G. L. RINGLAND.

CORE CONSTRUCTION FOR ELECTRICAL APPARATUS.

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1,286,782. Patented Dec. 3, 1918.

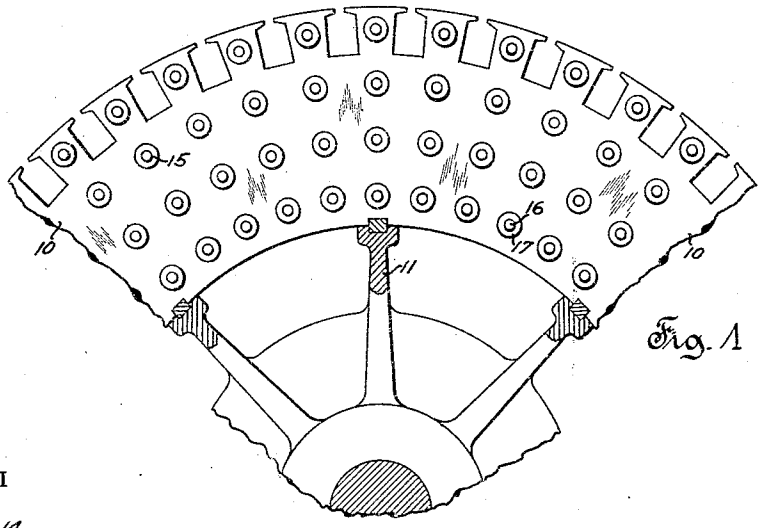


Fig. 1

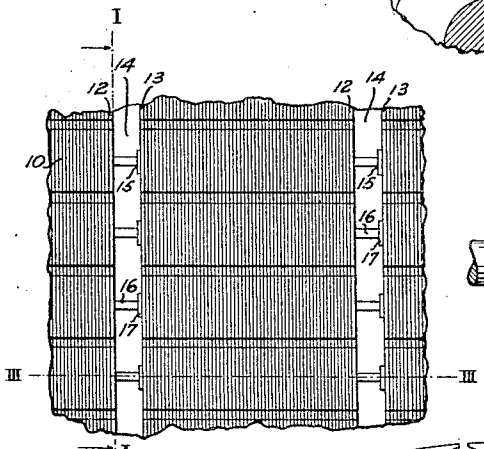


Fig. 2

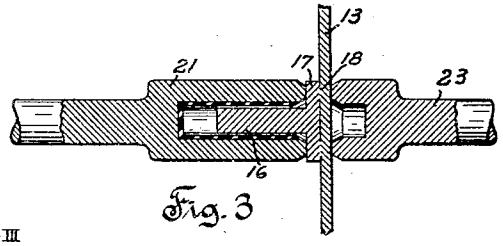


Fig. 3

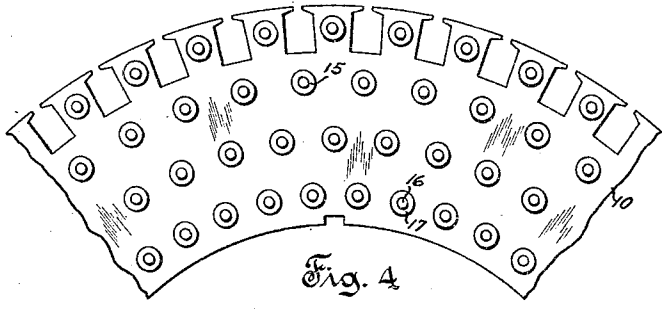


Fig. 4

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UNITED STATES PATENT OFFICE.

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CORE CONSTRUCTION FOR ELECTRICAL APPARATUS.

1,286,782. Specification of Letters Patent. Patented Dec. 3, 1918.

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To all whom it may concern:

Be it known that I, GEORGE L. RINGLAND, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Core Constructions for Electrical Apparatus, of which the following is a specification.

This invention relates in general to electrical apparatus and has particular relation to means for promoting efficient ventilation of the cores of such apparatus while maintaining a mechanically strong and durable core construction.

In the cores of electrical apparatus it is customary to provide passages for the flow of ventilating fluid for the purpose of maintaining the apparatus in a cool operating condition. In the ordinary construction, the cores are made up of a plurality of laminations held against axial movement by suitable retaining means, the laminations being assembled in groups spaced apart, the spaces providing passages for the flow of ventilating currents. Various means have been utilized to maintain the core parts properly spaced one from another and to provide the desired ventilating passageways for maintaining the core and the windings associated therewith in a cool and efficient operating condition. However, while fairly satisfactory results have been attained with certain prior art constructions, nevertheless, these results, whatever they may be, have been secured only at comparatively great expense, these prior art spacing devices being of more or less special shapes and requiring special means for the attachment thereof, the same involving high cost both for providing these devices and for attaching them in operative position.

