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(54) **Appliance Driven by an Electric Motor**

(57) In an appliance, such as a dry-shaver or a citrus press, which is driven by an electric motor (3) and has a housing comprising two complementary shells (1 and 2), the motor is mounted on a support (16) formed inside one of the shells and is secured to the support by a resilient clip (19) which projects from said one housing shell and hooks over a peripheral portion of the motor. A projection (21) formed on the other housing shell is arranged to constitute a stop for the clip to prevent movement thereof out of engagement with the motor when the two housing shells have been fitted together. A spindle (13) bears against a rubber pad 22. The motor may be mounted against spaced pads (23, 24) as in Fig 2 (not shown).

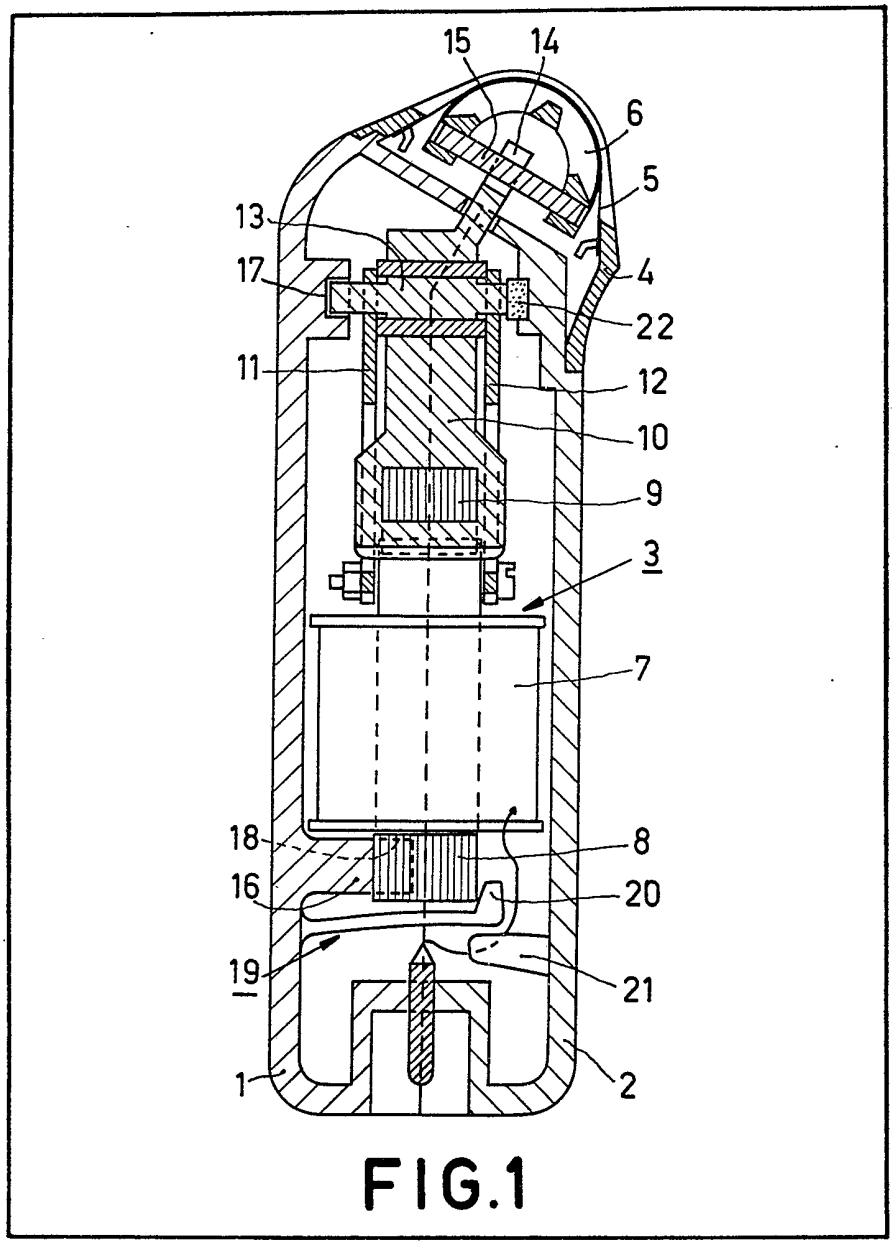

FIG.1

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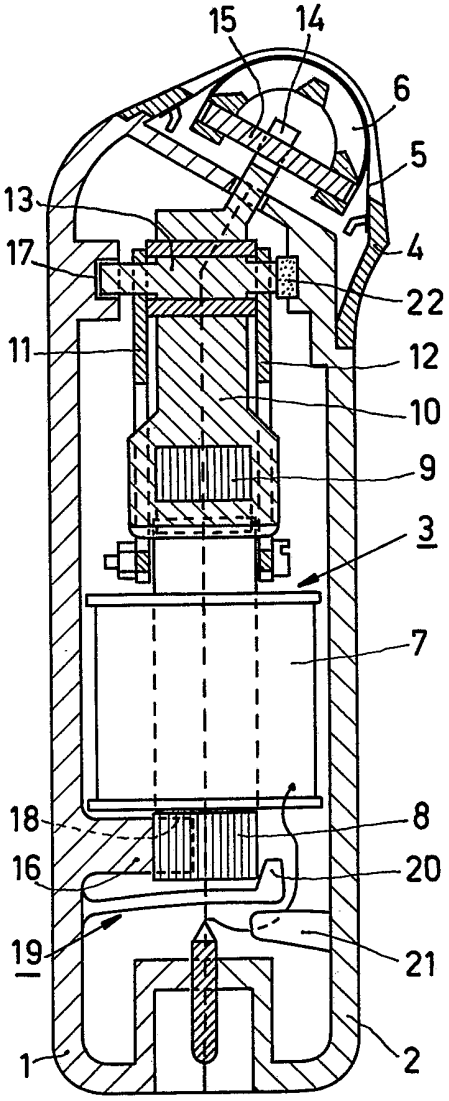
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FIG.1

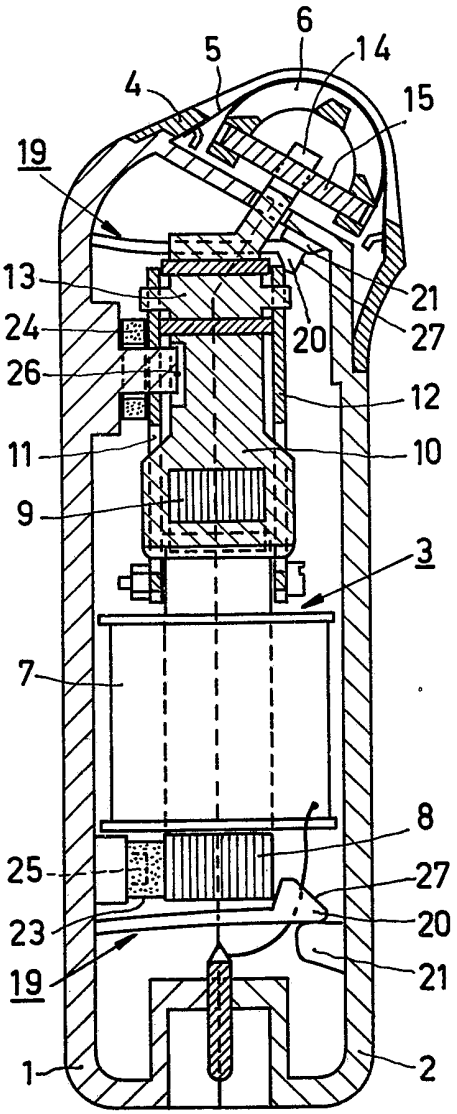
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FIG.2

