

Jan. 16, 1945.

E. PRAT DIVI

2,367,428

METHOD OF MANUFACTURING STATORS FOR ELECTRICAL MACHINES

Filed Feb. 5, 1943

3 Sheets-Sheet 1

Fig. 1.

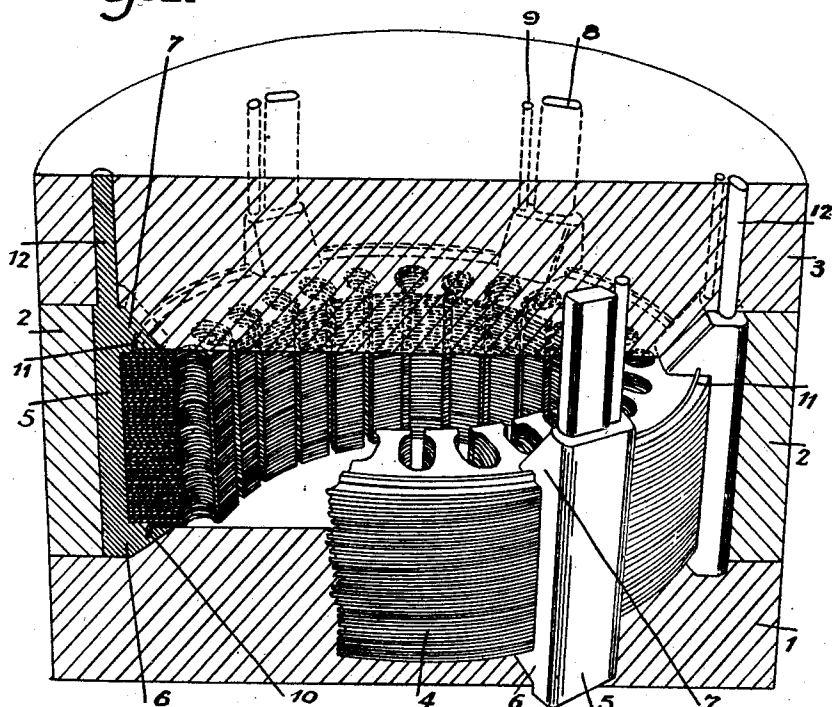
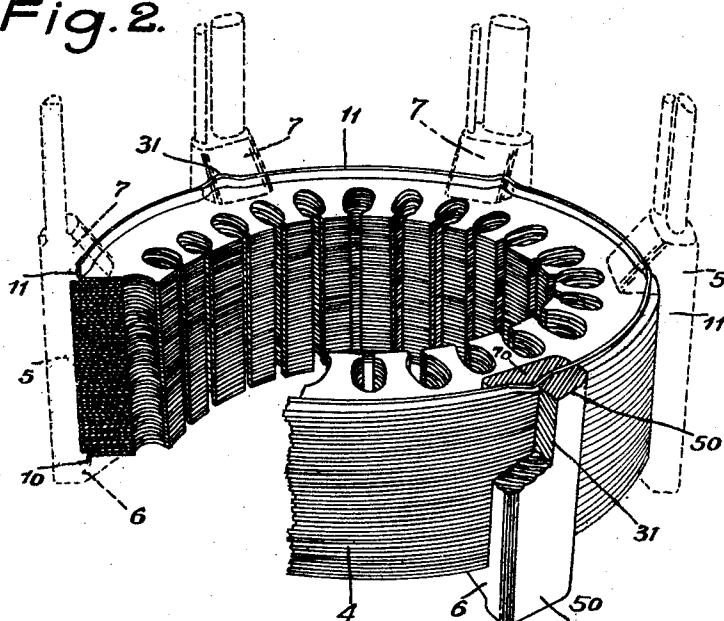


Fig. 2.