In accordance with this invention, in its preferred form, the devices used for spacing apart adjacent sections of the core are in the form of ordinary tinners' rivets having a shank portion and an enlarged head at one end of the shank portion. The heads of the rivets are attached to the end laminations of one or both of the spaced groups, being secured thereto by an autogenous union, preferably through an electric weld which can be very expeditiously made, the attachment being preferably at a plurality of points spaced from and symmetrically disposed about the axis of the rivet and radially outside of the shank portion of the rivet. The general construction is such as provides for the required mechanical strength, and also such as provides a maximum ventilating space with minimum obstructions, all of these results being secured with a minimum weight of material and at a comparatively small cost.

It is an object of this invention to provide improved means for spacing sections of a core of electrical apparatus, which means can be readily and cheaply provided and assembled, and which provides for the required mechanical strength and the efficient ventilation of the core.

It is a further and more specific object of this invention to provide an improved means for spacing and holding in operative position the sections of a core of electrical apparatus, this means involving the use of a plurality of separate spacing elements in the general form of headed rivets, the heads of the rivets being integrally united to one of the core sections at a plurality of points radially outside of the axis of the rivet, and the other ends of the rivets abutting against the other one of the spaced core sections.

These and other objects are attained by this invention, the various novel features of which will appear from the description and drawings, disclosing one embodiment of such invention, and will be particularly pointed out in the claims.

In the accompanying drawings:

Figure 1 is a radial sectional view through a fragment of the rotor core of a dynamo-electric machine embodying features of this invention, the section being taken along the line I—I of Fig. 2.

Fig. 2 is a fragmentary plan view of the core shown in part in Fig. 1.

Fig. 3 is an enlarged fragmentary sectional view along the line III—III of Fig. 2, along with apparatus, shown conventionally, for securing one of the spacing devices to a lamination.

Fig. 4 is a view similar to Fig. 1, showing a modified arrangement of the several spacing devices attached to an end lamination of a core section.

In the embodiment of the invention illustrated, a core 10 of the rotatable element of a dynamo-electric machine is shown mounted on a spider or other support 11. The core is divided into a plurality of spaced

sections, being here shown as made up of a plurality of laminations, the opposing end laminations of two sections being designated as 12 and 13, respectively, and the space between the core sections being designated as 14. This space 14 provides a passage for ventilating currents which, by contact with the heated surfaces of the core sections, maintain the core in a comparatively cool operating condition.

The space 14 between the core sections is provided during the assembling of the core on the spider 11, spacing devices 15 between the end laminations 12 and 13 serving to effectively maintain the sections in such spaced relation. As shown, these spacing devices 15 are in the form of ordinary iron or soft steel tinners' rivets comprising a shank portion 16 and an enlarged head 17 which is attached to the lamination 13 with the shank portion extending axially of the machine. These rivets or spacing devices are attached to the lamination 13 preferably before the same is assembled upon the spider, the preferable manner of attaching the same being through an autogenous union, as by electrically welding the head portion of the rivet to the lamination, the weld or area of attachment of the rivet being preferably at a plurality of points symmetrically arranged about the axis of the rivet or along an annular surface radially outside of the shank portion of the rivet, as generally shown at 18 in Fig. 3. In attaching the rivets, a hollow electrode 21 having its welding surface annular in shape and fitting over the shank 16 of the rivet, engages the inner side of the head 17, the outer side of the head abutting against one side of the lamination 13, and an electrode 23 whose contact surface is preferably of substantially the same area as that of the electrode 21 engages the opposite side of the lamination 13. The electrodes are connected to a suitable source of welding current to produce a welding heat at the required points on the surfaces to be welded, and the required degree of pressure is then applied, as in the ordinary welding operation. Most expeditious welding and generally satisfactory results are attained if an automatic feeding device is associated with the electrode 21 whereby the rivets are automatically moved into operative position to be welded as the electrodes or the work are shifted to accomplish the successive welding of the several rivets to the lamination.

The number and relative arrangement of the rivets or spacing devices may be anything desired to provide for the proper mechanical strength to resist compression between the spaced sections, two relative arrangements being shown in Figs. 1 and 4, that of Fig. 1 being one wherein the spacing devices are in substantially radial alinement, and that of Fig. 4 being one wherein the rivets are somewhat staggered radially.

