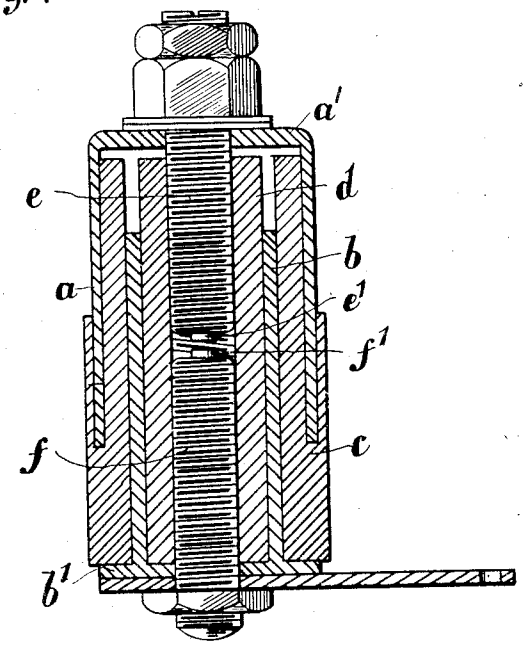
Jan. 9, 1923. 1,441,212

E. H. CARDWELL.

SPARK INTENSIFIER FOR IGNITION CIRCUITS.

FILED NOV. 10, 1921

Fig.1.



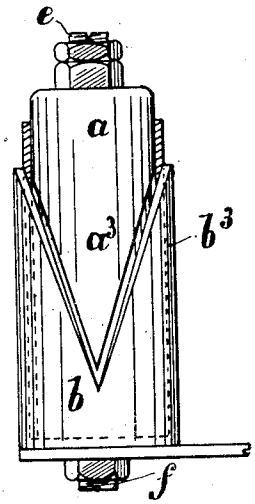


Fig.4.

Fig.2.

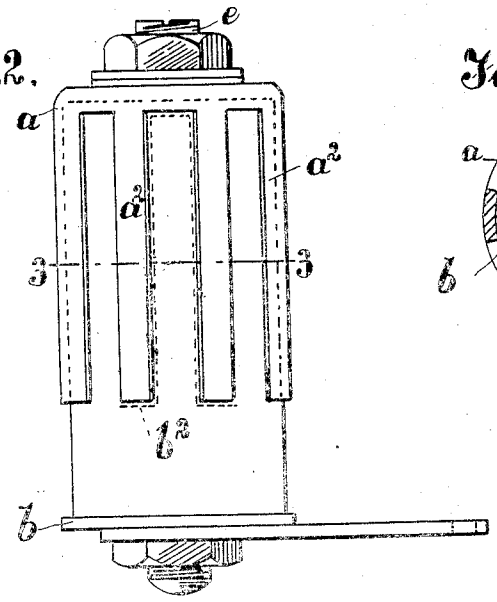
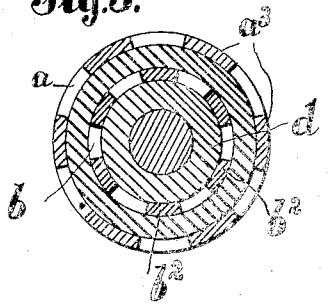


Fig.3.



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Atty.

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UNITED STATES PATENT OFFICE.

ERNEST HENRY CARDWELL, OF WEST KENSINGTON, ENGLAND.

SPARK INTENSIFIER FOR IGNITION CIRCUITS.

Application filed November 10, 1921. Serial No. 514,333.

To all whom it may concern:

Be it known that I, ERNEST HENRY CARDWELL, a British subject, residing at 51 Perham Road, West Kensington, in the county of London, England, have invented certain new and useful Improvements in Spark Intensifiers for Ignition Circuits, of which the following is a specification.

The present invention relates to electric ignition apparatus, and it consists of an improved device for intensifying the discharge at the sparking plug of an explosion or internal combustion engine. The present device differs from the ordinary "intensifier" or external spark-gap in series with the plug, in that it is designed to produce at the plug points a spark having the characteristics of the "B" spark, invented by Sir Oliver Lodge in 1903; according to that known arrangement (see British specification No. 2162 of 1903), the sparking plug was connected in series with an external gap, with a condenser in parallel so as to produce an oscillatory discharge even when the sparking plug was defective as regards insulation resistance.

The invention has for its chief feature of novelty an adjustable spark-gap provided with a condenser integral with the spark-gap device, the capacity of the condenser and the length of the gap being preferably both adjustable. The condenser consists of any desired number of nested cups or the like, alternate cups being connected to opposite electrodes. Variations in the capacity of the condenser may be made as desired to suit the conditions, so that from a maximum the capacity may be reduced to a negligible quantity if required.

The invention is hereafter more fully described with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of one form of construction of the device.

Figure 2 is an elevation of a modified construction.

Figure 3 is a cross section on line 3—3 of Figure 2.

Figure 4 is an elevation in part section of a second modification.

