J. F. CAVANAGH.

INDUCTION COIL.

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1,034,583. Patented Aug. 6, 1912.

Fig.1.

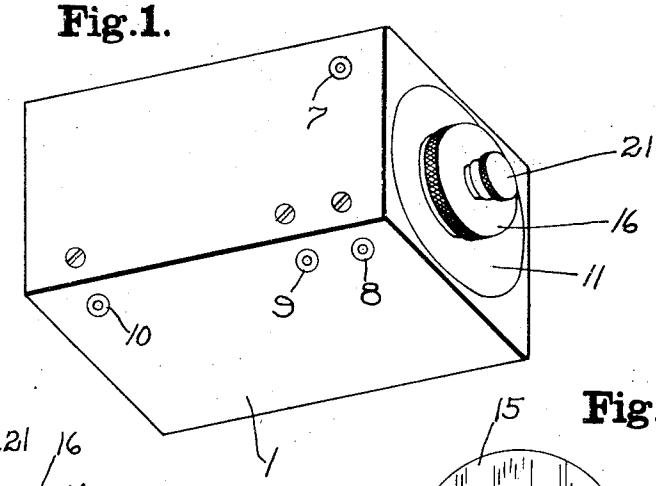


Fig.6.

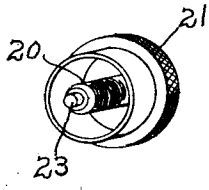


Fig.2.

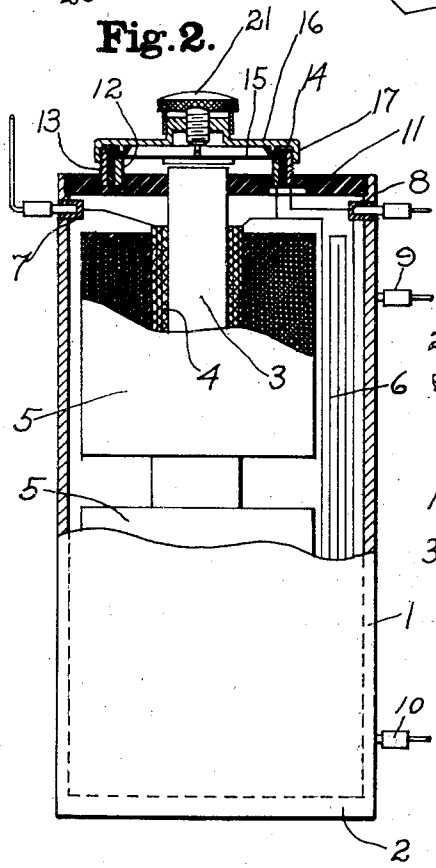


Fig.3.

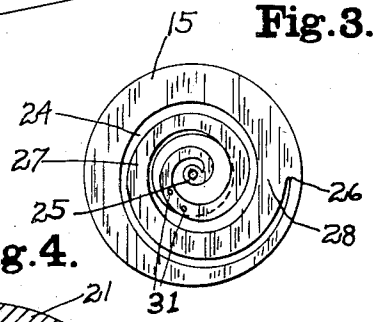


Fig.4.

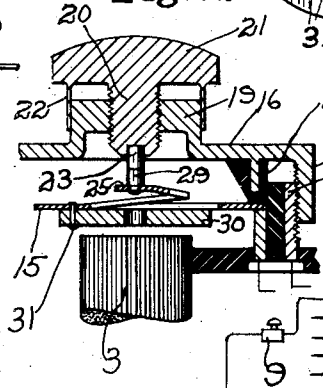
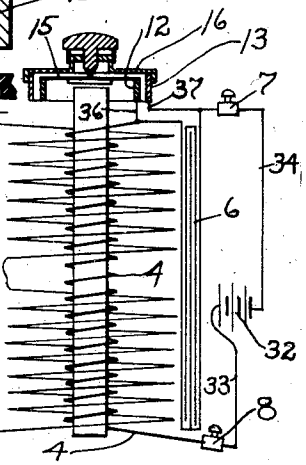


Fig.5.



