

TITLE OF THE INVENTION

INSULATING PAPER AND INSULATING METHOD FOR
CONNECTION OF LEADER LINE AND LEAD WIRE OF ELECTRIC
MOTOR

BACKGROUND OF THE INVENTION

Field of the Invention

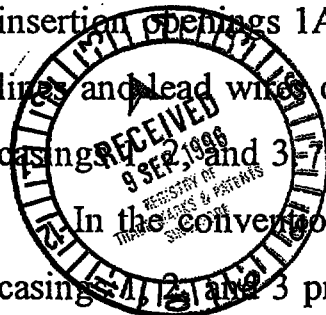
The present invention relates to insulating paper and an insulating method for insulating the connection of a leader line and a lead wire of an electric motor.

Description of the Related Art

Fig. 5 and Fig. 6 are a top plan view and a front view, respectively, of conventional integral insulating paper for insulating the connection of a leader line and a lead wire of an electric motor.

In Fig. 5 and Fig. 6, reference numerals 1, 2, and 3 designate connection casings formed on insulating paper 100; they are formed by ultrasonically welded sections 4 which are locally provided on the insulating paper 100. The connection casings 1, 2, and 3 respectively have insertion openings 1A, 2A, and 3A. The connections of the coil leader lines and lead wires of the electric motor are housed in the connection casings 1, 2, and 3.

In the conventional integral insulating paper 100, the connection casing 1, 2, and 3 provided in the insulating paper 100 are disposed aslant from the top edge to the bottom edge of the insulating paper 100 as shown in the figures. Therefore, when the insulating paper 100 is buried in a coil end with the connections of the leader lines and lead wires of the motor inserted in the connection casings 1, 2, and 3, and the coil end is



pressure-formed by lacing, if the connections should have any projection of solder, welder, solderless terminal, or the like, then the stress from the pressure applied to the coil would cause such a projection to break through the insulating paper 100. This leads to a danger of an insulation failure such as a rare short circuit.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide insulating paper and an insulating method for the connection of a leader line and a lead wire of an electric motor, which are capable of preventing an insulating failure such as a rare short circuit even when the insulating paper is buried in a coil end, with the connection of the leader line and the lead wire of the motor placed in a connection casing, and then subjected to lacing and pressure-forming of the coil end.

To this end, according to one aspect of the present invention, there is provided insulating paper which is intended for insulating the connection of a leader line and a lead wire of an electric motor; it has a seating on one edge thereof and a plurality of connection casings, in which the leader line and the lead wire of the motor are housed, which are provided on the outer peripheral section thereof on the opposite side from the seating, and which are mutually insulated and horizontally aligned; wherein the seating is buried in the coil end of a stator of the motor when mounting it on the stator of the motor, while the connection casings are configured so that they are exposed on the surface of the coil end of the stator of the motor rather than being buried in the coil end.

According to another aspect of the present invention, there is provided an insulating method for the connection of the leader line and the lead wire of a single-phase electric motor, wherein insulating paper is prepared which

has a seating on one edge thereof and a plurality of connection casings which are provided on the outer peripheral section thereof on the opposite side from the seating and which are mutually insulated and horizontally aligned. When mounting the insulating paper on the stator of the motor, the connections, to which the leader lines and the lead wires of the motor have been electrically connected by soldering, welding, caulking, etc., are inserted in the connection casings, then the seating is inserted between a main coil and an auxiliary coil to bury it in the coil end so as to fix the insulating paper on the surface of the coil end, thus allowing the connection casings to be on the surface of the coil end rather than being buried in the coil end.

