of base plate 2 for co-operation with a corresponding number of electrical contact members 11, mounted on a manually rotatable bakelite disk or plate 14 within recess 10. Contact members 11, radiate from the periphery of disk 14 and are suitably secured to metal shoes 15 in turn inset within the recessed periphery of said plate and connected therewith by means of screws 16. Rotation of disk 14 causes an increase or decrease in the width of the air gaps 13 between contact members 3 and 11 or closes these gaps entirely when members 11 are seated within shallow recesses 17 of contact member 3. A plurality of spring pressed brushes 18, slidably arranged within openings 19 of base plate 2 electrically connect the metal shoes 15 and contact members 11 with a corresponding number of connecting tubes 20, sleeved within openings 12 formed in the base plate 2 in axial alinement with openings 19 and adapted to frictionally receive and support metal contact shoes 21, which are sleeved upon and electrically connected with lead wires 22 for connection with the contacts of a distributor D, see Figure 4.

Bakelite disk 14 is rotatably secured to base plate 2 by means of a bakelite shaft 24, which extends axially through a bore 25 common to the disk and its hub portion 26. This shaft is formed at its front end with an enlarged head portion 27 against which one end of a compression spring 28 sleeved upon said shaft is seated, the other end of the spring 28 thus forces disk 12 into snug frictional contact with the bottom 9 of recess 10, and also normally maintains shaft 24 in its extended or Figure 2 position. The inner reduced end of shaft 24 is secured to a flanged tubular bushing 29, slidable through the wall 30 of a switch casing 31, which casing is formed with a threaded extension 32 adapted to screw into a threaded enlargement 33 of a bore 34 formed in base plate 2, in axial alignment with bore 25. A second coil spring 35 bearing at its opposite ends against the

flange 36 of bushing 29 and the wall 30 of casing 31 normally cooperates with the coil spring 28 to force the shaft 24 to its forward or extended position. This movement is limited by means of a metal bushing 36' loosely sleeved upon the shaft 24 and snugly seated in bore 34 in advance of bushing 29. Adjustable screw threaded oppositely disposed contact members 37 and 38 are respectively secured to the rear end of flanged bushing 29 and to a plate of insulating material 39, covering the outer or rear flanged end or casing 31, the two contact members in effect constituting a switch, as will be presently explained.

The covering plate 39, which is made of any suitable insulating material, supports two metal brackets 40 and 41, which in turn support a condenser C. Bracket 40 is electrically connected with casing 31 and with one set of the condenser plates and bracket 41 is electrically connected with contact member 38 and with the other set of condenser plates. A lead wire 43 connects bracket 40 with the distributor D, a lead wire 44 connects bracket 41 to ground and a lead wire 45 attached to a post 46 on base plate 2 connects the coil with bushing 36', by means of a wire 47, extending through a bore 48 in base plate 2 and welded to bushing 36' and post 46. Bushing 36' electrically contacts with the flanged tubular bushing 29, which is shiftably arranged in switch casing 31 and electrically connected with bracket 40 by means of a screw member 47, whereas said casing is insulated from bracket 41 by the insulating plate 39.

Preferably the recess 10 in base plate 2 is closed by a glass plate cover 50 provided with a central opening 51, through which hub portion 26 of disk 14 extends. This hub portion carries a collar 52, secured thereto by means of a screw 53, to facilitate manual adjustment of the air gaps between contact members 3 and 11. A metal ring 54 attached to base plate 2 by means of screws 55 is used for attaching the device to the instrument board 56 of an automobile, not shown.

