

Description

The present invention relates to motorized electrical appliances such as vacuum cleaners, coffee grinders and electric drills, especially, but not exclusively, of a portable type.

In the traditional design of such appliances, the various functional components, such as, for example, the electric motor, batteries (where a cordless appliance is concerned), the circuit supplying the motor with electricity and, in particular, the on/off switch comprise separate sub-assemblies, at least some of which often constitute elements of the appliance body. These sub-assemblies are not connected up until the assembly of the appliance is completed. Such an assembly method necessitates substantial handling of parts and sub-assemblies and allows the appliance to be tested only when assembly has been completed. Testing after completion of assembly is difficult and results in the necessity of dismantling and subsequently reassembling appliances wherein defects are detected. A similar disadvantage is encountered with respect to any post-sale maintenance.

It is, therefore, an object of the present invention to provide an improved method of assembly for motorized electrical appliances wherein the various component sub-assemblies may be tested, with respect to the interaction between them, under conditions of optimum accessibility.

It is another object to provide a more economical assembly method of the character aforesaid.

It is yet another object to provide an assembly method facilitating the production of various different types and models of appliances from standardized components.

The foregoing and other objects and advantages of the invention as may hereinafter appear are achieved by the assembly of the various component sub-assemblies of the appliance, such as the motor and the power take-off means, onto a supporting block to form a functional unit.

In GB-A-1 114 785, US-A-3 257 599 and FR-A-903 089, such functional units are disclosed, which have:

a flat supporting block having two opposite faces, i.e. a front face and a rear face, and a through bore having an axis,

an electric motor having a housing rigidly supported by the supporting block, at the rear thereof, and an output shaft disposed along the said axis and facing front,

power take-off means disposed at the front of the supporting block and operably connected with the output shaft through the bore of the supporting block,

the entirety of those electric supply means for the motor which belong to the appliance, wherein the said entirety is rigidly supported by the supporting block, at the rear thereof,

wherein the said unit is to be detachably fixed to the appliance.

Only after assembly and testing are complete

is the functional unit inserted into the appliance body, which functions merely as a cover.

At least some of the various component sub-assemblies of the functional units disclosed in the three documents hereabove are secured by means of screws to the supporting block, either directly or by means of other sub-assemblies. Such a way of assembling the functional units is long, tedious, and cannot be easily carried out with automatic means, more especially as screws have different respective directions.

With respect to the known functional units, the functional unit according to the invention is characterized in that, in order to receive and immobilize the housing of the electric motor and the supply means, the supporting block has on its rear face the following means, which are a single piece with the supporting block.

guiding means for mutual translation parallel with the axis,

stop means for limiting such a translation in a direction of bringing together,

back-stop means for allowing such a translation in a direction of bringing together till the stop means oppose thereto, and for impeding then a translation in the opposite direction,

in such a way that the electric motor and the supply means are assembled onto the supporting block by simple translational motions, parallel with the axis.

Advantageously, the various components of the functional unit are assembled onto the supporting block by simple translational motions and snap together or are retained by press fitment.

More specially, the invention also provides a method for assembling a functional unit, characterized by the succession of the following steps:

a) the supporting block is set down on an horizontal assembly jig, in a position in which the said axis is vertical and the said rear face faces upwards,

b) the motor and the supply means are allowed to descend on the supporting block and secured therewith by pushing downwards, towards the supporting block.

Other characteristics and advantages of the invention will emerge from the following description of a preferred embodiment and from the attached drawings which form an integral part of this description.

Description of the Drawings

Figure 1 is a perspective view, partially in section, of the functional unit of the present invention;

figure 2, which shows the unit of Fig. 1 in place in a vacuum cleaner, is a sectional view essentially along a plane of pseudosymmetry of the vacuum cleaner which passes through the axis of the motor, and partially in section along other planes parallel to this plane.

Description of the Preferred Embodiment

As shown in Figure 1, the functional unit 1, specifically arranged for use in a cordless vacuum cleaner, comprises a supporting block 2; an electric motor 3; a suction turbine 4 carried on the motor 3; means for supplying the motor 3 with electricity, namely four rechargeable batteries, denoted respectively by reference numerals 5 to 8, connected in series; an on/off switch 9; a socket 10 for connection to the output pins 11 of a battery charging unit 12; and 4 cables denoted respectively by reference numerals 14 to 17, connecting the batteries 5—8 to socket 10 on the one hand (cables 14 and 16) and to on/off switch 9 and motor 3 on the other hand (cables 15 and 17).

It is to be noted that all of the components of the vacuum cleaner which need to be tested during production are combined in this unit 1, with the advantage of easy access for testing of these components at the time of production. These components may then be conveniently inserted into the vacuum cleaner body 13 in a single operation and retained there by engagement between body 13 and supporting block 2.

Supporting block 2, advantageously molded in one piece of an electrically insulating plastic, has a generally flat shape defined, by two parallel faces, front face 18 and rear face 19.

