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(54) Improved supporting spool for electric windings.

(57) The spool (1) comprises tubular elements (8, 9) extending between heads (4 - 7) to define two half-spools (2, 3). Two of the heads (5, 7) are interconnected by a hinge such that the half-spools (2, 3) can be arranged linearly, for permitting an electric conductor to be continuously wound on the two half-spools (2, 3), and then positioned adjacent each other for permitting the wings of a U-shaped magnetic core to be inserted into the tubular elements (8, 9). One of the heads (5) has formed thereon a tab (19) and the adjacent head (7) has formed thereon a pocket (20), for spacing a bridging portion of the electric conductor which extends between the half-spools (2, 3) from the magnetic core. A raised portion (23) is also provided for impeding exit of the bridging portion of the electric conductor from the pocket (20).

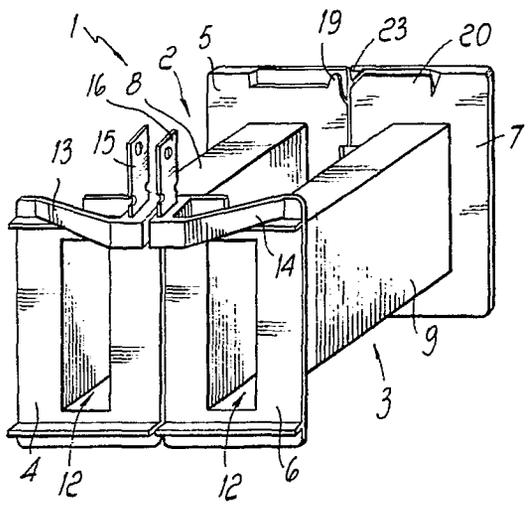


Fig. 1

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IMPROVED SUPPORTING SPOOL FOR ELECTRIC WINDINGS

The present invention relates to an improved supporting spool for electric windings.

As known, electric induction motors have a magnetic core, having associated therewith an electric winding through which an electric current flows.

Small-size motors employ U-shaped magnetic cores and on each wing of the U-shaped core there is a separate spool on which an electric conductor is wound.

Each spool is constituted by two substantially parallelepipedal facing heads which are connected, along a median axis, by a tubular element which also has a parallelepipedal configuration.

In order to facilitate the operations involved in winding the electric conductor onto the spools and successive assembly of the spools on the U-shaped magnetic core, a spool has been provided which is constituted by two half-spools. Each of the wings of the core is to be inserted into one of the half-spools, which are made of plastic material and are interconnected by means of a hinge element, constituted by a strip which connects corresponding longitudinal perimetral edges of two of the heads.

The presence of the hinge allows to align the two half-spools in the winding machine and therefore to wind the electric conductor more rapidly.

In a first step, the required number of turns is in fact wound onto one of the half-spools and one subsequently continues winding on the adjacent element, forming by means of the conductor a continuous bridge at the pivoting region.

After winding, the two half-spools can be easily and rapidly associated with the core of the motor by returning them to a side-by-side configuration. This is achieved by simply moving the ends of the spools remote from the hinge towards each other, causing respective rotation of the spools about the hinge.

Though it constitutes a considerable technical improvement with respect to previous spools for small induction motors, said known spool is not devoid of disadvantages, not least of which is the fact that the bridge which connects the two windings is located too close to the cores, i.e. in a region in which considerable magnetic fields form during operation, i.e. when electric current flows through the conductor.

This leads to the deposition of particles of iron or other metallic materials which may be produced through friction between metal parts or which may be present for other reasons. In fact, in the case of the installation of induction motors in household appliances such as washing machines, particular problems arise.

In washing machines, vibration-damping counterweights are used which are constituted by containers made of plastic material filled with iron powder.

The iron powder which is continuously deposited on the bridge connecting the two windings causes, in the course of time, the deterioration and breakage of the very thin insulating layer surrounding the conductor.

Short circuits and consequent motor breakdowns therefore occur, which require expensive maintenance interventions and imply significant inconvenience.

The aim of the present invention is to provide an improved supporting spool for electric windings which solves the above-cited technical disadvantage.

Within this aim, a primary object of the invention is to provide an improved supporting spool which is structurally simple.

Another object of the invention is to provide an improved supporting spool which can be produced with conventional production systems.

This aim, these objects and others which will become apparent hereinafter are achieved by an improved supporting spool for electric windings comprising at least two half-spools which are interconnected by at least one hinge and having seats for accomodating electric connectors, associable with the ends of a conducting wire wound on said half-spools, characterized in that it comprises elements adapted to space the portion of conducting wire which connects the respective windings from the cores of said half-spools.

Further characteristics and advantages of the invention will become apparent from the detailed description of a preferred embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of the improved supporting spool according to the invention;

figure 2 is a partially sectional perspective view of the spool of figure 1 on which an electric conductor is wound;

figure 3 is a top plan view of the spool according to the invention, assembled on a small-size induction conducting core.

With reference to the above figures, the improved supporting spool for electric windings, generally indicated by the reference numeral 1, is constituted by two half-spools 2 and 3, advantageously made of plastic material.

