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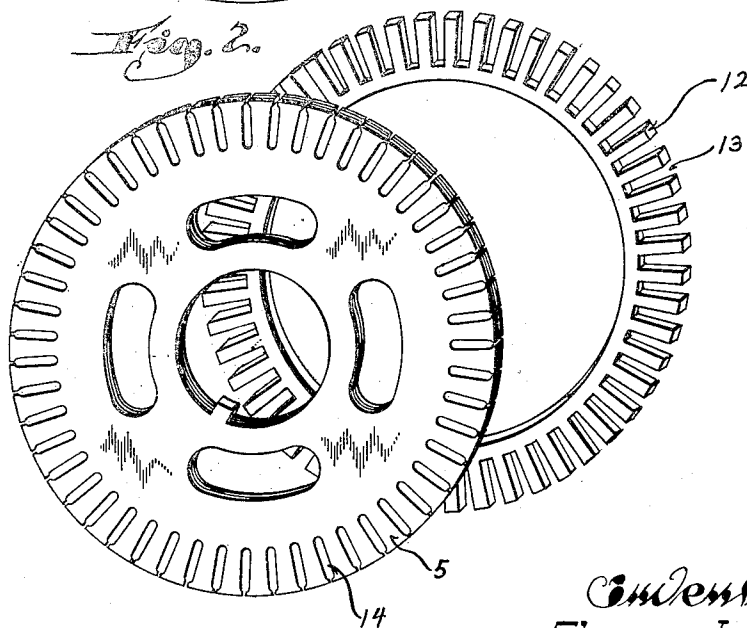
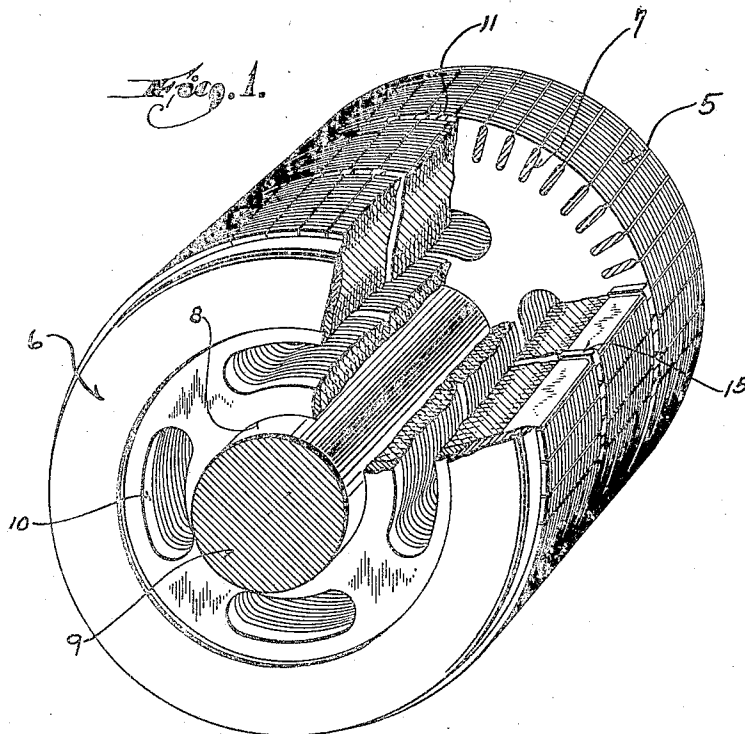
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2,368,296