Of the various above-mentioned components grouped into functional unit 1, only turbine 4 is intended to be placed opposite face 18 of supporting block 2, and this face can advantageously have any matching relief designed to improve the operating conditions of turbine 4. The other components, namely motor 3, batteries 5 to 8, on/off switch 9, socket 10 and cables 14 to 17 are carried by supporting block 2 opposite rear face 19 of supporting block 2. Supporting block 2 has a through bore 21. An output shaft 23 of motor 3 passes coaxially through bore 21 and is force-fitted into an orifice 24 in turbine 4. Motor 3 is retained on supporting block 2 by frictional engagement with an integral, cylindrical sleeve 25 which projects from face 19 around bore 21 and has an inner peripheral face 26 with a diameter approximate to that of the outer peripheral face 27 of the housing 28 of motor 3. It is noted that the diameter of face 26 is greater than that of bore 21, so that there exists on rear face 19 of supporting block 2, an annular face or collar 29 which serves as an abutment for housing 28. Thus, motor 3 can be conveniently mounted on supporting block 2 by being aligned such that output shaft 23 is coaxial with bore 21, in a direction going from rear face 19 to front face 18, and subsequently being moved in this direction relative to supporting block 2, thus entering sleeve 25, until housing 28 abuts collar 29. Advantageously, this installation of motor 3 on supporting block 2 is accompanied by the introduction of output shaft 23 into orifice 24 of turbine 4, which has previously been placed opposite front face 18 of supporting block 2 in position in which hole 24 is centered on the axis 22 of bore 21. It will be understood that in this way it is possible to install motor 3 by simply

allowing it to descend under the influence of gravity into sleeve 25 and then exerting a force to bring it into abutment with collar 29. Sleeve 25 advantageously includes reliefs which define face 26.

Each of batteries 5, 6, 7 and 8 can be mounted by means of a similar movement relative to supporting block 2, being snapped in place between a pair of lugs integrally formed in rear face 19 of supporting block 2. Only lugs 30 and 31, thus receiving battery 5, and lugs 32 and 33, thus receiving battery 7, can be seen in the drawing, but similar pairs of lugs are provided to receive batteries 6 and 8. Both lugs of a pair are flat and approximately parallel to one another, but each of them has a distal inwardly facing rib such as 34, 35, 36 and 37 respectively. The dimensions of each pair of lugs are such that movement of a battery toward rear face 19 of supporting block 2 in a direction parallel to axis 22 elastically spreads the paired lugs until the battery abuts supporting block 2, whereupon the lugs return to their initial position securely gripping the battery. In order to limit movement of the batteries to a direction parallel to axis 22, projections, such as 38 and 39, are provided on rear face 19 of supporting block 2.

It is to be noted that the particular U-shaped arrangement of the four batteries 5 to 8 permits two of them (6 and 7) to be connected in series by direct mutual contact between their ends. The other two batteries (5 and 8 respectively) are disposed perpendicular to the first two, adjacent to the free end of each of the first mentioned batteries, thus making it possible to connect them in series by means of simple soldering electrically conductive bridges 40 and 41 which are advantageously fitted immediately after the batteries have been mounted on the supporting block.

When functional unit 1 is assembled, the installation of batteries 5 to 8 and bridges 40, 41 precedes the installation, on rear face 19 of support 2, of a separate piece 42 formed of an electrically insulating plastic and grouping together on/off switch 9 and socket 10.

In order to mount piece 42 on supporting block 2 a number of props, two of which can be seen in the drawing where they are denoted respectively by reference numerals 43 and 44, are integrally formed on rear face 19 of block 2. In the example illustrated there are four of them, these four being disposed parallel to axis 22 and uniformly distributed about sleeve 25.

As shown more particularly in Figure 2 with respect to prop 44, each of these props includes a cylindrical recess such as 45 adapted to receive a matching stud, such as 47, carried by piece 42, which guides movement of the latter as it is installed on supporting block 2.

Between the studs, piece 42 has the form of a sleeve 48 designed to encase outer peripheral face 27 of housing 28 of motor 3 coaxially and with a play which is sufficiently large to allow free relative coaxial sliding but sufficiently small nevertheless to ensure coaxiality during such sliding. Motor 3 is advantageously installed on

supporting block 2, as described above, after first batteries 5 to 8 and then piece 42 have been installed in succession. Piece 42 thus serves as a means of guiding motor 3 relative to supporting block 2, in a direction parallel to axis 22 and ensuring that output shaft 23 is coaxial with the latter.

Switch 9 and socket 10 are disposed at diametrically opposed points on sleeve 48.

Socket 10 comprises two slides 49 and 50, formed in sleeve 48, and metal strips 51 and 52 designed to make electrical contact with a pin, such as pin 11, engaged in the corresponding slide when the batteries are to be recharged. Metal strips 50 and 51 can be inserted between suitable reliefs, formed in piece 42, either before or after the latter has been mounted on supporting block 2. Advantageously, the above-mentioned reliefs are arranged in such a way that insertion of strips 50 and 51 is carried out by simple translational movement relative to piece 42.