Each of said half-spools is in turn constituted by two heads, respectively indicated by the refence

numerals 4, 5 and 6, 7, which face one another in pairs; each head substantially has the shape of a rectangular lamina with rounded corners.

The two pairs of heads lie in parallel planes and are joined, along an axis which is perpendicular to said planes, by a parallelepipedal tubular element, respectively indicated by the reference numerals 8 and 9, which has an overall cross-sectional size which is smaller than the size of the heads 4-7. The heads 4-7 may be formed integrally with said tubular elements 8, 9 or rigidly associated therewith e.g., by welding or by employing adhesives or mechanical fixing devices.

A U-shaped magnetic core 11, formed by metallic laminae packed onto one another, defines a pair of wings 10. In order to allow the wings 10 to be inserted into the tubular elements 8, 9, said heads have holes 12 which constitute a continuation of the cavity or hollow portion defined within the tubular elements 8 and 9.

The heads 4, 6 are preferably rectangular and, at one of the shorter sides thereof, said heads 4 and 6 have tabs 13 and 14 which have seats for the complementarily shaped ends of corresponding electric connectors 15 and 16 which can be inserted therein. The ends of an electric conductor 17 wound on the half-spools 2 and 3 can be wound on said shaped ends.

Conveniently, the other two heads 5 and 7 are arranged side-by-side when the two half-spools are positioned for permitting insertion of the magnetic core 11. The spools 2 and 3 are interconnected by hinge elements, preferably constituted by strips 18 which connect respective perimetral edges. Obviously, the half-spools 2, 3 may be interconnected by any suitable hinge means such as a mechanical hinge, or flexible strip, or an interconnecting flexible junction.

According to the invention, a small tab 19 is defined on the inner face of the head 5 and extends substantially parallel thereto and a pocket 20 is defined on the inner face of the head 7 adjacent to the head 5.

In particular, said small tab 19 is located at one of the corners of the head 5 which face a corner of the head 7, whereas said pocket 20 extends throughout almost all of the transverse extention of the head 7, starting from a region adjacent to the tab 19.

The two half-spools 2 and 3, may be obtained by molding plastic material, such that they are produced side-by-side and then rotated with respect to one another through 180 degrees so as to be located coaxial to each other, in order to permit them to be mounted together on a winding machine which forms, by winding the electric conductor 17, a first winding 21 on the half-spool 2 and then, after passing said conductor 17 in said pocket 20 and in the space between the inner face of said head 5 and the tab 19, forms a second winding 22 on the half-spool 3.

In order to facilitate the passage of the conductor between the pocket 20 and the tab 19, a small raised portion 23 is defined on the corresponding corner of the head 7, and continues along the corresponding shorter side thereof. Said raised portion is adapted to prevent said conductor from being moved upwardly which would prevent, once the winding operation is completed, the subsequent return of the half-spools to a side-by-side position for assembly on the magnetic core 11.

The presence of the tab 19 and the pocket 20 allows to keep the conductor 17 spaced from the core 11, thereby spacing it from the region where a stronger magnetic field is created and preventing the deposition thereon of iron powder which, in the course of time, would compromise its integrity and the integrity of the entire motor.

Furthermore, since the tab 19, the pocket 20 and the raised portion 23 guide the conductor 17 and maintain it in position with respect to the heads 5 and 7, the risk of damaging the vulnerable portion of the conductor extending between the heads during handling and manoeuvring of the winding is eliminated.

In practice it has thus been observed that the invention has achieved the intended aim and objects.

As can be seen in the figures, the tab 19, the pocket 20 and the raised portion 23 can be provided directly on said spool 1 with simple modifications of the production molds.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Improved supporting spool for electric windings comprising at least two half-spools which are Interconnected by at least one hinge and having seats for accomodating electric connectors, associable with the ends of a conducting wire wound on said half-spools, characterized in that it comprises spacer elements adapted to space the conducting wire which connects the respective windings from the cores of said half-spools.

2. Improved supporting spool according to claim 1, characterized in that said elements adapted to space said conducting wire from the cores comprise a tab which extends parallel to the head of one of the half-spools in a region adjacent to one of the corners of the pivoting edge.

3. Improved supporting spool according to claims 1 and 2, characterized in that said elements adapted to space said conductor from the cores of said half-spools comprise a pocket defined on the head flanking the head of said tab, said pocket extending from a portion which is adjacent to said tab to a substantially median portion of said head.

4. Improved supporting spool according to claims 1, 2 and 3, characterized in that one of the corners of said heads which are adjacent to said tab and to said pocket has a raised portion which extends on the corresponding edge in a direction which is substantially parallel to said pocket.

5. Improved supporting spool according to one or more of the preceding claims, characterized in that, in the region connecting the two windings, said conducting wire which forms the windings of said spools passes between said pocket and said tab and is spaced from the core region.

6. Improved supporting spool according to claim 1, characterized in that said spacer elements comprise first conductor guide means rigidly associated with a head of a first half-spool, and second conductor guide means rigidly associated with a head of a second half-spool.

7. Improved supporting spool according to claims 1 and 6, characterized in that said first conductor guide means are aligned with said second conductor guide means upon said spools being positioned adjacent each other for accomodating the wings of a U-shaped magnetic core.

