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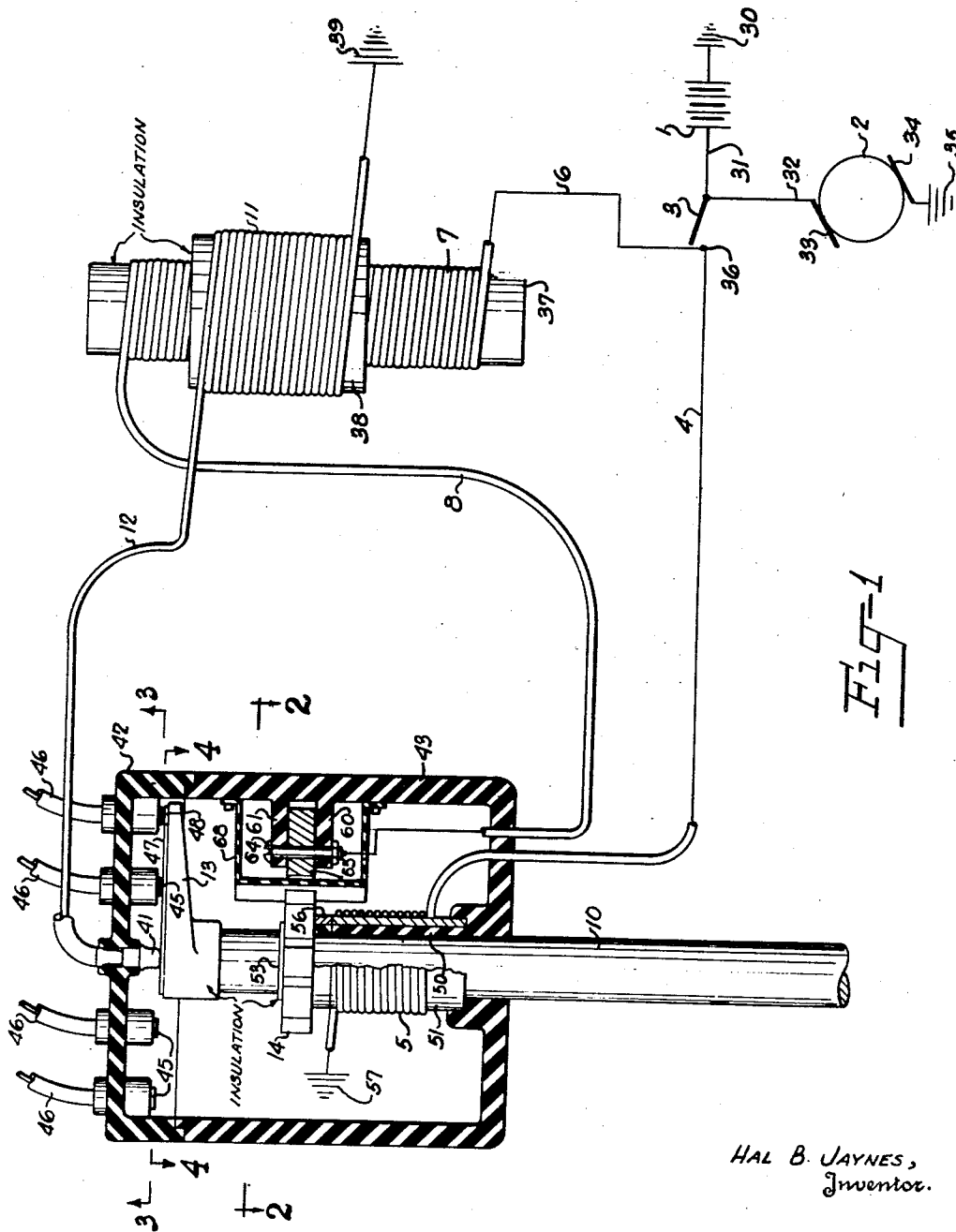
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2,559,437