The spark plugs 8 are of standard type, now in general use. The control and detecting device is connected in series with the ignition circuits for spark plugs 8, see Fig. 4, wherein the ignition circuit of an automobile is diagrammatically shown. This circuit includes a battery B, coil C', distributor D, the spark plugs 8 and the spark controlling and detecting device with condenser C. When in operation the current flows from battery B and thence through coil C', where the low voltage current is changed or stepped up to a high tension current. This current then flows through lead wire 45, wire 47, bushing 36', bushing 29, bracket 40 and lead wire 43 into distributor D, and is thence successively distributed to the respective contact members 3 of the detecting device. After jumping the visible sparking gaps 58 between contact members 3 and 11 the current flows to the respective spark plugs 8 and finally passes through the ground (the motor body not shown) back to coil C'. The extent of the gaps 58 can be readily regulated by rotating disk 14 in an appropriate direction, it of course being understood that any increase in the width of the gaps 58 will result in a corresponding increase in intensity of the spark at the plug gaps 13. The operator may therefore readily obtain the desired sparking intensity at the plugs while observing the plug action, thus obviating the danger of one or more cylinders missing due to accumulation of carbon and oil at the points of one or more plugs. The sparking action is partly intensified by condenser C which is connected in parallel with the distributor and feeds high tension current to the spark plugs.

In order to use the controlling and detecting device to start an engine by creating an explosion in that cylinder which is ready for the ignition spark, and the spark plug of which at this time has been switched into the ignition circuit by the distributor D of the engine, shaft 24 is pushed inwardly to interrupt the coil-distributor line between bushings 29 and 36' and to bring about a discharge of condenser C by approaching the contact members 37 and 38. This discharge, which of course occurs before contact member 37 has been moved into contact with member 38 causes sparking at the plug of the cylinder ready to fire. The starting means just described perhaps has greater utility where used with engines which do not have a mechanical starter such as the engines of aeroplanes which in most cases are started with the ignition circuit closed by manually rotating the propeller. This dangerous method of starting is avoided by the use of applicants device because the engine can be cranked with the ignition circuit open until the cylinders are under compression. The ignition circuit is then closed and switch contact 37 is actuated by shifting shaft 24 as previously described to effect sparking in the cylinder ready to fire.

Having thus described our invention, what we claim is:

1. A spark controlling and detecting device for intensifying and visibly indicating the successive sparking of the spark plugs of internal combustion engines including condenser means for increasing the capacity of the ignition circuit of an internal combustion engine and switching means to effect discharge of said condenser means and therewith jumping of a spark on the spark plug of that cylinder of the engine which at that time is connected to the ignition circuit of the engine.

2. A spark controlling and detecting device in combination with the ignition circuit of an automobile embodying a coil, a distributor, a plurality of spark plugs and spaced contact members connected in series with said spark plugs, a condenser connected parallel to said ignition circuit and switching means to effect discharge of said condenser while interrupting the said circuit to eliminate the coil of said circuit for a time interval.

3. In the ignition circuit of an internal combustion engine including means for producing high tension current, a distributor and a plurality of spark plugs, a spark controlling and detecting device having spaced contact members connected in series with said spark plugs, a condenser connected parallel to said ignition circuit, and switching means to effect discharge of said condenser by short circuiting same and disconnection of said high tension means feeding said circuit for a time interval.

4. In the ignition circuit of an internal combustion engine including means for producing high tension current, a distributor and a plurality of spark plugs, a condenser connected in parallel to said ignition circuits, and switching means to effect discharge of said condenser by short circuiting same and disconnection of said high tension means for causing sparking of the plug of that cylinder of the engine which is ready to fire.

5. In a spark controlling and detecting device a base plate, a rotatable plate mounted on said base plate, cooperating contact elements on said

two plates forming spark gaps between corresponding elements, a condenser supported by said base plate, a switch member on said base plate having its contacts connected with the plates of said condenser and yieldable means extending through said base plate and rotatable plate for moving the contacts of said switch member toward each other.

6. A spark controlling and detecting device according to claim 5, whereby the yieldable means extending through said base plate from an electric current lead carrying rigidly attached thereto a contact member adapted to effect a break in said current lead simultaneously with the approaching movement of the contacts of said first switch member.

ALEXANDER A. GUZIEL.
ARNOLD KORFF.