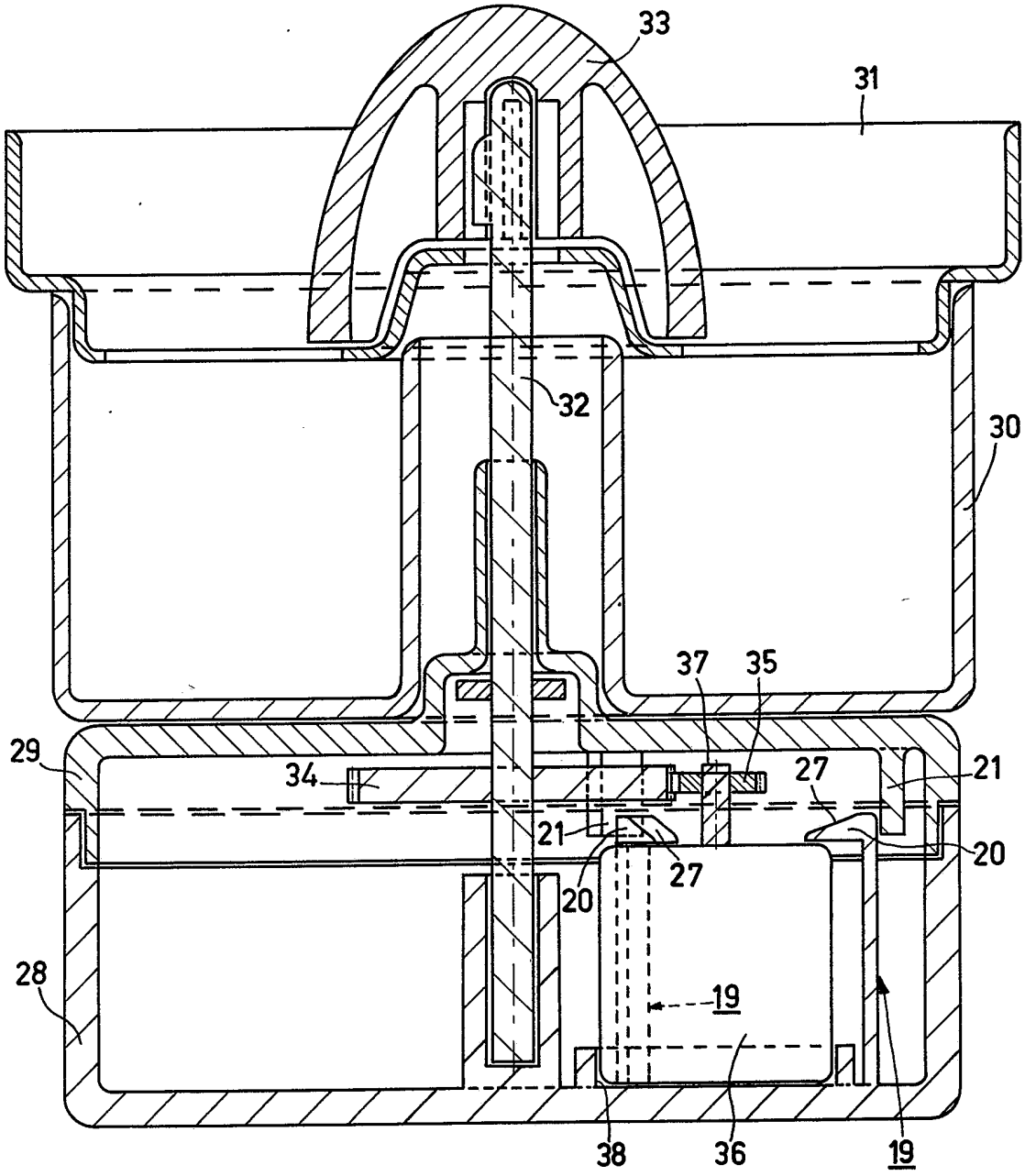

FIG.3

SPECIFICATION

Appliance Driven by an Electric Motor

The invention relates to an appliance driven by an electric motor having a housing which comprises two complementary shells, one of which serves as a mount for the motor, which motor is positioned on a support on said one housing shell and is secured thereto by retaining means. Such an appliance, which may be, for example, dry-shaving apparatus, a citrus press or the like, should meet the requirement that the motor, which is generally a comparatively heavy component, is held firmly in the housing so that in the event of shocks, for example, the motor does not become detached from its mount or its position relative to other parts of the appliance with which it cooperates is not altered. For this purpose it is known from, for example AT—PS 297,529 to secure the motor to a housing shell by means of a screw connection. For series production it is desirable that the appliances can be assembled as simply as possible, within minimal time and with a minimum number of tools or other mechanical aids. A screw connection is not conducive to the fulfillment of the last-mentioned requirements.

