J. F. CAVANAGH.

SPARK COIL FOR IGNITION.

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1,302,308.

Patented Apr. 29, 1919.

Fig. 1.

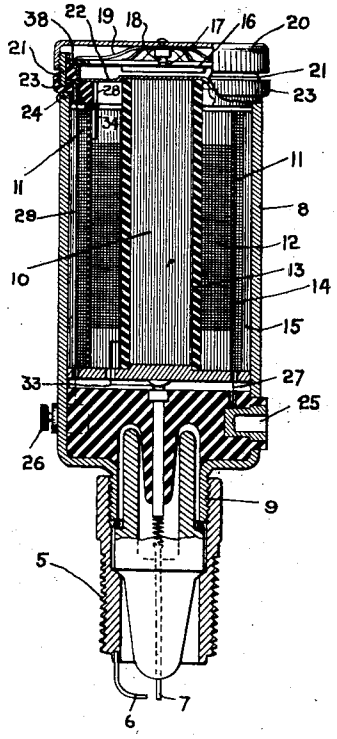


Fig. 2.

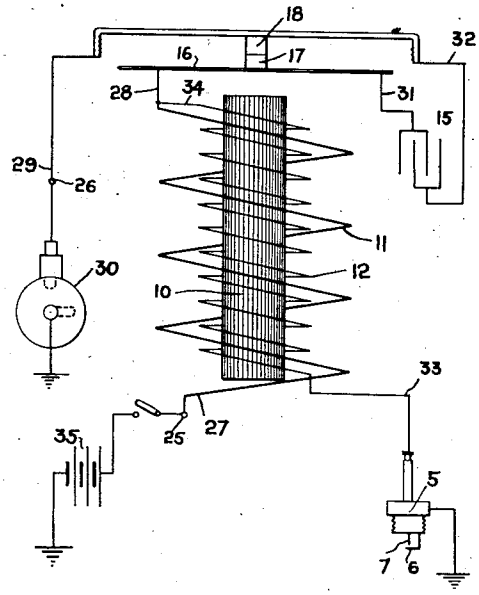
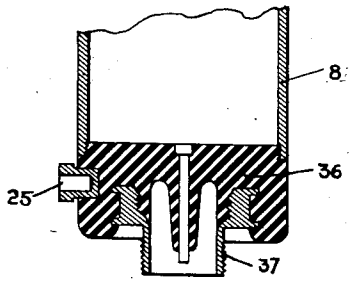


Fig. 3.



WITNESS:

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SPARK-COIL FOR IGNITION.

1,302,308. Specification of Letters Patent. Patented Apr. 29, 1919.

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To all whom it may concern:

Be it known that I, JOHN F. CAVANAGH, a citizen of the United States of America, residing at Meriden, Connecticut, have invented a new and useful Spark-Coil for Ignition, of which the following is a specification.

My present invention relates to spark coils and particularly to those of the self-contained or unit type, wherein the coil structure is supported on and carried by the spark plug itself.

Among the objects of the invention are to secure increased electrical efficiency and at the same time to produce a compact unit of relatively small size.

These and other objects I have obtained by constructing the unit with the secondary winding surrounding the magnetic core, the primary winding surrounding the secondary, and with a condenser surrounding the primary, the whole being inclosed within a magnetic shell supported by the spark plug. The vibrator is supported within the magnetic shell at one end of the core so as to be operated thereby.

Various other features of the invention will be made clear as the specification proceeds, reference being had to the accompanying drawing forming a part hereof and wherein I have illustrated the invention embodied in different practical forms.

In said drawing:—

Figure 1, is a vertical sectional view of the device.

Fig. 2, is a diagrammatic representation, showing the circuit arrangement.

Fig. 3, is a broken sectional view of a modified form.

5 designates the spark plug which may be of any preferred construction and provided with the usual spark gap terminals 6 and 7.

8 designates the magnetic shell which forms the housing for all the coil parts and in the first form of the device is directly connected with the spark plug as by means of a screw threaded joint at 9.

The coil structure comprises a suitable magnetic core 10 and primary and secondary windings 11 and 12 respectively.

In accordance with this invention the secondary winding is applied to the core and the primary winding is applied outside and surrounding the secondary winding, suitable insulating layers 13 and 14 being interposed between the secondary and the core and between the primary and secondary respectively. 15 designates the condenser which in my invention is placed outside and surrounding the primary and within the magnetic shell.