Switch 9 comprises, integrally formed on piece 42, a push button 54 elastically connected to a zone 53 of sleeve 48 by bridges of material 55. Parts 53 and 54 have plane faces 56 and 57 respectively, which are approximately parallel to axis 22 and are spaced apart from one another when part 54 is in its relaxed position. Part 54 can be brought by finger pressure into a position in which face 57 converges towards face 56. Face 56 and face 57 are covered by metal strips 58 and 59 respectively, which are normally apart and electrically insulated from one another but which come in contact with one another to make an electrical connection when part 54 is pressed.

Advantageously, bridges 55 are located adjacent rear face 19 of supporting block 2 when functional unit 1 is assembled, such that strips 58 and 59 can be installed, after piece 42 has been mounted on supporting block 2, by a simple translational motion parallel to axis 22.

The tag end of strip 58 is snapped onto one of the terminals 60 and 61 (here terminal 60) supplying motor 3 with electricity. Terminals 60 and 61 are located at the end of motor 3 opposite that from which output shaft 23 projects and take the form of pins parallel to said shaft. Thus when piece 42 is mounted on supporting block 2 electrical connection between strip 58 and terminal 60 can be made in a particularly direct and convenient way.

Strip 59 is advantageously U-shaped, being defined by two branches of unequal length which are connected by a rounded part tending to move them apart elastically. The longer of the two branches is intended to contact face 57, while the shorter lies along face 56, but does not contact strip 58.

The rounded part of strip 59 is thus adjacent bridges 55. Faces 56 and 57 have reliefs into which the two branches snap elastically when strip 59 is installed. A particularly advantageous method of assembling functional unit 1 comprises the following steps:

1. turbine 4 is placed on a horizontal assembly jig;

2. supporting block 2 is coaxially placed on turbine 4 with axis 22 vertical and rear face 19 turned upwards.

3. batteries 5 to 8 are placed on supporting block 2 and snapped in place by being pushed vertically downwards;

4. bridges 40 and 41 are soldered, a double pin 62 is soldered to battery 5 and a similar double pin 63 is soldered to battery 8;

5. piece 42 is placed on supporting block 2 and then, by means of a push exerted vertically downwards, locked in place;

6. strips 51 and 52 are installed on piece 42 by means of movements identical to those for mounting piece 42 on supporting block 2;

7. motor 3 is placed on supporting block 2 and pressed into fitment;

8. strips 59 and 58 are installed in succession by being inserted between faces 57 and 56 from the top downwards until they snap into place.

It should be noted that the soldering of bridges 40 and 41 and of pins 62 and 63, and the installation of strips 51 and 52 and of strips 59 and 58, with the exception of the snapping of the latter onto terminal 60 of motor 2, could be carried out in a different order in relation to the other steps. Moreover, it is optional to place turbine 4 on the assembly jig beforehand, since turbine 4 can be installed after motor 3 has been mounted on supporting block 2.

The final operation for assembling functional unit 1 involves installing cables 14 to 17, of which the first connects terminal 62 to strip 51, the second connects the same terminal 62 to second terminal 61 of motor 3, the third connects terminal 63 to strip 52 and the fourth connects the same terminal 63 to strip 59. Functional unit 1 can now be tested, before being mounted within the body of vacuum cleaner 13 which body is provided with carefully arranged orifices to allow access to slides 49 and 50 and to on/off switch 9.

It will be noted that the assembly of the various functional components of the vacuum cleaner in the form of functional unit 1 is associated with a particularly short length of the electrical connecting circuits, this being especially useful in a battery-operated appliance.

It will also be noted that a single supporting block 2 can be used for very different items of equipment which make use of motors of different powers, inasmuch as, if the motor used has a lower consumption than that for which the four-battery arrangement just described has been provided, batteries 5 and 8 can easily be omitted, in which case double pins 62 and 63 are placed in the same position as bridges 40 and 41 have been placed.

Claims

1. A functional unit for a motorized electrical appliance, such as a tool or an electric domestic appliance, having:

5

10

15

20

25

30

35

40

45

50

55

60

65

4

supporting block 2, as described above, after first batteries 5 to 8 and then piece 42 have been installed in succession. Piece 42 thus serves as a means of guiding motor 3 relative to supporting block 2, in a direction parallel to axis 22 and ensuring that output shaft 23 is coaxial with the latter.

Switch 9 and socket 10 are disposed at diametrically opposed points on sleeve 48.

Socket 10 comprises two slides 49 and 50, formed in sleeve 48, and metal strips 51 and 52 designed to make electrical contact with a pin, such as pin 11, engaged in the corresponding slide when the batteries are to be recharged. Metal strips 50 and 51 can be inserted between suitable reliefs, formed in piece 42, either before or after the latter has been mounted on supporting block 2. Advantageously, the above-mentioned reliefs are arranged in such a way that insertion of strips 50 and 51 is carried out by simple translational movement relative to piece 42.

Switch 9 comprises, integrally formed on piece 42, a push button 54 elastically connected to a zone 53 of sleeve 48 by bridges of material 55. Parts 53 and 54 have plane faces 56 and 57 respectively, which are approximately parallel to axis 22 and are spaced apart from one another when part 54 is in its relaxed position. Part 54 can be brought by finger pressure into a position in which face 57 converges towards face 56. Face 56 and face 57 are covered by metal strips 58 and 59 respectively, which are normally apart and electrically insulated from one another but which come in contact with one another to make an electrical connection when part 54 is pressed.

