A. A. KENT.

INDUCTION COIL HEAT DISSIPATING STRUCTURE.

APPLICATION FILED FEB. 17, 1920.

1,385,624. Patented July 26, 1921.

Fig. 1.

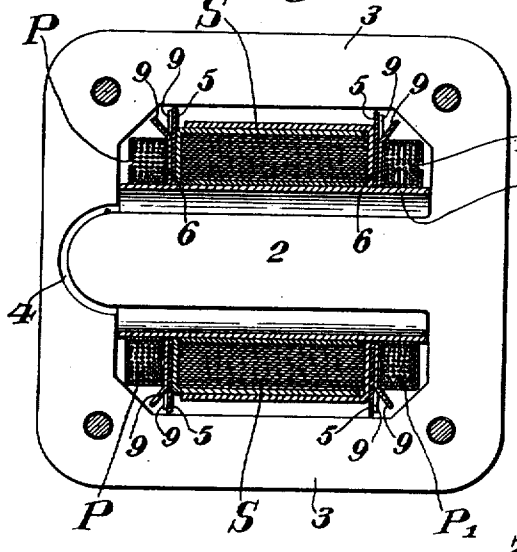


Fig. 2.

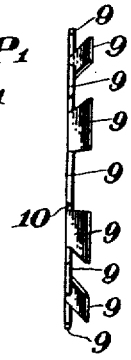


Fig. 3.

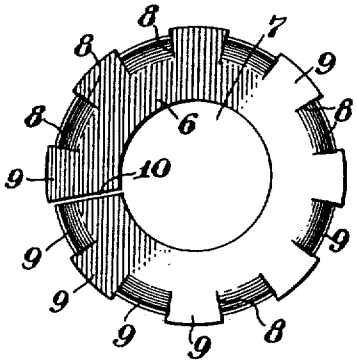


Fig. 7.

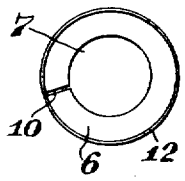


Fig. 8.

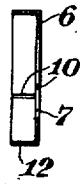


Fig. 9.



Fig. 10.

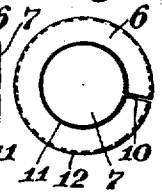


Fig. 4.

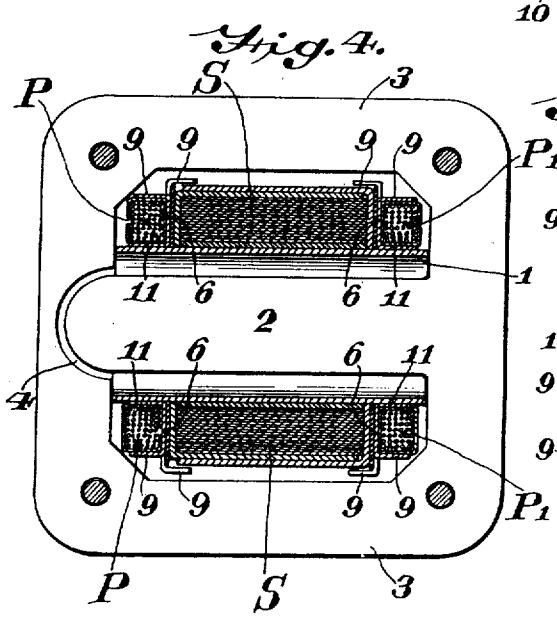


Fig. 5.

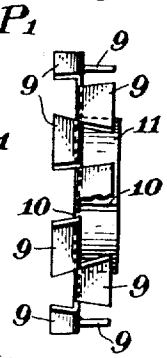
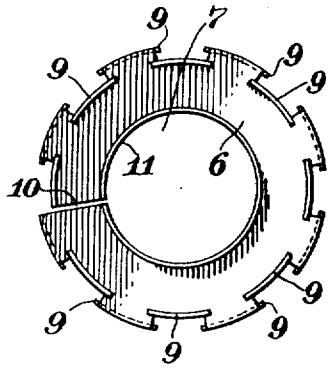


Fig. 6.



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ARTHUR ATWATER KENT, OF ARDMORE, PENNSYLVANIA.