ELECTRICALLY OPERATED DISTRIBUTOR

Filed Nov. 3, 1947

2 Sheets-Sheet 1



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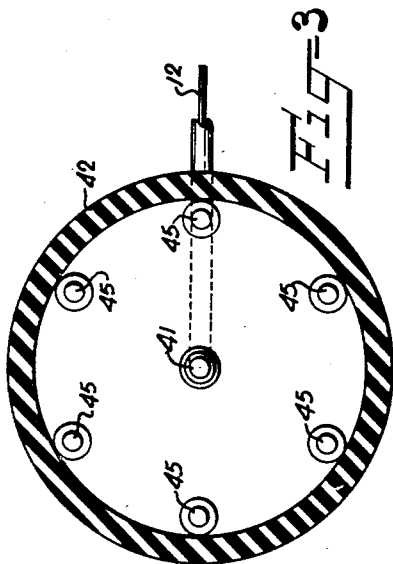
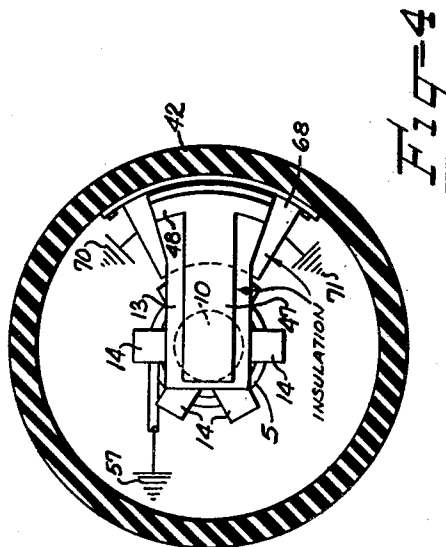
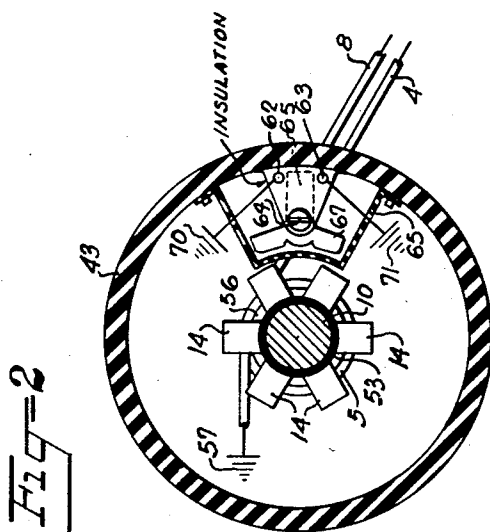
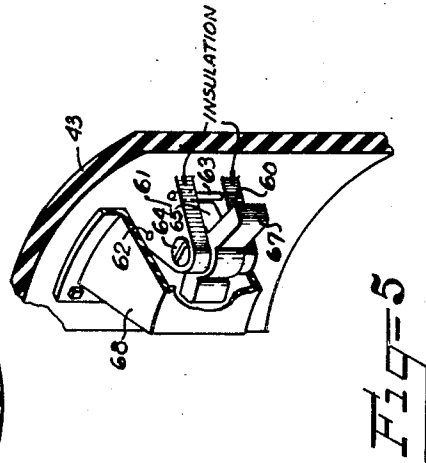
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ELECTRICALLY OPERATED DISTRIBUTOR

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UNITED STATES PATENT OFFICE

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ELECTRICALLY OPERATED DISTRIBUTOR

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Application November 3, 1947, Serial No. 783,694

3 Claims. (Cl. 200—19)

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This invention relates to a distributor for an internal combustion engine and more especially to an electrically operated distributor instead of the purely mechanical type heretofore employed.

It is an object of this invention to provide electrical means for making and breaking the circuit which goes to the spark plugs of an internal combustion engine.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which

Figure 1 is an elevation and sectional view and showing parts in schematic form of the system;

Figure 2 is a sectional plan view taken along the line 2—2 in Figure 1;

Figure 3 is a sectional view taken along the line 3—3 in Figure 1 and looking upwardly;

Figure 4 is a sectional plan view taken along the line 4—4 in Figure 1;

Figure 5 is an isometric view of the central right-hand portion of the distributor casing shown in Figure 1.

Referring more specifically to the drawing, the numeral 1 indicates a suitable source of direct current electrical energy such as a battery which is grounded at 30, and a wire 31 leads to a switch 3 which is the ignition switch of an internal combustion engine such as is mounted on a motor vehicle. A wire 32 leads from the wire 31 to a brush 33 of a generator 2 which also has a brush 34 grounded as at 35.

A wire 6 leads from contact 36 of the other side of switch 3 to a primary coil 7 wound on a suitable insulation member 37. Disposed around the primary coil 7 is an insulation tube 38 which has wound therearound a secondary coil 11 which is grounded as at 39. The other end of coil 11, which is wire 12, is led to a central brush 41 which is mounted in a distributor cap 42 mounted on top of a distributor housing 43. This distributor cap 42 has a plurality of contacts 45 therein from which wires 46 lead to the spark plugs of an internal combustion engine, not shown.

The distributor housing 43 is fixedly mounted by any suitable means, not shown, and a driven shaft 10 passes up through the bottom of distributor housing 43 and has a rotary arm 13 detachably mounted on the upper end thereof, which rotary arm is of suitable insulation material. Secured on top of the rotary arm 13 is a metallic member 47 which has an arc shaped portion 48 on its outer end. This is adapted to

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rotate past the contacts 45 in spaced relation thereto as is conventional in distributors.

The driven shaft 10 is surrounded by an insulation sleeve 50, which rises up from and is integral with the housing 43 and surrounding this sleeve 50 is a soft iron tube 51.

Mounted on the shaft 10 and immediately above the sleeve 50 is an insulation sleeve 53 and fixedly secured on the insulation sleeve 53 is a soft iron sleeve 56 which has projecting radially therefrom a plurality of soft iron arms 14.

A wire 4 leads from contact 36 of the switch 3 and is wound into a coil 5 surrounding the soft iron sleeve 51 and the coil 5 is grounded at 57.