Advantageously, bridges 55 are located adjacent rear face 19 of supporting block 2 when functional unit 1 is assembled, such that strips 58 and 59 can be installed, after piece 42 has been mounted on supporting block 2, by a simple translational motion parallel to axis 22.

The tag end of strip 58 is snapped onto one of the terminals 60 and 61 (here terminal 60) supplying motor 3 with electricity. Terminals 60 and 61 are located at the end of motor 3 opposite that from which output shaft 23 projects and take the form of pins parallel to said shaft. Thus when piece 42 is mounted on supporting block 2 electrical connection between strip 58 and terminal 60 can be made in a particularly direct and convenient way.

Strip 59 is advantageously U-shaped, being defined by two branches of unequal length which are connected by a rounded part tending to move them apart elastically. The longer of the two branches is intended to contact face 57, while the shorter lies along face 56, but does not contact strip 58.

The rounded part of strip 59 is thus adjacent bridges 55. Faces 56 and 57 have reliefs into which the two branches snap elastically when strip 59 is installed. A particularly advantageous method of assembling functional unit 1 comprises the following steps:

1. turbine 4 is placed on a horizontal assembly jig;

2. supporting block 2 is coaxially placed on turbine 4 with axis 22 vertical and rear face 19 turned upwards.

3. batteries 5 to 8 are placed on supporting block 2 and snapped in place by being pushed vertically downwards;

4. bridges 40 and 41 are soldered, a double pin 62 is soldered to battery 5 and a similar double pin 63 is soldered to battery 8;

5. piece 42 is placed on supporting block 2 and then, by means of a push exerted vertically downwards, locked in place;

6. strips 51 and 52 are installed on piece 42 by means of movements identical to those for mounting piece 42 on supporting block 2;

7. motor 3 is placed on supporting block 2 and pressed into fitment;

8. strips 59 and 58 are installed in succession by being inserted between faces 57 and 56 from the top downwards until they snap into place.

It should be noted that the soldering of bridges 40 and 41 and of pins 62 and 63, and the installation of strips 51 and 52 and of strips 59 and 58, with the exception of the snapping of the latter onto terminal 60 of motor 2, could be carried out in a different order in relation to the other steps. Moreover, it is optional to place turbine 4 on the assembly jig beforehand, since turbine 4 can be installed after motor 3 has been mounted on supporting block 2.

The final operation for assembling functional unit 1 involves installing cables 14 to 17, of which the first connects terminal 62 to strip 51, the second connects the same terminal 62 to second terminal 61 of motor 3, the third connects terminal 63 to strip 52 and the fourth connects the same terminal 63 to strip 59. Functional unit 1 can now be tested, before being mounted within the body of vacuum cleaner 13 which body is provided with carefully arranged orifices to allow access to slides 49 and 50 and to on/off switch 9.

It will be noted that the assembly of the various functional components of the vacuum cleaner in the form of functional unit 1 is associated with a particularly short length of the electrical connecting circuits, this being especially useful in a battery-operated appliance.

It will also be noted that a single supporting block 2 can be used for very different items of equipment which make use of motors of different powers, inasmuch as, if the motor used has a lower consumption than that for which the four-battery arrangement just described has been provided, batteries 5 and 8 can easily be omitted, in which case double pins 62 and 63 are placed in the same position as bridges 40 and 41 have been placed.

Claims

1. A functional unit for a motorized electrical appliance, such as a tool or an electric domestic appliance, having:



a flat supporting block (2) having two opposite faces, i.e. a front face (18) and a rear face (19), and a through bore (21) having an axis (22),

an electric motor (3) having a housing (28) rigidly supported by the supporting block (2), at the rear thereof, and an output shaft (23) disposed along the said axis (22) and facing front,

power take-off means (4) disposed at the front of the supporting block (2) and operably connected with the output shaft (3) through the bore (21) of the supporting block (2),

the entirety of those electric supply means (5—10) for the motor (3) which belong to the appliance, wherein the said entirety is rigidly supported by the supporting block (2), at the rear thereof,

wherein the said unit is to be detachably fixed to the appliance, characterized in that, in order to receive and immobilize the housing (28) of the electric motor (3) and the supply means (5—10), the supporting block (2) has on its rear face (19) the following means, which are a single piece with the supporting block:

guiding means (25, 30—33, 45) for mutual translation parallel with the axis (22),

stop means (29, 19, 43, 44) for limiting such a translation in a direction of bringing together,

back-stop means (26, 34—37, 45) for allowing such a translation in a direction of bringing together till the stop means (29, 19, 43, 44) oppose thereto, and for impeding then a translation in the opposite direction, in such a way that the electric motor (3) and the supply means (5—10) are assembled onto the supporting block (2) by simple translational motions, parallel with the axis (22).

2. The functional unit of claim 1, characterized in that the guiding means for mutual translation and the back-stop means include press fitment or friction means (25, 45).

3. The functional unit of claim 1, characterized in that the guiding means for mutual translation and the back-stop means include snap means (30—33, 34—37).