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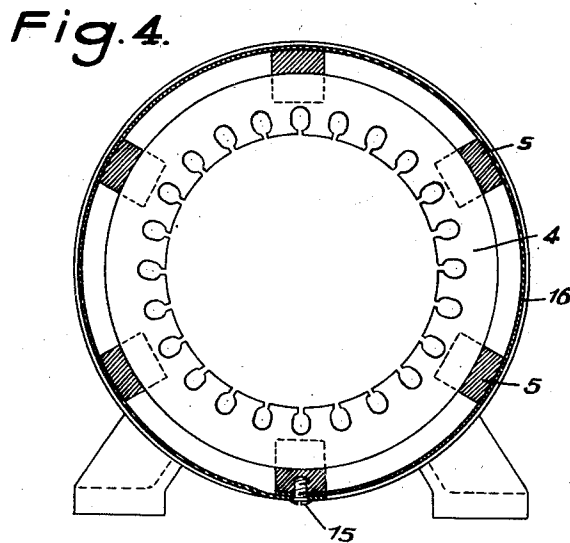
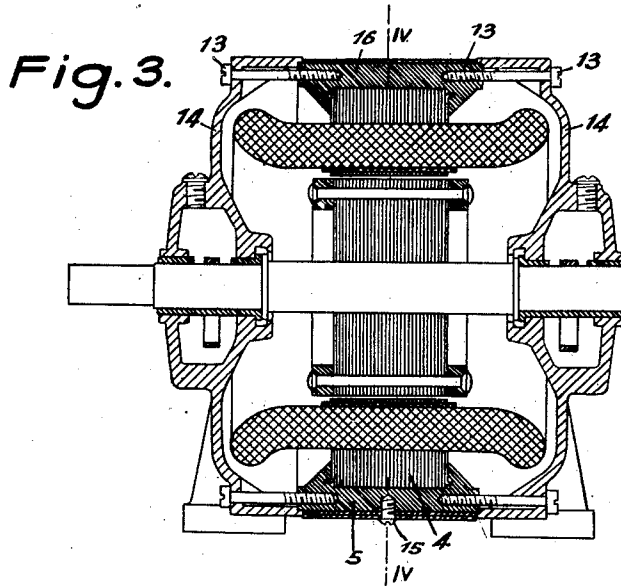
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 5.

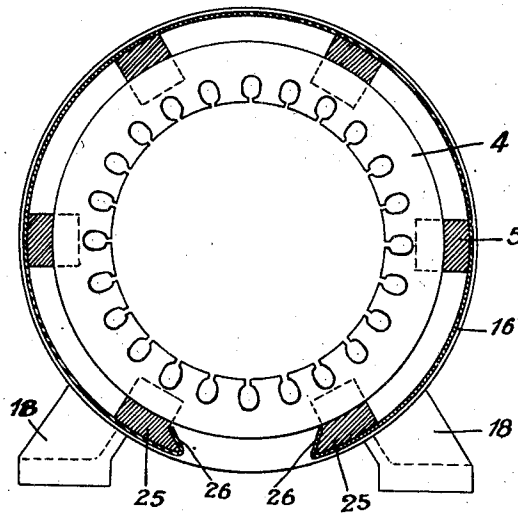
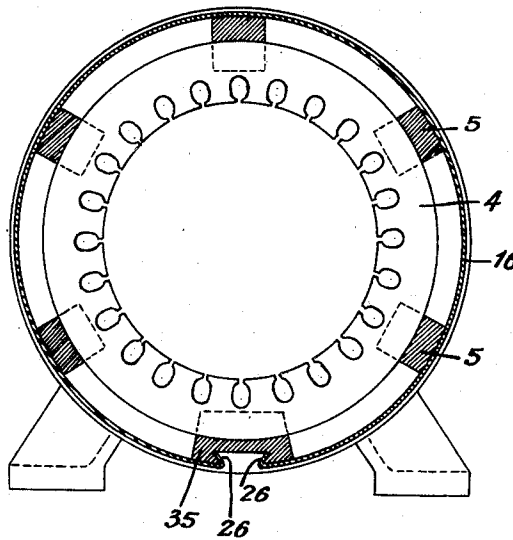


Fig. 6.



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UNITED STATES PATENT OFFICE

2,367,428

METHOD OF MANUFACTURING STATORS
FOR ELECTRICAL MACHINES

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Application February 5, 1943, Serial No. 474,889
In Spain June 23, 1942

2 Claims. (Cl. 22—203)

My invention refers to the manufacture of stators of electrical machines such as motors, dynamos, converters, etc.