ROTOR CONSTRUCTION

Filed Oct. 29, 1943

2 Sheets-Sheet 1



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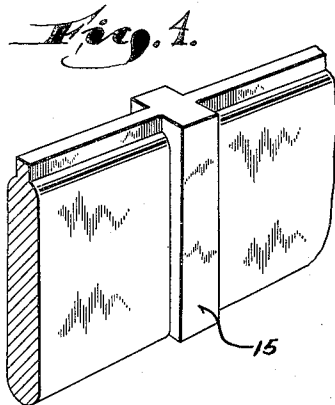
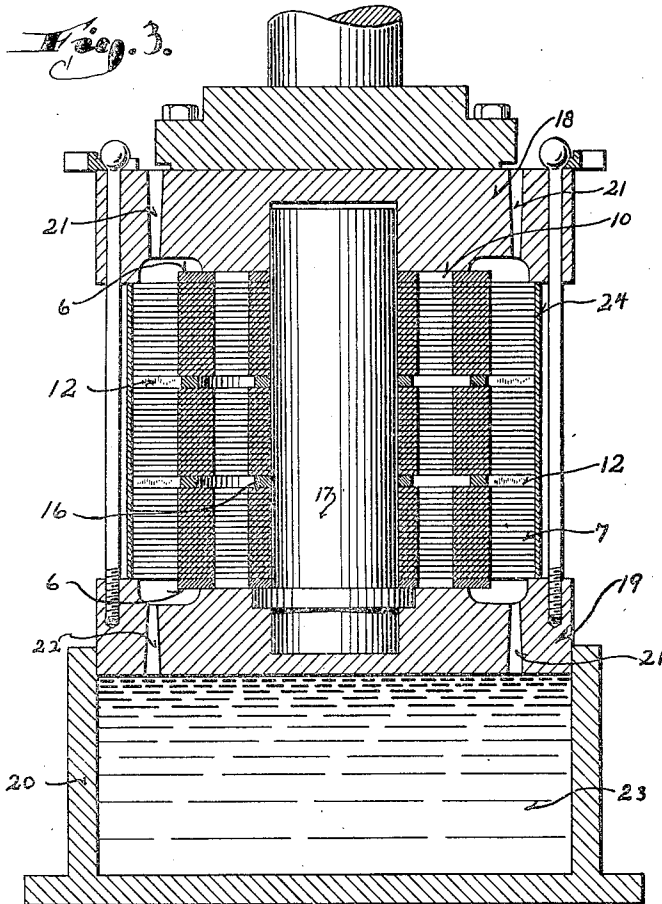
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ROTOR CONSTRUCTION

Filed Oct. 29, 1943

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,368,296

ROTOR CONSTRUCTION

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Application October 29, 1943, Serial No. 508,111

3 Claims. (Cl. 22-203)

This invention relates to the manufacture of squirrel cage rotors for electric motors and refers particularly to rotors of the cast type as in the copending application of Steven J. Goran, Serial No. 458,258, filed September 14, 1942, of which this application is a continuation in part.

It is the purpose of this invention to provide an inexpensive practical manner of insuring the formation of radial ventilating passages in the finished rotor through the use of temporary spacers between groups of laminations, the spacers being made of a material easily destroyed or removed by treatment which does not effect the cast rotor bars or the laminations.

In the aforesaid pending application, the spacers were defined as being made of any suitable destroyable material and cardboard was specifically disclosed as an example. In that case the rotor, after the casting operation, was baked at a temperature high enough to carbonize the cardboard but not melt the cast metal so that the spacers could be removed by an air blast.

With the use of spacers formed of cardboard or similar material when the hot molten metal strikes the edges of the slots punched into the periphery of the spacer some of the spacer material is burned away and as a consequence the metal being cast flows between the groups of laminations to form spacing projections therebetween.

While this method has proved generally satisfactory the present invention seeks to further reduce the cost of the process by substituting a spacer formed of material which can be reused after it is removed from the finished rotor.

For instance, a tin alloy, which melts at a temperature considerably lower than the melting point of the aluminum from which the rotor bars are cast, would be a very practical material, but other materials can be used as will be pointed out hereinafter.

With a view toward further reduction in the cost of manufacture, this invention has as another of its objects the provision of a spacer which has peripheral notches for alignment with the punched slots of the laminations with the notches larger than the slots to define pockets for the reception of the molten metal in the casting of the rotor. In this manner the desired spacing projections are formed on the bars but with the advantage of having the projections all alike and of definite shape and size.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combina-

tion and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view of a rotor constructed in accordance with this invention and having parts thereof broken away and in section;

Figure 2 is a perspective view of a few of the rotor laminations and one of the spacers to show their relative configurations;

Figure 3 is a cross-sectional view through the casting mold illustrating the manner in which the rotor is cast; and

Figure 4 is an enlarged fragmentary detail view illustrating the spacing projections formed integrally with the rotor bars during the casting of the rotors.

Referring now particularly to the accompanying drawings, in which like numerals refer to like parts, the numeral 5 designates the rotor laminations which are punched from thin sheets of steel or other suitable material and which are held assembled between end rings 6 by a series of rotor bars 7 cast integrally with the end rings.

The laminations are punched to provide a bore 8 for the reception of the rotor shaft 9 and to also provide longitudinal air passages 10. These passages communicate with radial ventilating passages 11 between groups of laminations. It is the formation of these radial ventilating passages with which this invention is chiefly concerned.