4. The functional unit of any of claims 1 to 3, characterized in that the supporting block (2), the guiding means (25, 30—33, 45) for translation, the stop means (29, 19, 43, 44) and the back-stop means (26, 34—37, 45) are made of a single piece of an electrically insulating plastic.

5. The functional unit of any of claims 1 to 4, characterized in that the supply means include a piece (42) having a sleeve-shaped zone (48) which coaxially surrounds the housing (28) of the motor (3) at the rear of the supporting block (2), and an on/off switch (9) rigidly supported by the said piece (42).

6. The functional unit of claim 5, characterized in that the said piece (42) of the supply means is made of an electrically insulating material.

7. The functional unit of claim 6, characterized in that the switch (9) includes two opposed portions (53, 54) of the said piece (42) of the supply means, wherein a first portion (53) is integral with the said sleeve-shaped zone (48) and

the second portion (54) is connected with the first portion (53), in a zone adjacent to the rear face (19) of the supporting block (2), by a bridge of material (55) allowing a relative movement of the two portions (53, 54) between a relaxed position in which they are distant from one another and approximately parallel to the axis (22), and a pressed position in which they converge with one another, and two metal strips (58, 59) which are secured with one and the other of the said portions (53, 54) respectively, on faces (56, 57) thereof facing one another.

8. The functional unit of claim 7, characterized in that the said strip (58) corresponding with the first portion (53) is directly snapped on a supply terminal (60) of the motor (3).

9. The functional unit of any of claims 6 to 8, characterized in that the supply means include rechargeable battery means (5—8) and socket means (10) for connecting the battery means with a charging unit (12) outside the appliance (13), and the said socket means (10) include two metal strips (50, 51) rigidly supported by the said piece (42) of the supply means.

10. The functional unit of claim 9, characterized in that the said socket means (10) on one hand, the said switch (9) on the other hand, lie in diametrically opposed positions on both sides of the sleeve-shaped zone (48) of the said piece (42) of the supply means.

11. The functional unit of claim 10, characterized in that the battery means (5—8) lie between the supporting block (2) and the said piece (42) of the supply means.

12. The functional unit of any of claims 1 to 11, characterized in that the power take-off means (4) are press-fitted on the output shaft (23) of the motor (3).

13. Motorized electrical appliance, including the combination of a functional unit (1) according to any of claims 1 to 12 an appliance body (13).

14. A method for assembling a functional unit according to any of claims 1 to 12, characterized by the succession of the following steps:

a) the supporting block (2) is set down on an horizontal assembly jig, in a position in which the said axis (22) is vertical and the said rear face (19) faces upwards,

b) the motor (3) and the supply means (5—10) are allowed to descend on the supporting block (2) and secured therewith by pushing downwards, towards the supporting block.

15. The method of claim 14, for assembling a functional unit according to claim 12, characterized in that the power take-off means (4) are placed on the assembly jig, as a preliminary.

16. The method of any of claims 14 and 15, for assembling a functional unit according to any of claims 5 to 10 or claim 12 combined with any of claims 5 to 10, characterized in that the step b) is carried out by allowing the motor (3) to descend and securing the motor (3) on the supporting block (2) after having placed and secured with the latter the said piece (42) of the supply means by means of a push exerted downwards, and using



the said sleeve-shaped zone (48) as a coaxial guiding means for the housing (28) of the motor (3).

17. The method of any of claims 14 and 15, for assembling a functional unit according to claim 11 or claim 12 combined with claim 11, characterized in that the step b) is carried out by allowing to descend and securing successively with the supporting block (2):

the battery means (5—8),

the said piece (42) of the supply means,

the motor (3), using the said sleeve-shaped zone (48) as a coaxial guiding means for the housing (28) thereof.

Patentansprüche

1. Funktionseinheit für ein motorisiertes Elektrogerät, wie ein Werkzeug oder ein elektrisches Haushaltsgerät, mit:

einem flachen Stützblock mit zwei gegenüberliegenden Flächen, d.h. einer Vorderfläche (18) und einer Rückfläche (19), sowie einer durchgehenden Ausnehmung (21), die eine Achse (22) aufweist,

einem Elektromotor (3) mit einem Gehäuse (28), das fest vom Stützblock (2) auf dessen Rückseite abgestützt ist, und einer Ausgangswelle (23), die entlang der genannten Achse (22) angeordnet ist und nach vorne gerichtet ist,

einer Leistungs-Abnahmeeinrichtung (4), die vorderseitig des Stützblockes (2) angeordnet ist und durch die Ausnehmung (21) des Stützblockes (2) in Wirkeingriff mit der Ausgangswelle (3) steht, der Gesamtheit der elektrischen Versorgungseinrichtungen (5—10) für den Motor (3), welche zu dem Elektrogerät gehören, wobei diese Gesamtheit fest auf der Rückseite vom Stützblock (2) abgestützt ist,

wobei die Funktionseinheit abnehmbar am Elektrogerät befestigt ist, dadurch gekennzeichnet, daß zur Aufnahme und zur Arretierung des Gehäuses (28) des Elektromotors (3) und der Versorgungseinrichtungen (5—10) der Stützblock (2) auf einer Rückfläche (19) folgende, einstückig mit dem Stützblock ausgebildete Einrichtungen aufweist.