In the usual construction of electrical machines the magnetic core of the stator is made up of a number of discs, with the corresponding slots for the passage of the wires, which is placed in the interior of a shell of cast iron, the discs remaining pressed one against the other between a flange of the outer shell and a ring which is applied from the other side and is fixed in position by means of screws. This usual construction is expensive owing to the amount of work required for the machining involved, that is the inside turning of the shell, the turning of the fixing ring and the screwing and placing of fitting screws.

In order to avoid this high cost, attempts have been made to have the body of the stator made of aluminum cast under pressure on the bunch of discs, but this requires the use of complicated and costly machinery.

The present invention however allows of making stators for electrical machines in a simple and economical way, without the use of costly machinery and with an economy of some 30 to 40% in the weight of cast iron.

The invention consists in casting in the periphery of the bunch of discs a series of independent ribs that clasp the bunch of discs, not only at the periphery but also at their extreme faces thus keeping the discs securely pressed together.

These ribs are cast preferably of aluminum, but there may also be used alloys of zinc and in general any other metal or alloy of suitable properties.

In casting these ribs there may be used a mould that in addition to the space for containing the bunch of discs forms the different cavities or moulds for casting the ribs that have to join these discs. Once the bunch of discs is placed in the interior of the mould, this is closed, keeping the cover sufficiently pressed in order to compress the discs forming the bunch to form a compact mass. Then the aluminum or other metal is poured into the tap of the mould to cast the number of ribs required. After this, the bunch of discs remains forming a whole as compact and strong as when in the old method it was pressed in the interior of the casting.

For the fitting of this stator core into the electrical machine, simply the runners of the ribs are cut off and the front ends of the ribs are machined on a lathe to allow of the application against them of the two end shields of the dynamo or motor. The whole is completed by a ring of

metal sheet which is placed between the two end shields of the electrical machine, surrounding the stator, in order to give a good appearance to the whole of the machine.

The construction of stators according to this invention does not require any special machinery or tool, apart from the metallic mould for casting the ribs, as the casting of these ribs can be carried out simply by hand, although there may be used also the usual machines for casting metals under pressure.

Notwithstanding this simplicity of installation there is obtained a job completely perfect and economical, so that the construction of the electrical machine is rendered less expensive to a very large degree by this invention.

In the attached drawings there is shown the method of constructing a stator for electrical machines according to this invention.

Figure 1 is a perspective section of the metallic mould for the casting of the ribs and the bunch of discs with the cast ribs.

Figure 2 is a similar view of the bunch of discs showing a variation in the form of the extreme or end discs.

Figure 3 is an axial section of an electrical machine with the stator constructed in accordance with this invention.

Figure 4 is a cross section of Fig. 3, through the lines IV—IV of this Figure 3.

Figure 5 is a section similar to Fig. 4 showing a variation in the way of fixing the outer cover plate, and

Figure 6 is a section showing another variation in the fixing of this cover plate.

For the construction of stators in accordance with this invention, there is used preferably a metallic mould as is shown in Fig. 1 and which is made up of three pieces: a bottom plate 1, a side part 2 and a cover or top part 3. These three pieces together form in the interior of the mould the necessary cavity for placing the bunch of discs 4 and for casting around the bunch the required number of ribs 5. These ribs 5 are suitably distributed around the periphery of the bunch of discs 4 and completely separated or independent from each other, that is they are cast independently and one after the other, which precisely allows them to be cast by hand and without the need of special machinery. They are formed at their extreme ends with projections or holding clamps 6, 7 which hold the end discs of the bunch 4 and owing to the contraction of the metal on cooling, keep the discs firmly held one against the other with the same or greater

strength than when the bunch is mounted in the interior of a casting.

The cover 3 of the mould includes for each one of the ribs 5 the necessary pouring holes 8 and air vents 9 to allow of the casting.

In order to give the bunch of discs 4 the necessary resistance, there may be applied to their ends rings of iron or other resisting material, but in most cases it is preferable to flange one or more discs of each one of the two sides or ends of the bunch, as is shown at 10 and at 11 of Fig. 1. This flanging of the outer discs imparts to these discs a sufficient resistance to allow them to transmit the pressure of the ribs 5 to all the part of the bunch included between the ribs and as the flanges 10, 11 remain inserted in the metal forming the heads 6, 7 of the ribs, the result is absolutely to prevent these ribs from coming apart from the bunch. However, in some cases, especially if there is used for casting the ribs a metal having relatively little contraction or if the extreme discs should be somewhat oxidized, it may happen that the cast metal of the ribs may not hold in an absolutely firm manner on the end discs and the ribs may slide along the periphery of the bunch of discs, in which case the exact distribution of the ribs and the holding effect on the discs would be altered.