According to still another aspect of the present invention, there is provided an insulating method for the connection of the leader line and the lead wire of a three-phase electric motor, wherein insulating paper is prepared which has a seating on one edge thereof and a plurality of connection casings which are provided on the outer peripheral section thereof on the opposite side from the seating and which are mutually insulated and horizontally aligned. When mounting the insulating paper on the stator of the motor, the connections, to which the leader lines and the lead wires of the motor have been electrically connected by soldering, welding, caulking, etc., are inserted in the respective connection casings, then the seating is inserted between an outer coil and a middle coil or between the middle coil and an inner coil so as to fix the insulating paper on the surface of the coil end, thus allowing the connection casings to be on the surface of the coil end rather than being buried in the coil end.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top plan view showing insulating paper in accordance with

the present invention;

Fig. 2 is a front view showing the insulating paper in accordance with the present invention;

Fig. 3 is a side view showing the insulating paper in accordance with the present invention;

Fig. 4 is a diagram showing an embodiment wherein the insulating paper in accordance with the present invention has been mounted on the stator of a single-phase motor to provide insulation;

Fig. 5 is a top plan view showing conventional insulating paper; and

Fig. 6 is a front view showing the conventional insulating paper.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 is a top plan view illustrative of insulating paper IP according to the present invention; Fig. 2 is a front view of the same; and Fig. 3 is a side view of the same.

Referring to Fig. 1, casings 1, 2, and 3 respectively house the connections of the leader lines and the lead wires of a motor coil. Reference numeral 4 denotes supersonically welded sections which are locally provided on the insulating paper IP. Reference numeral 5 denotes a seating.

The insulating paper IP according to the present invention is used to insulate the connections of the leader lines and the lead wires of the motor; it is formed as described below.

The seating 5 is provided on one edge of the insulating paper IP. The seating 5 is buried in the coil end of the motor stator when mounting the insulating paper IP on the motor stator.

Provided on the outer peripheral section of the insulating paper IP which is on the opposite side from the seating 5 are a plurality of

connection casings 1, 2, and 3 which are mutually insulated by the ultrasonically welded sections 4 locally provided on the insulating paper IP by ultrasonic welding and which are arranged so that they are horizontally aligned. These connection casings 1, 2, and 3 are configured so that they appear on the surface of the coil end rather than being buried in the coil end of the motor stator when attaching the insulating paper IP to the motor stator.

The respective connection casings 1, 2, and 3 are heat-welded by ultrasonic welding to form insertion openings 1A, 2A, and 3A on one side thereof (the right side in Fig. 1 and Fig. 2) and to form bags on the other side, i.e. on the left side in the figures, before they are cut respectively.

The insulating paper IP thus formed is attached to the stator of a single-phase motor and the connections of the leader lines and the lead wires are insulated; this embodiment is shown in Fig. 4.

Shown in Fig. 4 are the connection casings 1, 2, and 3 of the insulating paper IP for the leader lines and lead wires of the motor; a core 6 of the motor stator; a main coil 7; an auxiliary coil 8; and a lead wire 9.

The leader lines and the lead wires 9, which are common lines to all coils, are electrically connected by soldering, welding, caulking, etc. and then inserted in the connection casing 1; the leader line and the lead wire 9 of the auxiliary coil 8 are electrically connected in the same manner as described above and inserted in the connection casing 2; and the leader line and the lead wire 9 of the main coil 7 are electrically connection in the same manner as described above and inserted in the connection casing 3.

After inserting all the connections in the connection casings 1, 2, and 3, respectively, the seating 5 of the insulating paper IP is buried between the main coil 7 and the auxiliary coil 8. This assembly is then subjected to

lacing; the coil end is pressure-formed; and the insulating paper IP is fixed on the surface of the coil end.

At this time, the respective connection casings 1, 2, and 3 are exposed on the surface of the coil end rather than being buried in the coil end of the motor stator; therefore, even if the connections in the connection casings 1, 2, and 3 have projections of solder, welder, solderless terminal, etc., the connections would not be subjected to stress from the pressure applied to the coil. This prevents such projections from breaking through the insulating paper IP, causing an insulation failure including rare short circuit.