8. Improved supporting spool according to claims 1 and 6 or 7, characterized in that it further comprises retaining means rigidly associated with said head of said second half-spool adjacent said second conductor guide means, whereby a conductor wire is spaced from the core and retained in the second conductor guide means when handling and moving said half-spools.

9. Improved supporting spool according to claims 1 and 8, characterized in that said retaining means overlie said second conductor guide means.

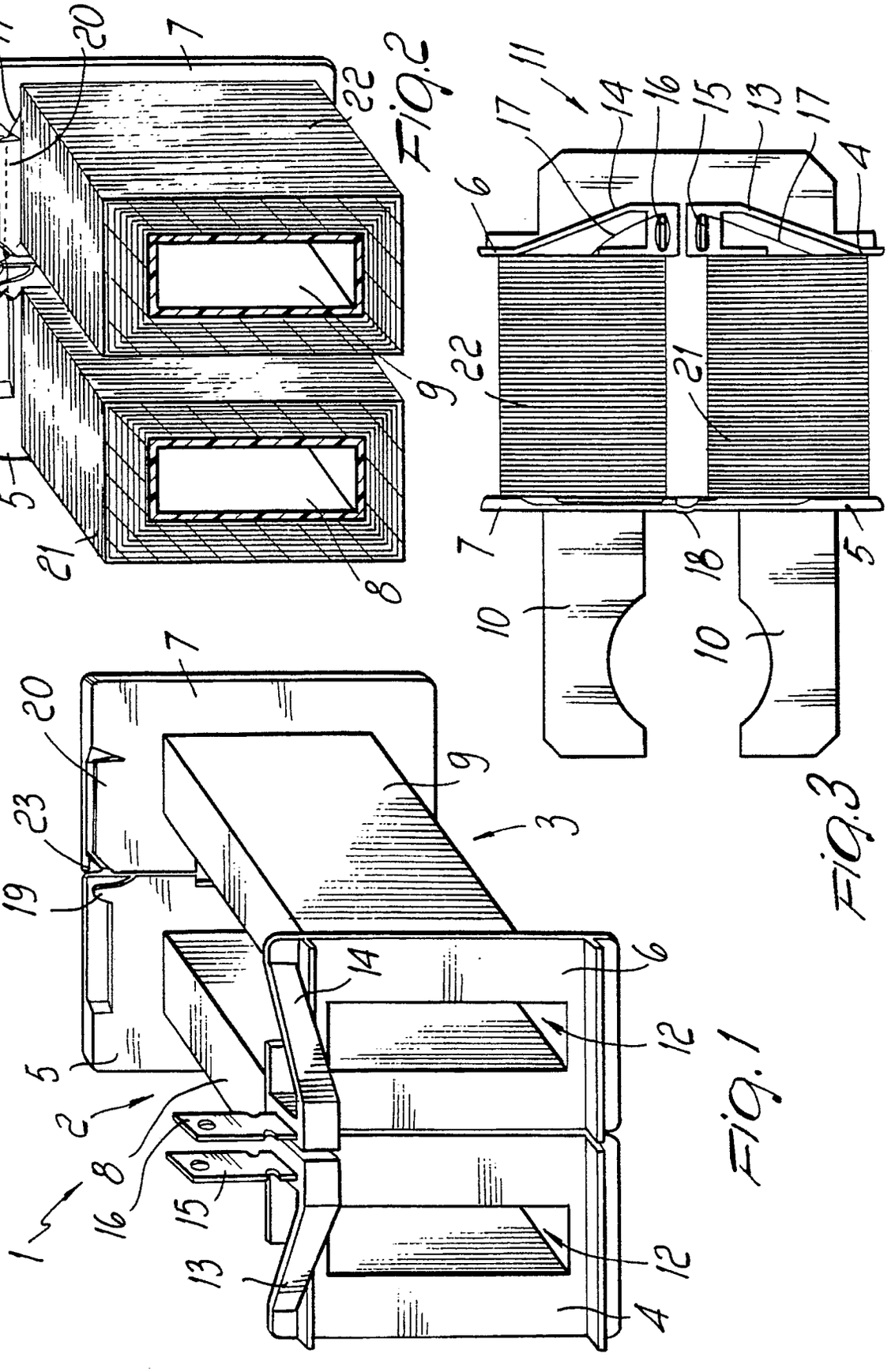


Fig.2

Fig.3

Fig.1

European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 90107647.1

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl.)
A	DE - C3 - 2 360 411 (SIEMENS) * Totality * --	1-9	H 01 F 5/02
A	DE - A - 2 138 987 (SWF-SPEZIALFABRIK FÜR AUTOZUBEHÖR) * Totality * --	1-9	
A	DE - C3 - 2 360 402 (SIEMENS) * Totality * --	1-9	
A	EP - A1 - 0 207 386 (EASTHORPE) * Abstract; fig. 1-9; claims 1-7 * ----	1-9	

TECHNICAL FIELDS SEARCHED (Int Cl.)

H 01 F 5/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	01-08-1990	VAKIL

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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