In order to avoid this, it is advisable to arrange in the flanged end discs and at the points at which they are to be clasped by the ribs, some gaps, projections or special profiles, that remain lodged in the head of the rib, thus preventing peripheral displacement of the latter. There may be especially adopted the arrangement shown in Fig. 2 in which the flanges 10, 11 of the end discs are not exactly circular but at the points at which the ribs are to be cast, they form undulations 31 that are held fast in the metal of the heads 6, 7 of the ribs, as is seen especially between the body 50 and the head 70 of the rib situated in the front part of this Figure 2.

Once the ribs 5 are cast in the way just explained, the whole of the stator is taken from the mould and to machine this stator it is only necessary to cut off the runners 12, to plane the extreme ends of the ribs and to make in these extreme surfaces the holes for the screws 13 that hold the end shields 14 of the dynamo or motor. These operations, as is understood, are extremely simple and much more economical than the work of machining the stators made up to the present.

This job of drilling and screwing the ribs can be avoided by mounting the two end shields 14 by means of bolts or screws through one end shield to another, passing through the hollow left between two ribs.

The fitting of these end shields 14 to the ribs 5 completes the mounting of the framework of the electrical machine, but in order to give it a better appearance it is advisable to cover the central space remaining between the two end shields 14 by means of a strip of metallic sheet 16 which may be arranged in the manner shown in Figs. 3 and 4, overlapping the ends on one of the ribs 5 and fixing it to this rib by means of one or more screws 15.

The arrangement of this sheet strip 16 may be simplified and the cost reduced by mounting it in the way shown in Fig. 5 or Fig. 6. Thus in Fig. 5 it is supposed that the two ribs 25 that remain placed between the feet 18 of the electrical machine, have one of their sides bevelled and the strip 16 has its ends 26 angularly bent, so that it fits in these bevelled parts of the ribs 25. The sheet strip 16 is fitted on the ribs 25 before applying the end shields 14 and then remains held by its angularly bent parts 26 and by the end shields 14 without being able to come loose.

In the form of construction shown in Fig. 6, the lower rib 35 is arranged with a slot in the form of a fan tail, in such a way that it forms also the two bevelled or inclined parts in a way similar to the ribs 25 of Fig. 5. The sheet strip 16 has also the ends 26 bent to fit into these bevelled or fan tailed parts and is held in the way explained in relation to Fig. 5.

I claim:

1. A method for the manufacture of a stator for an electrical machine, which comprises stacking a plurality of discs to form a bunch defining the magnetic core of the stator, flanging the end discs to provide an upstanding circumferential flange at each end of the stack extending substantially normally with respect to the stack ends, and casting at spaced points about the periphery of said stack a plurality of independent metallic ribs and projections extending laterally from said ribs into contiguity with said stack ends and the adjacent portions of said flange, whereby the cylindrical periphery of the bunch of discs is clasped at a plurality of points by said ribs and the ends of said bunch are clamped between said projections, while the upstanding flanges provide such enhanced resistance to clamping as to avoid deformation of the stator core in the parts included between said projections.

2. A method for the manufacture of a stator for an electrical machine, which comprises stacking a plurality of discs to form a bunch defining the magnetic core of the stator, flanging and undulating the end discs to provide an upstanding undulated circumferential flange at each end of the stack extending substantially normally with respect to the stack ends, and casting at spaced points about the periphery of said stack a plurality of independent metallic ribs and projections extending laterally from said ribs into contiguity with said stack ends and the adjacent portions of said flange, whereby the cylindrical periphery of the bunch of discs is clasped at a plurality of points by said ribs and the ends of said bunch are clamped between said projections, while the upstanding flanges provide such enhanced resistance to clamping as to avoid deformation of the stator core in the parts included between said projections while the undulations prevent relative circumferential movement between the bunch and the ribs.

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