Führungseinrichtungen (20, 30—33, 45) für eine relative Translationsbewegung parallel zur Achse (22),

Bewegungsbegrenzer (29, 19, 43, 44) zum Begrenzen dieser Translationsbewegung in eine Richtung, in welcher die Teile zueinander bewegt werden,

Rückwärts-Bewegungsbegrenzer (26, 34, 37, 45), welche eine Translationsbewegung in Richtung der Teile aufeinander zu bis zu den Begrenzungseinrichtungen (29, 19, 43, 44) ermöglichen und eine Translationsbewegung in entgegengesetzter Richtung verhindern, so daß der Elektromotor (3) und die Versorgungseinrichtungen (5—10) auf dem Stützblock (2) durch einfache Translationsbewegungen parallel zur Achse (2) angeordnet werden können.

2. Funktionseinheit nach Anspruch 1, dadurch gekennzeichnet, daß die Führungseinrichtungen

für eine gegenseitige Relativbewegung und die Rückwärts-Bewegungsbegrenzer einen Preßsitz oder Reibeinrichtungen (25, 45) aufweisen.

3. Funktionseinheit nach Anspruch 1, dadurch gekennzeichnet, daß die Führungseinrichtungen für eine relative Translationsbewegung und die Rückwärts-Bewegungsbegrenzer einen Schnapp-Mechanismus (30—33, 34—37) aufweisen.

4. Funktionseinheit nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß der Stützblock (2), die Führungseinrichtungen (25, 30—33, 45) für die Translationsbewegung, die Bewegungsbegrenzer (29, 19, 43, 44) und die Rückwärts-Bewegungsbegrenzer (26, 34—37, 47) aus einem einzigen Stück eines elektrisch isolierenden Kunststoffes hergestellt sind.

5. Funktionseinheit nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Versorgungseinrichtungen ein Teil (42) aufweisen, das einen hülsenförmigen Abschnitt (48) aufweist, welcher das Gehäuse (28) des Motors (3) coaxial auf der Rückseite des Stützblockes (2) empfängt, sowie einen An-/Ausschalter (9), der fest auf dem genannten Teil (42) abgestützt ist.

6. Funktionseinheit nach Anspruch 5, dadurch gekennzeichnet, daß das genannte Teil (42) der Versorgungseinrichtungen aus elektrisch isolierendem Material hergestellt ist.

7. Funktionseinheit nach Anspruch 6, dadurch gekennzeichnet, daß der Schalter (9) zwei gegenüberliegende Abschnitte (53, 54) des genannten Teiles (42) der Versorgungseinrichtungen aufweist, wobei der erste Abschnitt (53) integral mit dem genannten hülsenförmigen Abschnitt (48) ausgebildet und der zweite Abschnitt (54) mit dem ersten Abschnitt (53) verbunden ist, und zwar in einem Bereich benachbart der Rückfläche (19) des Stützblockes (2) mittels einer Material-Brücke (55), die eine relative Bewegung zwischen den beiden Abschnitten (53, 54) zwischen einer entspannten Position, in welcher sie voneinander Abstand haben und etwa parallel zur Achse (22) ausgerichtet sind, und einer gedrückten Stellung, in welcher sie auf einander zulaufen, ermöglicht, sowie zwei Metallstreifen (58, 59), welche mit dem einem bzw. dem anderen der genannten Abschnitte (53, 54) auf Oberflächen (56, 57) derselben befestigt sind, welcher einander zugekehrt sind.

8. Funktionseinheit nach Anspruch 7, dadurch gekennzeichnet, daß der genannte Streifen (58), welcher dem ersten Abschnitt (53) entspricht, direkt mit einem Versorgungsanschluß (60) des Motors (3) durch einen Schnapp-Verschluß verknüpft ist.

9. Funktionseinheit nach einem der Ansprüche 6 bis 8, dadurch gekennzeichnet, daß die Versorgungseinrichtungen eine wiederaufladbare Batterie (5—8) und einen Halter (10) zum Verbinden der Batterie mit einer Aufladeeinheit (12) außerhalb des Elektrogerätes (13) aufweisen, und daß der Halter (10) zwei Metallstreifen (50, 51) aufweist, die fest von dem genannten Teil (42) der Versorgungseinrichtungen abgestützt sind.

10. Funktionseinheit nach Anspruch 9, dadurch gekennzeichnet, daß der Halter (10) einerseits und



14

der genannte Schalter (9) andererseits diametral gegenüberliegend auf beiden Seiten des hülsenförmigen Abschnittes (48) des genannten Teiles (42) der Versorgungseinrichtungen angeordnet sind.

11. Funktionseinheit nach Anspruch 10, dadurch gekennzeichnet, daß die Batterie (5—8) zwischen dem Stützblock (2) und dem genannten Teil (42) der Versorgungseinrichtungen angeordnet ist.

12. Funktionseinheit nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß die Leistungs-Abnahmeeinrichtung (4) durch Preßsitz auf der Ausgangswelle (23) des Motors (3) angeordnet ist.