According to the present invention there is provided an appliance driven by an electric motor and having a housing which comprises two complementary shells, one of which serves as a mount for the motor, which motor is positioned on a support on said one housing shell and is secured thereto by retaining means, wherein the retaining means comprise a resilient clip which projects from said one housing shell and which hooks over a peripheral portion of the motor to hold said motor against the support and secure it to said one housing shell, and wherein on the other housing shell there is provided a projection which constitutes a stop for the clip to prevent movement thereof out of engagement with the motor when the two housing shells have been fitted together. Thus, the motor is simply clipped to the housing shell and can therefore be very easily and quickly fitted.

DE—OS 28 15 288 discloses an arrangement for securing a small electric motor to a receptacle, in which a resilient mount projects from the receptacle for engagement with a projection on the motor by means of a latching cam to urge the motor against another, rigid mount, the resilient mount being latched to the motor after said mount has snapped into position by a structural member which has to be fitted behind the resilient mount on the receptacle. In the present invention there is no need to mount or remove a special structural member for this purpose.

In a preferred embodiment of the invention the clip is provided on its hooked end with an inclined surface which, as the motor is moved towards said support in the assembly of the appliance, is engaged by the motor and cooperates therewith in the manner of a cam so that the clip is moved to allow the motor to pass onto the support, the clip then springing back to engage over said peripheral portion of the motor. Thus, no tool is required in fitting the motor in position.

The support for the motor may comprise an elastic pad and the projection which cooperates with the clip may be arranged to engage the clip with a force which urges the clip towards the motor. The motor is then retained in the housing elastically under constraining pressure.

Some embodiments of the invention will now be described in more detail by way of example with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view of a dry-shaving apparatus incorporating an embodiment of the invention, the section being taken on a central plane of the apparatus,

Figure 2 is a view similar to Figure 1 showing a modification of the embodiment of Figure 1, and

Figure 3 is a cross-sectional view of a citrus press incorporating a futher embodiment of the invention.

The dry-shaving apparatus shown in Figure 1 has a housing which comprises two complementary shells 1 and 2 and which accommodates an oscillating-armature motor 3. Mounted on the upper end of the housing is a shaving head comprising a frame 4 which carries shear foil 5 which is arched over a reciprocable cutter 6 composed of a series of blades of arcuate shape. The cutter is driven by the motor 3 and cooperates with the shear foil in the conventional manner.

The motor 3 comprises a stator 8, which is provided with an exciter coil 7, and an oscillating armature 9 connected to a lever 10. The stator 8 and the oscillating-armature lever 10 are combined to form an assembly by means of two parallel supporting plates 11 and 12, the lever 10 being pivotable about a spindle 13 which is mounted in the supporting plates 11 and 12. The oscillating-armature lever 10 has a free end 14 which projects from the housing shells 1 and 2 and which is forked to receive a coupling pin 15 on the cutter 6.

To assemble the motor 3 in the housing 1, 2, first the motor is mounted in the housing shell 1 and then the housing shell 2 is fitted on the housing shell 1 and is secured thereto by, for example, a screw or snap connection (not shown). To provide a firm mount for the motor 3 on the housing shell 1, this shell is provided with two motor supports. One support 16 is constituted by a ridge 16 on which the stator 8 is positioned; the other support is constituted by a recess 17 in the housing shell 1, in which recess one end of the spindle 13 for the oscillating-armature lever 10 can be inserted and seated. By inserting the end of the spindle 13 into the recess 17, the motor 3 is at the same time postioned relative to the housing shell 1 at the armature end of the motor. To position the motor at the stator end the ridge constituting the support 16 has projections 18 at its ends between which the stator 8 fits.