In the form represented in Figure 1, the condenser consists of two concentric cups or hollow cylinders a b, of brass or other conductor, separated by a suitable dielectric material c such as ebonite, the two nested but oppositely directed cups surrounding an insulating bush d in which the electrodes e f of the spark-gap are enclosed.

The electrodes which may be of stainless steel or other suitable material and of appropriate shape so as to produce the longest life possible, are secured axially within the bush d for example by screwing therein, so that the gap may be varied by screwing one of the electrodes further into the bush or unscrewing it partly from the same. The facing ends e' f' of these electrodes are preferably flat or squared, as shown.

The cups or cylinders a b forming the condenser are connected each to one of the electrodes e f for example by means of their bases a' b' which are perforated centrally so as to be a sliding fit upon the projecting ends of the electrodes.

The capacity of the condenser may be varied by screwing or sliding one cylinder longitudinally in relation to the other, so as to vary the amount of their overlap and thus adjust the effective surface and capacity.

Alternatively as shown in Figures 2 and 3, the surfaces of the cylinders or cups a b may be notched or cut away to provide similar series of fingers a^2 b^2, which afford the maximum capacity when in register and a minimum capacity when turned to bring one series of fingers over the intermediate spaces of the other series, thus enabling the electrostatic capacity to be readily adjusted.

Figure 4 illustrates a modification in which the cups a b are notched to form overlapping teeth a^3 b^3 of V-shape, the teeth of one cup being adjustable relatively to those of the other in the same way as the fingers employed in the previous construction.

The improved device is of considerable mechanical strength and forms a robust apparatus adapted to yield good results for prolonged periods of working; the heat of the discharge at the gap may be rapidly conducted away by the use of stout electrodes, the surfaces of the latter remaining unaffected by reason of their resistance to oxidation or vapourization.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. A device of the character described, comprising a pair of axially opposed adjustable electrodes, an insulating support for said electrodes, and an electrical condenser

surrounding said electrodes and having opposite poles connected to each of said electrodes.

2. A device of the character described, comprising two axially opposed adjustable electrodes having a gap between their adjacent extremities variable by their adjustment, an insulating support for said electrodes, and concentric condenser elements surrounding said electrodes, alternate condenser elements being connected to opposite electrodes.

3. A device of the character described, comprising two electrodes having a gap between adjacent points, means for adjusting said gap, an insulating support for said electrodes, condenser elements in concentric relation around said electrodes, alternate elements being connected to opposite electrodes, and means for adjusting the capacity of the condenser formed by said elements.

4. A spark intensifier for ignition circuits, comprising a pair of electrodes in interspaced relation, an insulating bush in which said electrodes are mounted, a series of nested cups surrounding said bush, alternate cups being directed in opposite relation and connected to opposite electrodes, and dielectric separating the cups of said series.

5. A spark intensifier for ignition circuits, comprising a pair of coaxial electrodes having a spark gap between their adjacent extremities, an insulating bush in which said electrodes are mounted, and an electrical condenser surrounding said bush, said condenser comprising a series of cups nested within one another, separated by dielectric and connected alternately to opposite ends of said electrodes.

6. A spark intensifier for ignition circuits, comprising a pair of electrodes in interspaced relation, an insulating support for said electrodes, an electrical condenser surrounding said electrodes, said condenser comprising a series of nested cups separated by dielectric and connected alternately to opposite electrodes, and means for varying the electrostatic capacity of said condenser by relative movement of said cups.

7. A spark intensifier for ignition circuits, comprising a pair of electrodes in interspaced relation, an insulating bush in which said electrodes are mounted, and an electrical condenser surrounding said bush, said condenser comprising concentric nested elements connected alternately to opposite electrodes, separated by dielectric and relatively revoluble to vary their electrostatic capacity.

8. A spark intensifier for ignition circuits comprising a pair of electrodes having a spark gap between their adjacent extremities, an insulating bush in which said electrodes are mounted, and an electrical condenser, said condenser comprising concentric nested cups connected alternately to opposite electrodes and separated by dielectric, and series of fingers upon overlapping portions of said nested cups, said cups being revoluble in relation to one another.

9. A spark intensifier for ignition circuits, comprising a pair of electrodes, of nonrusting material, said electrodes being screw-threaded and having a spark-gap between their adjacent extremities, an insulating bush into which said electrodes are screwed in coaxial alinement, a series of nested metallic cups separated by dielectric and connected alternately to opposite electrodes, said cups surrounding said bush and forming an electrical condenser, and means for varying the capacity of said condenser by relative movement of said cups.

10. A spark intensifier for ignition circuits, comprising an insulating bush, a pair of electrodes of non-oxidizing material screwed coaxially into said bush, said electrodes having flat faces to their adjacent ends and a spark gap between said faces, means for connecting said electrodes in the ignition circuit, a series of nested cups surrounding said bush, dielectric separating said cups, said cups being connected alternately to opposite electrodes, the rims of said cups being cut to form notches and fingers, and means for revolving said cups in relation to one another for varying the electrostatic capacity between the notched surfaces.

In testimony whereof I hereunto affix my signature.

ERNEST HENRY CARDWELL.

Witnesses:
VICTOR F. FEENY,
CYRIL J. FEENY.