

This invention relates to a supporting structure for an electric motor of a kitchen appliance, in particular a citrus juicer, including a panel fabricated from an insulating material and having a mount for securing the motor, on which mount end portions are provided which are adapted to be connected to a source of electricity through a connecting cable and serve the function of connecting contact lugs or contact pins provided on the motor, with the contact pins being connected to the end portions by making physical contact therewith.

In machines or appliances provided with an electric drive mechanism, the motor is conveniently mounted on a supporting structure on which further components such as switching devices, electrical terminals and transmission components are arranged in order to thereby obtain a sub-assembly capable of being preassembled, thus facilitating its subsequent installation in the machine or the appliance.

Thus, for example, it is known from GB-2 002 182 A to mount an electric motor on a supporting structure by means of a bayonet connector, contacting at the same time the motor terminals with end portions attached to connecting cables without providing additional connecting elements. In addition to requiring an axial displacement, this arrangement necessitates a rotary motion of the electric motor relative to the supporting structure, resulting in an increased mounting complexity particularly in the automatic assembly of such drive mechanisms, involving in consequence added cost.

Further, DE-38 27 470 A1 discloses an electric control means (multiple-contact switch) comprised of conductive strips, which switch, when actuated, controls various paths of current.

It is an object of the present invention to devise a supporting structure for an electric motor drive means which enables the motor to be connected to a connecting cable, a switch or further electrical components in a manner affording economy of manufacture and ease of mounting.

According to the present invention, this object is accomplished in that the end portions are provided on conductive strips, that the conductive strips are blanked from sheet metal, that the end portions are elastically deformable such that the contact pins of the motor, on displacement of the motor in the longitudinal direction

of the motor axis, are adapted to be resiliently urged into engagement with the end portions, and that for the formation of a switch adjacent contact lugs are formed on the conductive strips, one of the contact lugs being adapted to be urged into engagement with the other contact lug by means of a movable actuating member deforming it elastically in the process. As a result, when the motor is secured to the supporting structure, the motor terminals are connected to the conductive strips in an electrically conductive relationship without any additional means being required. The motor mounting operation is thereby simplified significantly.

It will be appreciated that by integrally forming the end portions with the conductive strips and by means of the mechanically actuatable switch formed in the motor housing by conductive strips, the mounting of the motor on the supporting structure as well as the arrangement of the switch formed at the same time by the conductive strips becomes particularly simple and economical, enabling significant cost savings to be obtained in particular in supporting structures employed in high quantities in domestic appliances, particularly citrus juicers.

The switch of the present invention is operatively associated with a switchgear and drive unit which is integrally formed with the supporting structure, its conductive strips serving the function of turning the drive unit on and off for one thing, and contacting the drive unit for another thing.

To obtain the requisite elasticity, the end portions of the conductive strips may be bent in U-shape. Further, the elastically deformable end portions may extend into a slotted opening in the panel, with the contact lugs or contact pins of the motor terminals being arranged on the side of the panel remote from the conductive strips. This configuration has the advantage that the motor and the conductive strips may be arranged on opposite sides of the panel, enabling them to be mounted on the panel simultaneously or in any desired sequence.

In another advantageous embodiment of the present invention, the conductive strips, in forming a single-piece sheet-metal element, are adapted to be connected to the panel by positive-engagement means, and the panel may include openings or cutouts through which a parting tool may reach to sever the sheet-metal element, following its assembly, into the individual conductive strips forming separate current paths. With the further development of the present invention, a supporting structure is provided

which can be assembled together from separately manufacturable, individual components without involving a highly complex assembly operation. Excluding the conductive strips, the panel can be manufactured as a plastic injection molding in conformity with applicable requirements, and the sheet-metal element can be configured in compliance with applicable sheet-metal forming requirements to produce the conductive strips. All conductive strips being included in a single component, the sheet-metal element, prior to assembly, their mounting on the panel can be accomplished with great ease and also with the aid of an automatic assembly machine.

According to a further feature of the present invention, securing the conductive strips to the panel can be accomplished in that the conductive strips include elastically deformable portions which are each lockingly engageable between respective hooks facing each other in pairs. By this means, a simple snap fitting is provided requiring no additional fastening means and enabling the conductive strips to be assembled automatically. To locate the conductive strips in position, projections between which the conductive strips extend may be additionally provided on the panel.

Preferably, the contact lugs are formed out of the plane of the sheet-metal element by bending them at right angles in such a fashion that they are upended on the plane and extend parallel thereto. Supporting ribs are preferably provided on the panel to provide a lateral support for the contact lugs.