WITNESSES

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INDUCTION-COIL.

1,034,583. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed April 19, 1909. Serial No. 490,721.

To all whom it may concern:

Be it known that I, JOHN F. CAVANAGH, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Induction-Coils, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in induction coils adapted for use in the electric igniting circuit of hydrocarbon or explosion engines, and has for its object to provide a casing for a coil that is completely inclosed and self-contained, being both water and air tight and effectually protected from injury.

A further object of the invention is to provide an improved current interrupting vibrator of simple, practical and efficient construction, and also to increase the effectiveness of the magnetic field and consequently the electro-motive force of the coil by controlling to some extent the path of travel of the lines of force in circulating through the coil.

In the construction of induction coils having a secondary winding it is found of great importance to radiate or draw the lines of force outward from the center of the core at the poles a distance sufficient to cause the greatest number to pass through the secondary winding in completing their magnetic circuit. In order to accomplish this result I employ two concentric soft iron rings set in the insulating head of the coil case, which rings have the effect of drawing out, spreading, or radiating the lines of force from whence they will naturally pass through the secondary winding, thus greatly increasing the efficiency of the coil. These concentric iron rings serve a double purpose, in addition to their acting upon the lines of force the inner ring performs the function of the ordinary vibrator block, as it serves to support my spirally formed disk-like resilient vibrator all around its outer edge and directly over the center of the core. The outer ring, which is insulated from the inner ring, performs the function of the usual bridge as it supports a cap member through the center of which is the usual adjustable platinum pointed contact screw, by which construction it will be seen that this cap in addition to serving as a bridge for supporting the adjusting screw, also completely incases or incloses the vibrator and also the contact points in substantially an air-tight and water-tight chamber, thus protecting said points from the deteriorating effect of moisture, dust and injurious gases.

As my improved vibrator is made in a disk form it also serves in addition to acting as a vibrator to assist the lines of magnetic force to pass through the secondary winding.

It is found in practice that the ordinary vibrator having an armature supported from one end is necessarily obliged to work on the arc of a circle and therefore the surface of the points are thrown out of line with each other when the screw is being adjusted, thus causing sparking and undue wear. I have completely obviated this difficulty by making my vibrator in a spiral form, whereby the contact point which is set at the apex of the spiral is caused to move in a direct line with the axis of the contact screw, thus removing all possibility of the surfaces of the points getting out of alinement one with the other.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1— is a perspective view illustrating the general shape and construction of my improved induction coil. Fig. 2— is the same partly in section. Fig. 3— is a plan view of my spirally formed vibratory disk. Fig. 4— is an enlarged view illustrating the upper end of the core and showing the armature, a portion of the vibrator disk and the inclosing cap in section supporting the contact points. Fig. 5— is a diagrammatic view illustrating the winding of the coil and the connection of said winding to a spark plug. Fig. 6— is a perspective view of the frictional thimble containing the contact regulating screw.