Inasmuch as the rotor bars and end rings are cast, it follows that to provide the radial ventilating passages, temporary spacers must be inserted between laminations where the ventilating passages are to be located. To this end, ringlike spacers 12 are provided.

These spacers are of the same diameter as the laminations and are inserted between groups of laminations during their assembly preparatory to casting. Notches 13 opening to the periphery of the spacers are so spaced as to align with the bar forming slots 14 punched into the peripheral portions of the laminations. The notches 13, however, are larger than the slots so that when the rotor bars are cast, spacing projections 15 of definite size and shape will be formed on the rotor bars to space the groups of laminations around

the periphery of the rotor. At the center permanent spacing collars 16 of suitable metal are provided between the groups of laminations. These collars, together with the spacing lugs or projections 15, firmly hold the groups of laminations properly spaced.

In preparing the rotor for the casting operation the laminations and spacers are assembled on a suitable mandrel 17 in the manner well known in the art and clamped between upper and lower heads 18 and 19, respectively. The assembly is then mounted in a casting press with the lower head serving as a plunger and entering the pot 20 of the press.

By virtue of the provision of suitable passages 21 and 22 in the heads the molten fluid 23 is forced up into the rotor bar and end ring forming spaces as the ram of the press descends. It is, of course, understood that the open slots are closed by a removable sheath 24 during the casting operation.

After the casting operation the entire rotor is treated to either melt or dissolve the temporary spacers 12 depending upon the material from which they are made.

As indicated hereinbefore, tin alloys which melt at temperatures well below the melting point of aluminum are suitable where the spacer is to be made of metal. Many other materials, however, are suitable.

For instance, plastics which will dissolve upon treatment with an inexpensive solvent that has no effect upon the cast rotor can be employed. Also it is possible to use clay or similar material, the binder of which can be readily dissolved.

In any event, it is desirable to employ a material which can be liquified and subsequently reused by pouring the same into a mold shaped to form the spacer.

In this way a double saving is effected for not only is the material used for the spacer saved, but molding the spacer is considerably cheaper than punching it from a blank.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides an exceedingly simple and inexpensive method of providing case squirrel cage rotors with radial ventilating passages.

What I claim as my invention is:

1. The hereindescribed method of making squirrel cage rotors having cast conductor bars embedded in the aligned slots of a stack of punched laminations which comprises: assembling the laminations with a temporary spacer of

solid material capable of being liquefied by a treatment which does not affect the metal of which the rotor is cast or the laminations, and with the spacer extending to the periphery of the laminations but provided with notches in line with the slots of the laminations but larger than the slots so that in casting the bars the metal filling said notches forms lug-like projections to space the groups of laminations between which the spacer is interposed; casting the conductor bars; and subsequently liquifying the spacer to remove the same and leave radial ventilating passages between the conductor bars and said groups of laminations.

2. The hereindescribed method of making a squirrel cage rotor having cast conductor bars embedded in slots in a laminated core which comprises: assembling the laminations of the core with their slots properly aligned and with the laminations divided into at least two groups held spaced apart by a spacer of metal having a melting point lower than that of the metal of which the conductor bars are cast, and which spacer has peripheral notches in line with the slots of the laminations but larger than the slots so that the metal of the conductor bars flowing into said notches forms uniform lug-like projections of definite size and shape to hold the two groups of laminations spaced apart at the periphery of the rotor; casting the conductor bars into the slots and notches; and subjecting the rotor after the casting operation to a temperature high enough to melt the spacer but not high enough to affect the cast conductor bars.

3. The hereindescribed method of making a squirrel cage rotor having cast conductor bars embedded in slots in a laminated core which comprises: assembling the laminations of the core with their slots properly aligned and with the laminations divided into at least two groups held spaced apart by a spacer of solid material capable of being dissolved by a solvent which in no wise affects the cast rotor bars and which spacer has peripheral notches in line with the slots of the laminations but larger than the slots so that the metal of the conductor bars flowing into said notches forms lug-like projections of definite size and shape to hold the two groups of laminations spaced apart at the periphery of the rotor; casting the conductor bars into the slots and notches; and subjecting the rotor after the casting operation to treatment with a solvent capable of dissolving the spacer without affecting the cast conductor bars.

STEVEN J. GORAN.