By using spacing devices of the character described and attaching the same to end laminations of the spaced core sections in the manner described, a very cheap, simple and effective spacing means is provided, the same being such as provides for the required mechanical strength with a minimum of weight and also a minimum of obstruction to the flow of ventilating currents. It will be apparent that practically the only obstruction offered by the rivet to the flow of ventilating currents is through the shank portion thereof, and this need be only of such size, as, with a suitable number thereof, sufficient strength is provided to resist axial approach of the spaced sections when the core is assembled. By attaching the rivet to an end lamination at a plurality of points spaced from and substantially symmetrically disposed about the axis of the rivet, or, as shown, along an annular surface radially outside of the shank portion of the rivet, instead of merely along the axis or wholly at one side thereof, it will be apparent that maximum resistance is afforded against separation of the rivet from the lamination as might be caused by a force applied to the shank portion in a direction transverse to the axis thereof. In fact, with the arrangement described, attempts to remove the attached rivet from the lamination result only in severing the portion of the lamination attached to the rivet from the body portion of the lamination, there being no indication of any separation along the welded area.

It will be apparent that, instead of attaching all of the spacing devices to one lamination, such as 13, a portion of the spacing devices may be attached to the opposed lamination, such as 12, the rivets extending in opposite directions and the outer ends of the shank portions bearing against the other end lamination.

It should be understood that it is not desired that the invention claimed be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In a core for electrical apparatus, a plurality of axially spaced sections, and means for holding said sections in spaced relation, said means comprising a plurality of spacing elements, each of said spacing elements including a substantially cylindrical shank portion and an enlarged head bearing against and attached to one of said sections, and the opposite end of said shank portion bearing against the other of said sections.

2. In a core for electrical apparatus, a plurality of axially spaced sections, and

means for holding said sections in spaced relation and comprising a plurality of spacing elements, each of said spacing elements being in the form of a rivet having a shank portion and an enlarged head, and said enlarged head bearing against and being attached to one of said sections at a plurality of points radially outside of the shank portion of said rivet.

3. In a core for electrical apparatus, a plurality of axially spaced sections, and means for holding said sections in spaced relation and comprising a plurality of spacing elements in the form of rivets, each of said rivets including a shank portion and an enlarged head, and said enlarged head bearing against and being attached to one of said sections at a plurality of points symmetrically disposed about and radially outside of the shank portion of said rivet.

4. In a core for electrical apparatus, a plurality of axially spaced sections, and means for holding said sections in spaced relation and comprising a plurality of spacing elements in the form of rivets, each of said rivets comprising a shank portion and an enlarged head, and said enlarged head being united to one of said sections by fusion of metal of the parts at points symmetrically disposed about and radially outside of the shank portion of the rivet.

5. In a core for electrical apparatus, a plurality of axially spaced sections each comprising a plurality of laminations, and means for holding said sections in spaced relation, said means comprising a plurality of spacing elements in the form of rivets, each of said rivets comprising a shank portion and an enlarged head, and said enlarged head being united to an end lamination of one section by fusion of metal of the head and said end lamination along annular surfaces thereof.

6. In a core for electrical apparatus, a lamination, and a plurality of spacing devices secured thereto, each of said spacing devices comprising a shank portion and an enlarged head at one end of said shank portion, and said head being attached to the face of said lamination at a plurality of points radially outside of said shank portion and symmetrically disposed about the axis of said shank portion.

7. In a core for electrical apparatus, a lamination, and a plurality of spacing devices secured thereto, each of said spacing devices comprising a shank portion and an enlarged head at one end of said shank portion, and said head being integrally united to said lamination along an annular surface radially outside of said shank portion.

8. In a core for electrical apparatus, a lamination, and a plurality of spacing devices secured thereto, said spacing devices being in the form of rivets having a shank portion and an enlarged head at one end of said shank portion, and said head being integrally united to said lamination by fusion of metal of the parts at points symmetrically disposed about the axis of the shank portion and radially outside of said shank portion.

9. In combination in a core, a plurality of laminations, and means for axially spacing said laminations, said spacing means comprising a plurality of spaced rivets each having a shank portion and an enlarged head, and said head being integrally united to one of said laminations by fusion of metal of the parts along an annular surface radially outside of the shank portion of the rivet.

10. In a core for a dynamo-electric machine, a lamination, and a plurality of spacing devices secured thereto, each of said spacing devices having a longitudinal axis of symmetry parallel to the axis of rotation of said core and being autogenously united to said lamination at a plurality of points spaced from and symmetrically disposed about the axis of said spacing device.

11. In a core for a dynamo-electric machine, a lamination, and a spacing device secured thereto having a longitudinal axis of symmetry parallel to the axis of rotation of the core and being autogenously united to said lamination.

In testimony whereof, the signature of the inventor is affixed hereto.

G. L. RINGLAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."