13. Motorisiertes Elektrogerät einschließlich einer Funktionseinheit (1) gemäß einem der Ansprüche 1 bis 12 und einem Gerät-Hauptteil (13).

14. Verfahren zum Zusammenbauen einer Funktionseinheit gemäß einem der Ansprüche 1 bis 12, gekennzeichnet durch die Abfolge der folgenden Verfahrensschritte:

a) der Stützblock (2) wird auf einer horizontal ausgerichteten Montagefläche positioniert, wobei die genannte Achse (22) vertikal steht und die genannte Rückseite (19) nach oben gerichtet ist,

b) der Motor (3) und die Versorgungseinrichtungen (5—10) werden auf den Stützblock (2) abgesenkt und durch Herunterdrücken befestigt.

15. Verfahren nach Anspruch 14 zum Zusammenbauen einer Funktionseinheit gemäß Anspruch 12, dadurch gekennzeichnet, daß die Leistungs-Abnahmeeinrichtung (4) zunächst und vorläufig auf der Zusammenbaufläche positioniert wird.

16. Verfahren nach einem der Ansprüche 14 oder 15 zum Zusammenbauen einer Funktionseinheit gemäß einem der Ansprüche 5 bis 10 oder 12 in Kombination mit einem der Ansprüche 5 bis 10, dadurch gekennzeichnet, daß der Schritt b) derart ausgeführt wird, daß der Motor (3) abgesenkt und auf dem Stützblock (2) befestigt wird, nachdem an letzterem das genannte Teil (42) der Versorgungseinrichtungen durch einen abwärts gerichteten Druck positioniert und befestigt ist, wobei der genannte hülsenförmige Abschnitt (48) als koaxiale Führungseinrichtung für das Gehäuse (28) des Motors (3) dient.

17. Verfahren nach einem der Ansprüche 14 oder 15 zum Zusammenbauen einer Funktionseinheit gemäß Anspruch 11 oder Anspruch 12 in Kombination mit Anspruch 11, dadurch gekennzeichnet, daß der Schritt b) derart ausgeführt wird, daß folgende Teile nacheinander abgesenkt und mit dem Stützblock (2) verbunden werden:

die Batterie (5—8)

das genannte Teil (42) der Versorgungseinrichtungen, und

der Motor (3), wobei der genannte hülsenförmige Abschnitt (48) als koaxiale Führungseinrichtung für das Gehäuse des letzteren (28) dient.

Revendications

1. Une unité fonctionnelle pour un appareil électrique motorisé tel qu'un outil ou un appareil électroménager, comportant:

un bloc-support (2) plat, présentant deux faces opposées à raison d'une face avant (18) et d'une face arrière (19) et un trou traversant (21) présentant un axe (22),

un moteur électrique (3) présentant un carter (28) porté de façon solidaire par le bloc-support (2), en arrière de celui-ci, et un arbre de sortie (23) disposé selon ledit axe (22) et tourné vers l'avant, des moyens (4) récepteurs de mouvement, disposés en avant du bloc-support (2) et en relation d'entraînement avec l'arbre de sortie (23) via le trou (21) du bloc-support (2),

l'ensemble des moyens (5 à 10) d'alimentation du moteur (3) en électricité propres à l'appareil, ledit ensemble étant porté de façon solidaire par le bloc-support (2), en arrière de celui-ci,

ladite unité étant destinée à être fixée de façon amovible à l'appareil, caractérisée en ce que, pour assurer la réception et l'immobilisation du carter (28) du moteur électrique (3) et des moyens d'alimentation (5 à 10), le bloc-support (2) présente sur sa face arrière (19) les moyens suivants, qui forment une seule pièce avec le bloc-support:

des moyens (25, 30 à 33, 45) de guidage à la translation relative parallèlement à l'axe (22),

des moyens (29, 19, 43, 44) de butée pour limiter cette translation dans le sens d'un rapprochement mutuel,

des moyens (26, 34 à 37, 45) de contre-butée pour autoriser ladite translation dans le sens d'un rapprochement mutuel jusqu'à ce que les moyens de butée (29, 19, 43, 44) s'y opposent, et pour empêcher alors une translation en sens inverse, de telle sorte que le moteur électrique (3) et les moyens d'alimentation (5 à 10) soient assemblés au bloc support (2) par de simples mouvements de translation parallèles à l'axe (22).

2. L'unité fonctionnelle selon la revendication 1, caractérisée en ce que les moyens de guidage à la translation relative et les moyens de contre-butée comportent des moyens d'emmanchement ou de friction (25, 45).

3. L'unité fonctionnelle selon la revendication 1, caractérisée en ce que les moyens de guidage à la translation relative et les moyens de contre-butée comportent des moyens d'encliquetage élastique (30 à 33, 34 à 37).

4. L'unité fonctionnelle selon l'une quelconque des revendications 1 à 3, caractérisée en ce que le bloc-support (2), les moyens (25, 30 à 33, 45) de guidage à la translation, les moyens de butée (29, 19, 43, 44) et les moyens de contre-butée (26, 34 à 37, 45) sont réalisés en une seule pièce d'une matière plastique isolante électriquement.