In order to be able to secure the connecting cable to the panel in a simple manner, in a still further feature of the present invention one end of the panel may be provided with several undercut slots into which the connecting cable is engageable in the form of meandering windings. In addition, the panel may include wall elements adjoining the slots and partially embracing the meandering windings of the connecting cable.

An embodiment of the present invention will now be described in more detail in the following with reference to the accompanying drawings. In the drawings,

FIG. 1 is a top plan view of the supporting structure of the present invention showing the side on which the conductive strips are mounted;

FIG. 2 is a cross-sectional view of the supporting structure taken along the line II-II of FIG. 1; and

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FIG. 3 is a partial sectional view of the supporting structure taken along the line III-III of FIG. 3.

With reference to FIGS. 1 and 2, the supporting structure 1 shown is comprised of a panel 2 of an essentially plane basic shape fabricated from an insulating plastic material. In addition to a mount 3 for securing an electric motor 4, several conductive strips 5, 6, 7, 8 of thin-walled copper sheet are mounted on the panel 2. At its end remote from the mount 3, the panel 2 includes three undercut slots 9 suitable for engagement by an electrical connection cable whose conductors are adapted to be connected to the conductive strips 7, 8.

With reference to FIG. 3, the individual conductive strips 5 to 8 are held on the panel 2 by respective hooks 10, 11 facing each other in pairs, the hooks extending out of the panel surface and having teeth fitting over the respective leg of a U-shaped bent portion 12 of the conductive strips 5 to 8. This way of positive engagement ensures a secure fastening of the conductive strips 5 to 8 and affords ease of assembly because the two legs of the U-shaped portions 12 can be compressed by elastic deformation to such a degree that the portions 12 can be pushed through between the teeth of the hooks 10, 11, locking in place under the hooks 10, 11.

According to FIG. 1, the conductive strips 5 to 8 are essentially parallel to each other and to the longitudinal axis of the panel 2, with the conductive strips 5, 6 being offset relative to the conductive strips 7, 8 in the longitudinal direction of the panel 2, such that the end portions 13, 15 of the conductive strips 5, 6 on the side close to the slots 9 and the end portions 14, 16 of the conductive strips 7, 8 on the side close to the mount 3 are juxtaposed. In the area of the end portions 13 to 16, the panel 2 of FIGS. 1 and 2 includes adjacent slotted openings 17. Being bent several times in a direction transverse to their longitudinal axis, the end portions 13 to 16 are formed into elastically deformable U-shaped loops, their free leg ends providing contacts which engage within the openings 17 and are biased into engagement with contact pins 18 projecting into the openings 17 from the opposite side of the panel 2. The contact pins 18 are secured to the motor 4 and connected to the respective terminals of the motor windings.

With reference to FIG. 2, the ends 19, 20 of the conductive strips 7, 8 remote from the end portions 14, 16 are bent at right angles transversely to their longitudinal axis, extending through respective slots 21, 22

in the panel 2. On the underside of the panel 2, the ends 19, 20 are configured as contact lugs on which a respective plug (not shown) connected to a conductor of the connecting cable is adapted to be push-fitted. The connecting cable itself can then be plugged into an outlet (not shown) of an electricity supply.

According to FIG. 2, the ends of the conductive strips 5, 6 remote from the end portions 13, 15 are configured as contact lugs 23, 24. The contact lugs 23, 24 are arranged in a parallel juxtaposed relationship to each other and at right angles to the conductive strips 5, 6 and, in being bent at right angles, extend upwardly at the lands of the conductive strips 5, 6, such as to be upended relative to the surface of the panel 2. At the land of the conductive strip 5, the contact lug 23 is held on the panel 2 by supporting ribs 25. By means of elastic deformation, the free end of the contact lug 23 is movable parallel to the surface of the panel 2 until it abuts with the contact lug 24. The contact lug 24 is supported on the panel 2 over nearly its full length by means of supporting ribs 26, being therefore immovable. The two contact lugs 23, 24 constitute a switch enabling the terminals of the motor 4 which are connected to the conductive strips 5, 6 to be interconnected.

To close the switch 23, 24, an actuating member 27 is provided which is pivotally mounted on the panel 2 about a pivot point 40 and can be pivoted under the action of a force F until the end of the contact lug 23 makes contact with the end of the contact lug 24. The actuating member 27 includes a spring arm 28 injection molded therewith as an integral plastic molding, the spring arm resting with its free end on a rib 29 of the panel 2, maintaining the actuating member 27 in the open position of the switch shown in FIG. 1. The force F necessary for closing the switch is determined primarily by the resilient force of the spring arm 28.