INDUCTION-COIL-HEAT-DISSIPATING STRUCTURE.

1,385,624. Specification of Letters Patent. Patented July 26, 1921.

Application filed February 17, 1920. Serial No. 359,396.

To all whom it may concern:

Be it known that I, ARTHUR ATWATER KENT, a citizen of the United States, residing in Ardmore, county of Montgomery, and State of Pennsylvania, have invented certain new and useful Improvements in Induction-Coil-Heat-Dissipating Structures, of which the following is a specification.

My invention relates to means for carrying off heat from a winding of electrical apparatus, and particularly from a winding or windings of an induction coil, especially when forming part of an ignition system for furnishing igniting sparks to an internal combustion engine, a winding or windings of a induction coil, particularly when employed in a closed circuit system, often having generated therein excessive heat, especially when the engine stops in such position that the interrupter contacts leave the primary circuit closed.

My invention resides in a heat dissipating structure comprising means preferably of good heat conductivity disposed adjacent or more or less embracing the winding or windings, to absorb heat therefrom and conduct it away from the winding or windings and delivering it to another medium, for example, a solid or liquid medium surrounding or immersing the structure.

For an illustration of some of various forms my invention may take, and of an example of application thereof, reference is to be had to the accompanying drawing, in which:

Figure 1 is a cross sectional view, partly in plan, of induction coil structure embodying my invention.

Fig. 2 is an edge view of a heat dissipating member forming part of the structure of Fig. 1.

Fig. 3 is a side view of the structure shown in Fig. 2.

Fig. 4 is a cross sectional view, partly in plan, of induction coil structure embodying a modified form of heat dissipating structure.

Fig. 5 is an edge view of modified form of heat dissipating member employed in Fig. 4.

Fig. 6 is a side view of the structure shown in Fig. 5.

Figs. 7 and 8 are a view and section, respectively, of a modified heat conducting structure.

Figs. 9 and 10 are a sectional and side view, respectively, of a further modification of heat conducting structure.

Referring to Figs. 1 to 3, 1 is a spool or tube surrounding the core 2 of magnetizable material, as iron laminæ, or equivalent. In the example illustrated, the magnetic circuit is closed through the rectangular yoke structure 3, an air gap 4 intervening between the yoke and one end of the core 2.

Upon the tube 1 is disposed the high tension secondary winding S disposed between the primary coils P and P^1.

Between the primary coils and the secondary S may intervene the insulating washers or members 5, of mica or other suitable material. Adjacent each of the primary coils, and in heat absorbing relation with respect thereto, is disposed the heat dissipating or conducting member 6, of copper, aluminum or other material of suitable heat conductivity, in the form of a washer or disk having the hole 7 embracing spool 1, and, in the example illustrated, lying between each primary coil and the secondary S, though it will be understood that such member may be disposed in any equivalent or other suitable position or relation. Extending in from its periphery to any suitable distance are the slits 8 whereby there are formed fins or flanges 9, all or some of which may be bent to right or left to any suitable position or extent.

The member 6 is circumferentially discontinuous, particularly for the relation described where it surrounds the core of an induction coil, in that it shall not constitute a short circuited turn or member in which electrical energy would be uselessly dissipated by induction. To so render the member 6 discontinuous, there is formed therein the slot 10, a single slot leaving the structure 6 unitary, it being understood, however, that the member 6 may be divided into any suitable number of parts distributed circumferentially of the spool 1.

When heat is developed in the adjacent winding, some of it is absorbed by the member 6 and conducted outwardly to its fins or flanges 9 from which it is conducted into the surrounding air or other medium, as oil, sand or the like, in which the induction coil structure is immersed or embedded, as described, for example, in the co-pending application of William A. Evans, Ser. No. 348,603.

By recourse to the heat conducting struc-

ture described, if the primaries P and P¹ should be for an extended time traversed by current when employed in a closed circuit ignition system, and particularly in case the engine should stop with the interrupter contacts in engagement with each other, as upon a dwell, and the resistance of the circuit should be relatively low, considerable heat will be liberated in the coils, raising their temperature, but a rise in temperature to undesired or dangerous point is prevented by rapidly conducting away heat by the above described structure.