Referring to the drawings 1 designates a casing preferably square in cross section and constructed of a block of wood or other suitable material having a central bore nearly through the same leaving a bottom portion 2 integral therewith and into which bore is set the core 3 around which is arranged the primary coil 4, secondary coils 5—5 and condenser 6. The terminals for the primary coil are connected to sockets 7 and 8 while the terminals for the secondary coil are connected at 9 and 10. The space around the coils is then packed with a suitable filling and an insulated head 11 is secured in the upper end of the block hermetically sealing the contents, the upper end of core 3 being arranged to extend through said head a short distance. Encircling the upper end of this core and molded into the head 11 are two concentric soft iron rings 12 and 13 insulated from each other by the ring 14 which is set between them, said ring 12 being connected to the primary coil and ring 13 to the condenser by wires 36 and 37, respectively. The inner ring 12 is a little narrower and its upper edge is slightly below that of the outer ring 13, which edge serves as a continuous bearing for the vibrator disk 15 hereinafter described. The outer face of the outer ring is preferably threaded to receive the correspondingly threaded and downwardly turned edge 17 of the cap 16, said cap also being provided on its inner edge with an insulating ring 18 adapted to set down hard onto the vibrator disk and bind its outer edge firmly against its bearing ring 12. The center portion of this cap is raised and thickened at 19 forming a boss which is provided with a tapped hole to receive the regulating screw 20, said screw being knurled on its outer edge and provided with an enlarged head 21 projecting downwardly from which is a thin annular ring or skirt 22 adapted to fit closely around the boss 19 and be sprung out of a true circular form to flexibly engage said boss and retain the screw by friction when set in position. The inner end of this screw is provided with a platinum or iridium point 23 which comes in contact with the corresponding point at the end of the spiral spring of the vibrator 15. This vibrator is formed of a thin disk through which is cut a spiral groove or opening 24, winding outward from the center 25 nearly to the periphery thereof at 26, thereby forming a resilient circularly or spirally shaped vibratory finger 27 gradually tapering in cross section from its starting point 28 toward the center or end 25 thereof, thereby forming an exceptionally long and flexible spring whose center is adapted to move in and out on a line parallel with the axis of the core at which center is mounted an iridium or platinum contact point 29.

An armature 30, see Fig. 4, is riveted at 31 a short distance back from the end of the spring, thereby providing an auxiliary spring for the contact point which produces the well known hammer-blow effect, allowing the armature to attain its maximum velocity before breaking contact at the points.

The operation of my improved induction coil may be more fully described as follows: The current derived from the battery 32 passes through the wire 33, primary coil 4, inner ring 12 by wire 36 through the vibrator 15, points 23 and 29 back across the cap 16 to the outside ring 13 through wires 37 and 34 back to the source 32, the condenser 6 performing its usual function which is that of reducing the tendency to arc. The electric current passing through the primary winding magnetizes the core and this magnetism attracts the vibrator armature 30, which by the flexure of its spring is allowed to move from its opposite contact point toward the core thus separating said contact points, opening and interrupting the circuit, when the electric current thus broken ceases to flow and the core loses its magnetism, the armature then ceases to be attracted and at once returns by the tension of its spring to its first or contact position, again completing the circuit. The foregoing cycle is continuously repeated as long as effective current is supplied to the coil. This making and breaking of the primary current and core magnetism, induces a high tension current in the secondary, which is led by the circuit through wire 38 to the spark plug 35, producing a powerful spark for igniting the engine fuel and driving its piston by the explosion of the same.

An essential and practical feature of my improved construction is that both of the contact points may be readily removed from the casing for inspection or repair by simply removing the cap and dropping out the vibrator disk without changing the adjustment of either of the points.

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

1. An induction coil comprising a magnet core, primary and secondary windings, a conducting member, an independent and removable interrupter member resting on said conducting member, and a contact-carrying cap covering and binding said interrupter to said conducting member.

2. An induction coil comprising a magnet core, primary and secondary windings, a conducting ring surrounding said magnet core, an independent and removable interrupter member supported on said ring and

a contact-carrying cap covering and binding said interrupter to said ring.

3. An induction coil comprising a primary and secondary coil with a condenser, a removable interrupter member having a continuous marginal portion and cut within its margin to provide a flexible central resilient tongue movable in line with its axis for the purpose of interrupting the primary circuit, and means for securing the entire marginal portion in fixed position.

4. An induction coil comprising a primary and a secondary coil, an interrupter constructed of a thin sheet metal disk having a continuous outer portion and provided with a spirally formed aperture through it whereby a flexible vibratory member is formed integral with the outer portion of said disk.