5. L'unité fonctionnelle selon l'une quelconque des revendications 1 à 4, caractérisée en ce que les moyens d'alimentation comportent une pièce (42) présentant une zone de forme de manchon (48) entourant coaxialement le carter (28) du moteur (3) en arrière du bloc-support (2), et un



commutateur de marche-arrêt (9) porté de façon solidaire par ladite pièce (42).

6. L'unité fonctionnelle selon la revendication 5, caractérisée en ce que ladite pièce (42) des moyens d'alimentation est en un matériau isolant électriquement.

7. L'unité fonctionnelle selon la revendication 6, caractérisée en ce que le commutateur (9) comporte deux parties en vis-à-vis (53, 54) définies par ladite pièce (42) des moyens d'alimentation, dont une première (53) est solidaire de ladite zone (48) en forme de manchon et dont la seconde (54) est reliée à la première (53), dans une zone adjacente à la face arrière (19) du bloc-support (2), par un pont de matière (55) autorisant un déplacement relatif de ces deux parties (53, 54) entre une position de relâchement dans laquelle elles sont écartées l'une de l'autre et approximativement parallèles à l'axe (22) et une position de pression dans laquelle elles convergent mutuellement, et deux lames métalliques (58, 59) solidaires respectivement de l'une et l'autre desdites parties (53, 54), sur des faces (56, 57) de ces dernières en vis-à-vis.

8. L'unité fonctionnelle selon la revendication 7, caractérisée en ce que ladite lame (58) correspondant à première partie (53) est directement branchée sur une borne (60) d'alimentation du moteur (3).

9. L'unité fonctionnelle selon l'une quelconque des revendications 6 à 8, caractérisée en ce que les moyens d'alimentation comportent des moyens accumulateurs électriques rechargeables (5 à 8) et des moyens (10) formant prise pour connecter les moyens accumulateurs à une unité de chargement (12) extérieure à l'appareil (13), et en ce que lesdits moyens formant prise (10) comportent deux lames métalliques (50, 51) portées de façon solidaire par ladite pièce (42) des moyens d'alimentation.

10. L'unité fonctionnelle selon la revendication 9, caractérisée en ce que lesdits moyens formant prise (10) d'une part, ledit commutateur (9) d'autre part, sont disposés dans des positions diamétralement opposées, de part et d'autre de la zone en forme de manchon (48) de ladite pièce (42) des moyens d'alimentation.

11. L'unité fonctionnelle selon la revendication 10, caractérisée en ce que les moyens accumulateurs (5 à 8) sont placés entre le bloc-support (2) et ladite pièce (42) des moyens d'alimentation.

12. L'unité fonctionnelle selon l'une quelconque

des revendications 1 à 11, caractérisée en ce que les moyens récepteurs (4) sont emmanchés sur l'arbre de sortie (23) du moteur (3).

13. Appareil électrique motorisé, comportant en combinaison une unité fonctionnelle (1) selon l'une quelconque des revendications 1 à 12, et un corps d'appareil (13).

14. Un procédé d'assemblage d'une unité fonctionnelle selon l'une quelconque des revendications 1 à 12, caractérisé par la succession des étapes suivantes:

a) on dépose le bloc-support (2) sur une platine horizontale de montage, dans une position dans laquelle ledit axe (22) est vertical et ladite face arrière (19) est tournée vers le haut,

b) on laisse descendre, sur le bloc-support (2), le moteur (3) et les moyens d'alimentation (5 à 10) et on les solidarise avec le bloc-support (2) par une poussée appliquée vers le bas, vers le bloc-support.

15. Le procédé selon la revendication 14 pour l'assemblage d'une unité fonctionnelle selon la revendication 12, caractérisé en ce que, au préalable, on dépose sur la platine de montage les moyens (4) récepteurs de mouvement.

16. Le procédé selon l'une quelconque des revendications 14 et 15, pour l'assemblage d'une unité fonctionnelle selon l'une quelconque des revendications 5 à 10 ou selon la revendication 12 en combinaison avec l'une quelconque des revendications 5 à 10, caractérisé en ce que l'on pratique l'étape b) en laissant descendre le moteur (3) et en solidarisant le moteur (3) sur le bloc-support (2) après avoir placé et solidarisé avec ce dernier ladite pièce (42) des moyens d'alimentation, au moyen d'une poussée exercée vers le bas, et en utilisant ladite zone (48) en forme de manchon comme moyen de guidage coaxial pour le carter (28) du moteur (3).

17. Le procédé selon l'une quelconque des revendications 14 et 15, pour l'assemblage d'une unité fonctionnelle selon la revendication 11 ou selon la revendication 12 en combinaison avec la revendication 11, caractérisé en ce que l'on pratique l'étape b) en laissant descendre et solidarissant avec le bloc-support (2) successivement:

les moyens accumulateurs (5 à 8),

ladite pièce (42) des moyens d'alimentation,

le moteur (3), en utilisant ladite zone (48) en forme de manchon comme moyen de guidage coaxial pour le carter (28) de ce dernier.