With reference to FIG. 1, the conductive strips 5 to 8 are interconnected by tabs 30, 31, 32 and a bracket 33 to facilitate their assembly. In this manner, they form initially a single-piece sheet-metal element manufactured from a plane piece of sheet metal in several operations involving blanking and forming. Such an integrally formed sheet-metal element affords substantially greater ease of manipulation and assembly than individual, separate conductive strips. Thus, in view of the described configuration of the hooks 10, 11 and the portions 12 (FIG. 3), the sheet-metal element can be placed down on the panel 2, the application of a suitable

pressure enabling it to be connected firmly with the panel 2. Following this assembly operation, however, the supporting structure 1 is not as yet ready for use because the current paths formed by the individual conductive strips 5 to 8 as illustrated in FIG. 1 are not yet isolated from each another.

To enable the parting operation to be performed, rectangular openings 34 are provided in the panel 2 in the area of the tabs 30, 31, 32 and the bracket 33, the openings providing access for a cutting tool, as for example a cutting punch, from the underside of the panel 2 up to the tabs 30 to 32 and the bracket 33 (not shown). In combination with a mating tool seatable down on the tabs 30 to 32 and the bracket 33, the conductive strips 5 to 8 can be divided into separate individual elements simply by severing the portions of the tabs 30 to 32 spanning the openings 34 and by completely detaching the bracket 33, enabling each strip to form an isolated current path (not shown).

The bracket 33 is not absolutely necessary for the formation of the single-piece sheet-metal element. However, it ensures an increased stability and an improved manipulating capability of the sheet-metal element during assembly. After the conductive strips 5 to 8 are parted, the actuating member 27 is mounted in the bearing bore of the panel 2 by engagement of its bearing pin.

The supporting structure described is especially suitable for use in small electric motors as they find application in kitchen appliances, for example. Its use in the drive mechanism of a citrus juicer is particularly advantageous. In this application, the actuating member 27 can be moved through the axially movable reamer, the ensuing contact between the contact lugs 23, 24 causing the motor 4 to be turned on.

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Patent Claims

1. A supporting structure for an electric motor of a kitchen appliance, in particular a citrus juicer, including a panel fabricated from an insulating material and having a mount for securing the motor (4), on which mount end portions (13 to 16) are provided which are adapted to be connected to a source of electricity through a connecting cable and serve the function of connecting contact lugs or contact pins (18) provided on the motor (4), with the contact pins (18) being connected to the end portions (13 to 16) by making physical contact therewith,

c h a r a c t e r i z e d i n t h a t the end portions (13 to 16) are provided on conductive strips (5 to 8), that the conductive strips are blanked from sheet metal, that the end portions (13 to 16) are elastically deformable such that the contact pins (18) of the motor (4), on displacement of the motor in the longitudinal direction of the motor axis, are adapted to be resiliently urged into engagement with the end portions (13 to 16), and that for the formation of a switch adjacent contact lugs (23, 24) are formed on the conductive strips (5, 6), one (23) of the contact lugs being adapted to be urged into engagement with the other contact lug (24) by means of a movable actuating member (27) deforming it elastically in the process.

2. The supporting structure as claimed in claim 1, c h a r a c t e r i z e d i n t h a t the end portions (13 to 16) of the conductive strips (5 to 8) are bent in U-shape.

3. The supporting structure as claimed in any one of the claims 1 or 2, c h a r a c t e r i z e d i n t h a t the elastically deformable end portions (13 to 16) extend into a slotted opening (17) in the panel (2), and that the contact lugs or contact pins (18) of the motor terminals are arranged on the side of the panel (2) remote from the conductive strips (5 to 8).

4. The supporting structure as claimed in any one of the preceding claims, characterized in that the conductive strips (5 to 8), in forming a single-piece sheet-metal element, are adapted to be connected to the panel (2) by positive-engagement means, and that the panel (2) includes openings (34) or cutouts through which a parting tool may reach to sever the sheet-metal element, following its assembly, into the individual conductive strips (5 to 8) forming separate current paths.

5. The supporting structure as claimed in claim 1, characterized in that the conductive strips (5 to 8) include elastically deformable portions (12) which are each lockingly engageable between respective hooks (10, 11) facing each other in pairs.

6. The supporting structure as claimed in any one of the preceding claims, characterized in that projections (25, 26) between which the conductive strips (5 to 8) extend are provided on the panel (2).

7. The supporting structure as claimed in claim 1, characterized in that the contact lugs (23, 24) are formed out of the plane of the sheet-metal element by bending them at right angles in such a fashion that they are upended on the plane and extend parallel thereto.

8. The supporting structure as claimed in any one of the preceding claims, characterized in that one end of the panel (2) is provided with several undercut slots (9) into which the connecting cable is engageable in the form of meandering windings.

9. The supporting structure as claimed in claim 8, characterized in that the panel (2) includes wall elements adjoining the slots (9) and partially embracing the meandering windings of the connecting cable.