The shaft 10 is, of course, driven from the engine and is grounded to the engine and many of the grounds shown schematically are passed either directly to the engine or to the shaft 10. Projecting from the interior surface of distributor housing 43 are the projections 60 and 61, which have contacts 62 and 63 therein, and pivotally mounted as at 64 is a T-shaped arm 65. This arm 65 has an arcuate portion 67 integral therewith whose arc conforms to the circle defined by the outer ends of the members 14, but on a greater radius. The above described assembly is housed by an insulated housing 68 which, however, does not insulate against magnetism. The contacts 62 and 63 are grounded as at 70 and 71 respectively and wire 8 which leads from the opposite end of primary coil 7 to which wire 6 is connected, leads into the distributor housing and is connected to the pivot pin 64.

Method of operation

When the switch 3 is closed, current will be generated, of course, by generator 2 when the engine is running and current will flow from the generator as well as battery 1, if generator 2 does not supply a sufficient current, and the current will flow through wire 6 to energize coil 7 and it will also flow through wire 8 to pivot pin 64. The secondary coil 11 will thus be energized and current will flow through wire 12 to contact 41 in the center of the distributor cap which is in contact with the metallic plate 47 on top of the distributor cap. It will also flow through wire 4 and energize coil 5 which is grounded at 57. This will magnetize soft iron tube 51 which, being in contact with the annular portion 56 which has integral therewith the arms 14, will also magnetize the arms 14. These arms 14 will rotate past the arcuate member 67 and it will attract this member and will swing the assembly of member 65 along with arms 67 on pivot 64 to

cause the member 65 to alternately engage the contacts 62 and 63. These contacts, being grounded will make and break the circuit leading through wire 8 to the pivot pin 64.

According to the Lenz's law, when a gasoline engine is running very slowly, an intermittent current will occur in the wire leading from the secondary coil to the plate 47 of the distributor rotary arm. At this time current leaves the distributor rotary arm at the arcuate portion 48 of the arm to the particular contacts 45 and to the spark plugs in succession during rotation.

Now, as the speed of the engine is increased, the intermittent current in the same mentioned wire changes from intermittent to a continuous current (however, a pulsating current), since there is current present at all times, the swinging of the distributor arm will cause current to leave from the leading edge of the arcuate portion 47 to the spark plug wire contacts 45. This process causes an advance in spark.

The process just explained will allow an advance in the spark when it is used in connection with any old or now used type of spark systems by the widening of the rotary arms, that is the provision of the arcuate portion 48 and the elimination of the centrifugal advancing of the cam shaft. However, it is understood that the circle in the distributor cap about which the spark plug wire contacts 45 are placed must be larger in order that the distance between each spark plug contact 45 may be sufficiently great so as not to allow the spark to flow to more than one of the spark plugs at a time.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A circuit breaker comprising a housing, a driven shaft rotatably mounted in the housing, an electro-magnet insulated from and mounted on the shaft and being adapted to be connected to a source of electrical energy, a soft iron member fixedly mounted on the shaft and having a plurality of circumferentially spaced radially disposed soft iron arms extending therefrom, the said electro-magnet slidably and rotatably engaging the soft iron member, an oscillatable metallic member pivotally mounted on an axis parallel to the axis of said shaft adjacent the path of travel of the free ends of said arms on the soft iron member, said oscillatable member having an arcuate portion in the plane of the arms, the axis of the oscillatable member being disposed intermediate the ends of the arcuate portion, a radially disposed portion integral with the arcuate portion and a contact disposed adjacent each side of the radially disposed portion whereby, upon rotation of the shaft and its associated soft iron member with the radially disposed soft iron arms, the oscillatable member will be caused

to oscillate to thereby alternately engage the contacts in timed relation to the speed of rotation of the driven shaft.

2. In a structure according to claim 1, an air tight housing of non-magnetizable material surrounding the oscillatable member and the contacts and being secured to the first-named housing to thus prevent oxidization of the oscillatable member and its associated contacts.

3. A circuit breaker comprising a housing, a driven shaft extending into the housing and being rotatably mounted therein, said shaft being having mounted therearound and insulated therefrom a fixed soft iron tubular member, a coil disposed around the soft iron tubular member, and being adapted to be connected to a source of electrical energy, a second soft iron tubular member fixedly mounted on and insulated from the shaft and having a plurality of circumferentially spaced radially disposed soft iron arms extending therefrom, said second soft iron tubular member being in sliding rotational engagement with the fixed tubular member, an oscillatable metallic member pivotally mounted on an axis parallel to said shaft adjacent the path of travel of the free ends of said arms on the second soft iron member and having an arcuate portion in the plane of the arms, the axis of the oscillatable member being disposed intermediate the ends of the arcuate portion, a radially disposed portion integral with the arcuate portion and a pair of contacts disposed one adjacent each side of the radially disposed portion, whereby the said coil disposed on the first-named tubular soft iron member will magnetize both of the soft iron members, to, in turn, magnetize the radially disposed soft iron arms extending from the second soft iron tubular member and whereby, upon rotation of the shaft and the associated radially disposed soft iron arms, the radially disposed arms will magnetically attract the arcuate portion of the oscillatable member thereby causing the oscillatable member to oscillate and causing its radially disposed portion to alternately move into engagement with the contacts in timed relation to the speed of rotation of the driven shaft.

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