The vibrator which I prefer to use consists of a diaphragm 16 carrying a contact point 17 and a coöperating contact point 18 supported by a spring 19, the latter being secured to a cap 20 which is adjustable for the purpose of controlling the breaker points, said cap being shown for the purpose having a screw threaded connection with the ring 21.

The end of the core is shown covered by a plate 22 and this with the diaphragm 16 is shown carried by an insulating ring 23 removably seated in the upper end of the magnetic shell and secured in place by suitable fastenings 24. This ring or base member 23 also serves in the disclosure as a mounting for the screw ring 21. Suitable insulation 38 may be interposed between the diaphragm and the spring supporting the upper breaker point.

Suitable terminals 25 and 26 are provided for the primary circuit wires, one of said terminals (25) being connected with the primary by means of a lead 27. The other end of the primary is connected with the diaphragm by means of a lead 28 and the other terminal 26 is connected by an external lead 29 with the timer 30. The condenser is connected across the breaker points by suitable leads 31 and 32 and one end of the secondary is connected with the insulated terminal of the spark plug by means of a lead 33, the other end of the secondary having a connection with the primary lead as indicated at 34 in Fig. 2. The battery, indicated at 35, is connected with the primary circuit terminal 25.

The modified form shown in Fig. 3, is similar to that described except that the magnetic shell 8 is not directly connected with the spark plug, it being supported by the insulating base 36 in which the base 37 of the spark plug structure is mounted.

The structure described results in a most compact form of coil unit and one wherein

the greatest electrical efficiency is obtained from both the primary and secondary windings in that the primary being removed from the core is located in a comparatively weak portion of the magnetic field and therefore subjected to a reduced counter E. M. F., whereas the secondary being located next to the core is subjected to the maximum strength of the magnetic field. This it will be evident results in reduced sparking at the breaker points and the primary and secondary both operating at maximum efficiency serve to produce an intensified igniting spark of high efficiency. The location of the condenser at the outside tends to keep the capacity of the same constant in that the temperature of the same is maintained substantially constant and there is therefore not the variations in capacity arising from temperature changes. The vibrator while entirely housed and thoroughly protected is readily accessible for cleaning or renewal and is easily adjusted by simply turning the cover cap.

I claim:

1. In a spark plug unit, the combination with a spark plug, of a coil carried thereby and comprising a secondary winding, a primary winding about said secondary winding, and a condenser about said primary winding.

2. In a spark plug unit of the character set forth in claim 1, an outer magnetic shell surrounding and inclosing the coil structure.

3. In a spark plug unit, the combination with a spark plug, of a coil carried thereby and comprising a magnetic core, a secondary winding about said magnetic core, a primary winding about the secondary winding and a magnetic shell inclosing said windings and core.

4. In a combination like that set forth in claim 3, a condenser within the magnetic shell and surrounding the primary winding.

5. The combination with a spark plug, of a coil unit carried thereby and comprising a magnetic core, a vibrator operated thereby, a secondary winding on said core, a primary winding surrounding the secondary winding, a condenser surrounding the primary winding, and a magnetic shell surrounding the condenser and forming a part of the magnetic circuit.

6. In combination with a spark plug, a magnetic shell carried thereby, a core and primary and secondary windings housed within said magnetic shell, and a vibrator comprising a removably supported diaphragm carrying a contact point, a spring supported contact point coöperating therewith, and an adjustable cap for the shell having a bearing on said spring for the purpose of adjusting the contact points.

7. In a spark plug coil unit, a spark plug, a shell carried thereby, a magnetic core and primary and secondary windings within said shell, a diaphragm removably supported in the shell, a contact point carried thereby, a coöperating contact point and a spring supporting the same, and an adjustable cap for the shell engaging said spring contact.

8. In a spark coil, a magnetic shell, an annular insulating base mounted in one end thereof, vibrator contacts carried by said base and a magnetic core and primary and secondary windings within the shell.

9. A spark coil comprising a magnetic core, a secondary winding on said core, a primary winding surrounding the secondary winding, a magnetic shell surrounding the primary and forming a part of the magnetic circuit, and a condenser also surrounding the primary winding.

JOHN F. CAVANAGH.