While I have described the structure as coöperating particularly with the primary winding, it will be understood that it may also similarly coöperate with the secondary winding, or with any other winding of electrical apparatus of other or different type.

In Figs. 4 to 6 inclusive is illustrated a modified structure wherein the member 6 is provided with fins or flanges 9 of different lengths and extending to both right and left over or adjacent to both primary and secondary windings, or into any other suitable position or relation. Furthermore, the member 6 may be provided with the inner flange 11, termed a core flange, surrounding the spool 1 and disposed between it and the surrounding primary winding, whereby further heat absorbing surface is presented to the winding in which excessive heat may be developed.

In this instance again the member 6 is slotted completely through, as by slot 10, which also severs the cylindrical flange 11, which accordingly also is circumferentially incomplete.

In lieu of producing fins by slitting the heat conducting member, the same may be formed as indicated in Figs. 7 and 8, wherein the member 6 terminates in a laterally extending flange 12, the structure being completely cut through by slot 10 to prevent formation of a closed circuit.

In Figs. 9 and 10 is a structure similar to that shown in Figs. 7 and 8, except that there is provided in addition a core flange 11, which with the remainder of the structure is completely cut through by a slot 10.

What I claim is:—

1. The combination with a current conducting winding, of means for conducting heat therefrom comprising a member lying adjacent said winding in heat absorbing relation thereto and having fins lying beyond said winding, said member having a core flange surrounded by said winding.

2. The combination with an induction coil winding traversed by fluctuating current, of means for conducting heat therefrom comprising a circumferentially discontinuous heat conducting member disposed adjacent thereto in heat absorbing relation and extending beyond said winding.

3. The combination with an induction coil winding traversed by fluctuating current, of means for conducting heat therefrom comprising a circumferentially discontinuous heat conducting member disposed adjacent thereto in heat absorbing relation and extending beyond said winding, said member having a circumferentially discontinuous core flange surrounded by said winding.

4. The combination with an induction coil comprising primary and secondary windings, of heat dissipating means comprising a circumferentially discontinuous metallic member disposed in heat absorbing relation with respect to one of said windings and extending beyond the same to position to dissipate the heat conducted therethrough.

5. The combination with an induction coil comprising primary and secondary windings, of heat dissipating means comprising a circumferentially discontinuous metallic member disposed in heat absorbing relation with respect to one of said windings and extending beyond the same to position to dissipate the heat conducted therethrough, said member having a circumferentially discontinuous core flange surrounded by said winding.

6. The combination with an induction coil comprising primary and secondary coils disposed side by side, of heat dissipating means comprising a heat conducting member electrically independent of and disposed between said coils and in heat absorbing relation with respect to at least one of them, said member extending beyond said coil to dissipate heat delivered thereto.

7. The combination with an induction coil comprising primary and secondary coils disposed side by side, of heat dissipating means comprising a heat conducting member electrically independent of and disposed between said coils and in heat absorbing relation with respect to at least one of them, said member extending beyond said coil to dissipate heat delivered thereto, said member terminating in fins extending in different directions.

8. The combination with an induction coil comprising primary and secondary coils disposed side by side, of heat dissipating means comprising a heat conducting member disposed between said coils and in heat absorbing relation with respect to at least one of them, said member extending beyond said coil to dissipate heat delivered thereto, said member terminating in fins disposed respectively, over said primary and secondary coils.

9. The combination with an induction coil comprising primary and secondary coils disposed side by side, of heat dissipating means comprising a heat conducting member disposed between said coils and in heat absorbing relation with respect to at least one of them, said member having a core flange sur-

rounded by said one of said coils, said member extending beyond said one of said coils to dissipate heat delivered thereto, said member terminating in fins disposed over said one of said coils.

10. The combination with an induction coil comprising primary and secondary coils disposed side by side, of heat dissipating means comprising a heat conducting member disposed between said coils and in heat absorbing relation with respect to at least one of them, said member having a core flange surrounded by said one of said coils, said member extending beyond said one of said coils to dissipate heat delivered thereto, said member terminating in fins disposed, respectively, over neighboring primary and secondary coils.

In testimony whereof I have hereunto affixed my signature this 16th day of February, 1920.

ARTHUR ATWATER KENT.