In the embodiment described above, the insulating paper IP according to the present invention is attached to the stator of the single-phase electric motor to insulate the connections of the leader lines and lead wires. The same applies for insulating the connections of the leader lines and lead wires of a three-phase electric motor although an embodiment thereof is not illustrated.

More specifically, in the case of the three-phase electric motor also, the leader lines and lead wires of the motor are electrically connected by soldering, welding, caulking, etc. and the connections are inserted in the connection casings 1, 2, and 3, respectively, then the seating 5 of the insulating paper IP is inserted between an outer coil and a middle coil or between the middle coil and an inner coil to fix the insulating paper on the surface of the coil end.

In this case also, the connection casings 1, 2, and 3 are exposed on the surface of the coil end of the motor stator instead of being buried in the coil end; therefore, even if the connections in the connection casings 1, 2, and 3 have projections of solder, welder, solderless terminal, etc., the connections would not be subjected to stress from the pressure applied to

the coil. This prevents such projections from breaking through the insulating paper IP, causing an insulation failure including rare short circuit.

Thus, according to the present invention, a seating is formed on one edge of the insulating paper for insulating the connections of the leader lines and the lead wires of an electric motor and the seating is inserted in the coil end of a motor stator when attaching it to the motor stator. In addition, a plurality of connection casings are formed on the outer peripheral section of the insulating paper on the opposite side from the seating in such a manner that they are mutually insulated and horizontally aligned so that they are positioned on the surface of the coil end rather than being buried in the coil end of the motor stator. These connection casings respectively hold the connections of the leader lines and the lead wires of the motor; therefore, the insulating paper can be installed by the seating thereof which is inserted in the coil end while the connection casings are positioned on the surface of the coil end. This prevents the stress from the pressure applied to the coil from being applied to the connection casings when the coil end is pressure-formed following a lacing process.

Hence, even if the connections in the connection casings have projections of solder, welder, solderless terminal, etc., such projections do not break through the insulating paper with a resultant insulation failure including rare short circuit. This provides the connections with good insulating performance.



WHAT IS CLAIMED IS:

1. Insulating paper for insulating a connection of a leader line and a lead wire of an electric motor, comprising:

a seating formed on one edge thereof; and

a plurality of connection casings which are formed on an outer peripheral section of the insulating paper which is on the opposite side from said seating, which are mutually insulated and aligned horizontally, and in which said connection of the leader line and the lead wire of said electric motor are housed; wherein

said seating is buried in a coil end of a stator of the electric motor when attaching it to the stator of the electric motor while said connection casings are positioned on the surface of the coil end of the stator of the electric motor rather than being buried in the coil end.

2. An insulating method for the connection of a leader line and a lead wire of a single-phase electric motor: wherein

insulating paper is prepared which has a seating on one edge thereof and a plurality of connection casings which are provided on an outer peripheral section thereof on the opposite side from the seating and which are mutually insulated and horizontally aligned;

when mounting the insulating paper on a stator of the electric motor, the connections, to which the leader lines and the lead wires of the electric motor have been electrically connected by soldering, welding, caulking, etc., are inserted in the connection casings;

then the seating is inserted between a main coil and an auxiliary coil to bury it in the coil end so as to fix the insulating paper on the surface of



the coil end;

thus allowing the connection casings to be on the surface of the coil end rather than being buried in the coil end.

3. An insulating method for the connection of a leader line and a lead wire of a three-phase electric motor: wherein

insulating paper is prepared which has a seating on one edge thereof and a plurality of connection casings which are provided on an outer peripheral section thereof on the opposite side from the seating and which are mutually insulated and horizontally aligned;

when mounting the insulating paper on a stator of the electric motor, the connections, to which the leader lines and the lead wires of the electric motor have been electrically connected by soldering, welding, caulking, etc., are inserted in the connection casings;

then the seating is inserted between an outer coil and a middle coil or between the middle coil and an inner coil to bury it in the coil end so as to fix the insulating paper on the surface of the coil end;

thus allowing the connection casings to be on the surface of the coil end rather than being buried in the coil end.