To secure the motor 3 to the housing shell 1,

two resilient clips are provided in the form of resiliently flexible elongate members 19 with hooked ends 20. The clips project from the inner side of the housing shell 1 near the support 16 and are arranged mirror-symmetrically relative to the plane of cross-section of Figure 1, so that only one of the clips is visible in this figure. In the present embodiment the clips are integral with the housing shell 1. The ends 20 of the clips hook over a peripheral portion of the motor, namely, an edge portion of the stator 8, and since the clips are resilient they urge the stator 8 against its support 16 and thus secure the motor 3 to the housing shell 1. The mounting of the motor is simply effected: first the clips 19 are bent back slightly with the hand or by means of a tool, after which the motor 3 is placed on its supports 16,17 and the clips are subsequently released to engage over the edge portion of the stator 8.

On the inner side of the other housing shell 2, for the cooperation with the two clips 19, there are provided two projections 21 which are each engageable with a corresponding one of the clips to constitute a stop therefor and to define the position of that clip relative to the motor. When the housing shell 2 has been fitted on the housing shell 1 and the clips 19 can no longer be deflected, this being prevented by the associated projections 21. This provides a secure mounting of the motor 3 on the housing shell 1 and also, when, for example, the apparatus is subjected to physical shocks, absorbs the inertial forces exerted by the motor 3. As can be seen in Figure 1, some clearance may be allowed between the clips 19 and the associated projections 21, because the projections 21 primarily serve to prevent the clips from being deflected sufficiently to become disengaged from the motor in the finished assembled condition of the apparatus. Such a clearance may, for example, be effective in allowing for dimensional tolerances.

In the present embodiment the motor 3 is secured to the housing shell 1 with clips only at the location of the stator. This is found to be satisfactory for holding the motor while the housing shell 2 is being fitted on the housing shell 1 during further assembly of the apparatus. However, it is then necessary that in the finished assembled condition of the apparatus the motor 3 is also secured between the two housing shells at the location of the oscillating-armature lever 10, for which purpose in the present embodiment a rubber pad 22 is provided on the housing shell 2 for cooperation with the end of the spindle 13 of the lever 10 remote from the recess 17 so as to press the spindle 13 at its other end into the recess 17. Thus, an elastic mounting is obtained for the motor at this location.

The shape and location of the clips may differ from the shape and location shown. For example, each clip may also be constituted by a leaf spring which at one end is embedded in or secured to the housing shell 1 and at its other, free end is hooked.

Although two clips are preferred for securing the motor to the support 16, a single clip disposed centrally relative to the support would suffice.

In the embodiment of Figure 2 the motor 3 is secured to the housing shell 1 by means of four clips 19. Two of these clips again engage with the stator 8 of the motor, whilst the other two clips cooperate with the motor at the location of the oscillating-armature lever 10, namely, by engaging over an edge portion of the supporting plate 12 of the lever with their hooked ends 20. The two clips at each end of the motor are again arranged mirror-symmetrically relative to the plane of the cross-section of Figure 2, so that only two of the four clips are visible in this figure. Thus, the motor 3 is again firmly secured to the housing shell 1. If desired, futher clips may be provided for engagement with peripheral portions of the motor.

In the embodiment of Figure 2 the supports for the motor 3 on the housing shell 1 are constituted by elastic pads 23 and 24 respectively. In this case the pads are constituted by rubber rings, which are fitted on corresponding projections 25 and 26 on the housing shell 1 in order to keep them in position. For supporting the stator end of the motor there are provided two pads 23, which, like the clips 19, are arranged mirror-symmetrically relative to the plane of cross-section of Figure 2. For supporting the end of the motor adjacent the oscillating-armature lever 10 there is provided a centrally disposed pad 24. This pad is fitted on a pin-shaped projection 26 which at the same time serves for positioning the motor, for which purpose the free end of the projection 26 extends into an aperture formed in the supporting plate 11.