5. An induction coil comprising a primary and a secondary coil, and an interrupter comprising a ring having a spirally shaped flexible member integral therewith.

6. An induction coil, comprising a core, a primary and a secondary coil, an interrupter comprising a ring having a flexible spiral vibratory member integral therewith, and a ring about said core on which the periphery of said interrupter ring is supported, substantially as described.

7. An induction coil comprising a core, a primary and a secondary coil, an interrupter comprising a circular ring having a flexible spiral vibratory member integral therewith, an armature on one side of said member and a contact point on the opposite side of said member near its apex, and means around said core for supporting said ring and flexible member.

8. In an induction coil, a core, a primary and a secondary winding, a condenser, a magnetic interrupter, and a concentric ring of magnetic material supporting and in magnetic contact with said interrupter for the purpose of increasing the attraction between said core and said interrupter.

9. An induction coil comprising a primary and a secondary coil, an interrupter constructed in the form of a resilient vibratory tongue, and rings arranged to support and work in conjunction with said interrupter for influencing the lines of force and controlling their path of travel in circulating through the coil.

10. An induction coil comprising a core, a primary and a secondary coil, an interrupter constructed of a flexible spiral spring and one or more iron rings about said core for influencing the lines of force and controlling their path of travel in circulating through the coil.

11. An induction coil comprising a core, a primary and a secondary coil, an interrupter constructed of a flat metal ring having a flexible spiral spring formed integral therewith, an armature and a contact point fixed near the apex of said spiral spring, a metal ring about one end of said core, said ring being adapted to support said interrupter, and a cap for inclosing the same.

12. An induction coil comprising a core, a primary and a secondary coil, an interrupter constructed of a flat metal ring having a flexible spiral spring formed integral therewith, an armature and a contact point fixed near the apex of said spiral spring, a plurality of metal rings about one end of said core, said interrupter being supported around its outer edge on one of said metal rings, a cap supported from one of said metal rings adapted to tightly inclose the operating parts, and an adjustable contact screw threaded through said cap.

13. An induction coil comprising a core, a primary and a secondary coil, an interrupter, a metal ring about one end of said core, said interrupter being supported on said ring, a cap of conducting material inclosing the operating parts, an adjustable contact screw threaded through said cap, and means for firmly retaining said screw.

14. An induction coil comprising a core, a primary and a secondary coil, an interrupter constructed in the form of a resilient spiral member, two concentric rings insulated from each other about one end of said core, said interrupter being firmly supported on the inner ring a cap forming a bridge member and also serving to tightly inclose the interrupter and the contact points, said cap being supported on the outer ring, and an adjustable contact screw threaded through said cap.

15. An induction coil, comprising a casing constructed of a block having a circular bore the bottom portion of said block being integral therewith, a core, primary and secondary coils and a condenser located in said bore, the mouth of said bore being closed and sealed with a single insulating head, a vibrator and contact points operatively mounted on the outside of said head, and a removable cap also mounted on said head for inclosing said vibrator and the contact points.

16. An induction coil comprising a primary and secondary coil with a condenser and an interrupter, means around the core for deflecting the lines of force, a cap inclosing said interrupter, an adjustable contact screw threaded through said cap, and means connected to said screw for retaining the same by friction.

17. In an induction coil, a tapped hub, a vibrator controlling screw adjustably mounted on said hub, said screw being provided with an enlarged head, a skirt portion connected to said head and extending

downward about the shank of the screw for engaging said hub and retaining said screw therein by friction.

18. In an induction coil, a tapped hub, a vibrator controlling screw adjustably mounted on said hub, said screw being provided with an enlarged head, a skirt portion connected to said head and extending downward about the shank of the screw, said skirt portion being of thin metal and adapted to be bent out of a true circular form whereby said skirt is adapted to engage the periphery of said hub and retain said screw therein by friction.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN F. CAVANAGH.

Witnesses:

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E. I. OGDEN.