For each of the four clips 19 there is again provided an associated projection 21 on the housing shell 2, which projection, when the housing shells 1 and 2 have been fitted together, engages the relevant clip and thereby constututes a stop for that clip to define its position relative to the motor. As is apparent from Figure 2, the projections 21 in the present embodiment are so constructed and arranged that they engage the clips 19 with a force which urges the clips towards the motor, so that the motor is urged against the elastic pads 23 and 24 with a specific fixed pressure. In this way a particularly firm mounting of the motor is guaranteed, because mounting is not only achieved through the resilient action of the clips but also through the cooperation of the projections with the clips.

In the embodiment of Figure 2 each clip 19 is provided on its hooked end 20 with an inclined surface 27 which, as the motor 3 is moved towards its supports 23 and 24 on the housing shell 1 in the assembly of the apparatus, is engaged by the motor and cooperates therewith in the manner of a cam that the clip is deflected to allow the motor to pass onto the supports, the clip then springing back to engage over the respective edge portion of the motor.

The citrus press shown in Figure 3 comprises a

base unit with two housing shells 28 and 29, an annular receptacle 30 which can be fitted on the upper housing shell 29 and an annular filter 31 which can in turn be fitted on the receptacle 30. A vertical drive spindle 32 projects from the housing shell 29 and extends through the receptacle 30 and the filter 31. On the upper end of the drive spindle 32 a pressing cone 33 can be fitted in such a way that it is locked to the spindle for rotation therewith. The cone operates in known manner to squeeze juice from the citruc fruit. The drive spindle 32 is driven by a motor 36 *via* a reduction gear constituted by gear wheels 34 and 35. The gear wheel 34 is mounted on the drive spindle 32 and the gear wheel 35 on the shaft 37 of the motor 36.

The motor 36, which in the present embodiment is of cylindrical shape, is accommodated in the lower housing shell 28. On this housing shell 28 there is provided a support 38 for the motor in the form of a seat on the bottom of the housing shell 28, which seat receives the end of the motor 36 remote from the shaft 37. In order to secure the motor to the housing shell 28 there are provided three clips 19 which are equally spaced around the seat 38, only two of the clips being visible in Figure 3. The clips 19 again take the form of resiliently flexible elongate members which project upwardly from the bottom of the housing shell 28 and with hooked ends 20 engage over the upper peripheral portion of the motor to urge the motor against the support 38, thus securing the motor to the housing shell 28. On their hooked ends 20 the clips again have inclined surfaces 27 which enable the motor to be fitted simply by pushing it against these surfaces and then down past the hooked ends of the deflected clips onto its seat 38.

Projections 21 are again provided on the housing shell 29 for engagement with the clips 19 to constitute stops therefor so that the position of the clips relative to the motor is defined.

Thus, the motor is again firmly secured to the housing shell, whilst at the same time the motor can be fitted in a simple manner without the need for any tools.

Claims

1. An appliance driven by an electric motor and having a housing which comprises two complementary shells, one of which serves as a mount for the motor, which motor is positioned on a support on said one housing shell and is secured thereto by retaining means, wherein the retaining means comprise a resilient clip which projects from said one housing shell and which hooks over a peripheral portion of the motor to hold said motor against the support and secure it to said one housing shell, and wherein on the other housing shell there is provided a projection which constitutes a stop for the clip to prevent movement thereof out of engagement with the motor when the two housing shells have been fitted together.

2. An appliance as claimed in Claim 1, wherein the clip is provided on its hooked end with an inclined surface which, as the motor is moved towards said support in the assembly of the appliance, is engaged by the motor and cooperates therewith in the manner of a cam so that the clip is moved to allow the motor to pass onto the support, the clip then springing back to engage over said peripheral portion of the motor.

3. An appliance as claimed in Claim 1 or 2, wherein said support comprises an elastic pad and said projection is arranged to engage the clip with a force which urges the clip towards the motor.

4. An appliance substantially as herein described with reference to any of the accompanying drawings.

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