Oct. 29, 1957 C. SCAROULIS 2,811,305

AUTOMATIC BATTERY-OPERATED FANS

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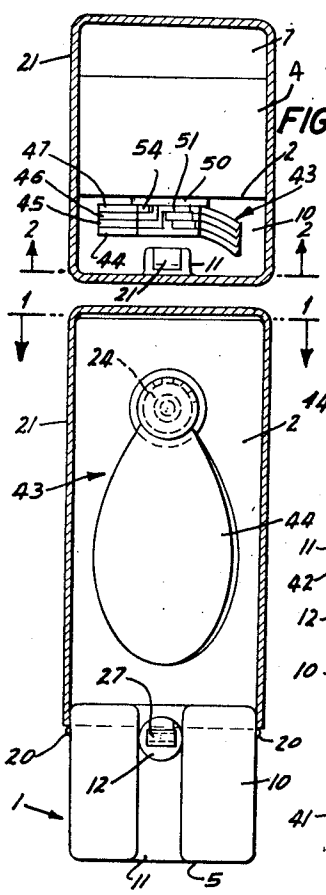


FIG. 1

FIG. 2

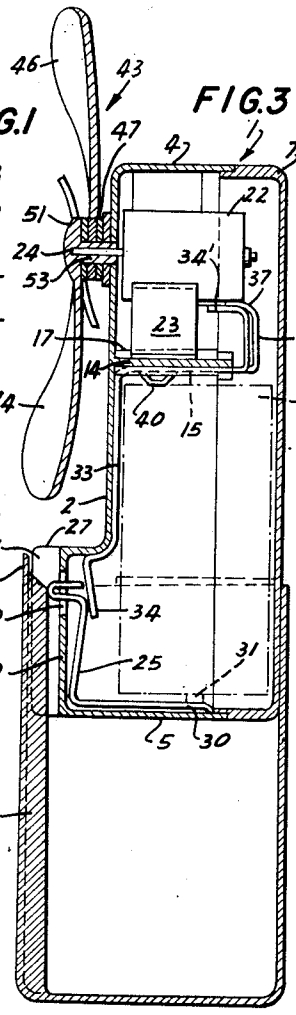


FIG. 3

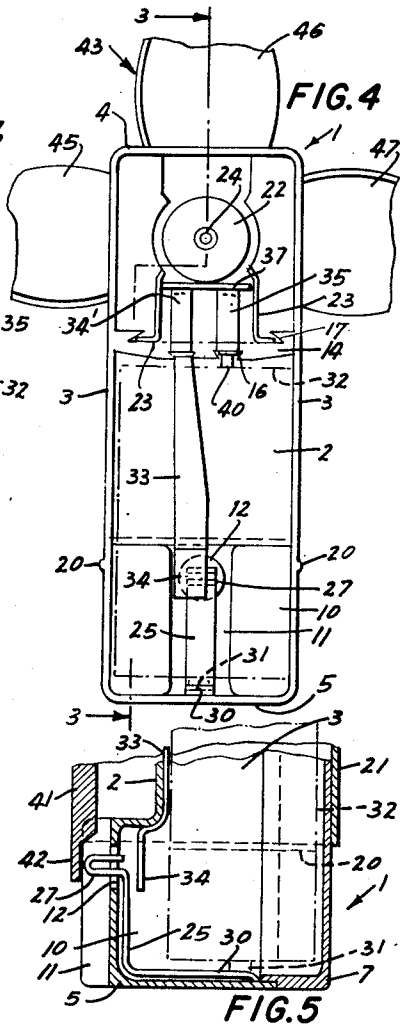


FIG. 4

FIG. 5

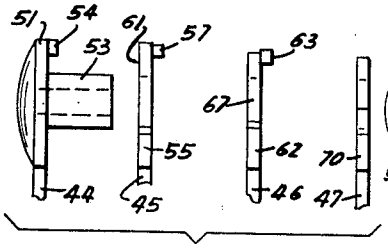


FIG. 6

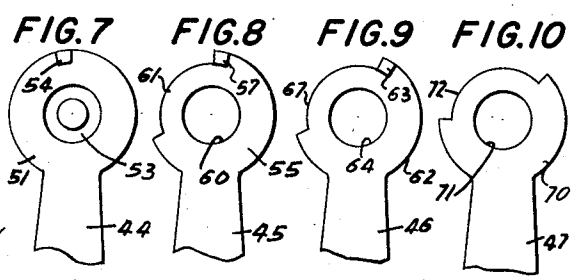


FIG. 7 FIG. 8 FIG. 9 FIG. 10

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AUTOMATIC BATTERY-OPERATED FANS

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3 Claims. (Cl. 230—259)

The present invention relates to improvements in hand fans and, more specifically, to a new and improved portable fan which is operated electrically through a battery of the type used in flash lights or other portable electric devices, and which is an improvement over an electric battery-operated hand fan disclosed by my co-pending patent application Serial No. 522,591, filed July 18, 1955, which issued as Patent No. 2,750,104 on June 12, 1956.

One object of the present invention is the provision of a device of the character described which has stiff fan blades which are foldable one upon the other, and which are constructed and arranged in such a manner that they will unfold automatically when the fan starts running.

Another object of the present invention is the provision of a device of the character described which has a cover member for completely covering the fan blades and the actuating switch while the device is not in operation, so that the device can be carried in a bag or a pocket without disforming or damaging the fan blades or any other movable parts of the device and without accidentally starting the motor; said cover member can be attached to the fan also in such a manner that it serves as a large handle for conveniently holding the device, and while being so attached it will automatically switch on the fan and cause it to operate until the cover member is removed from its position in which it serves as a handle.

A further object of the present invention is the provision of a device of the character described which is well adapted for being manufactured inexpensively by mass production processes and which is also durable, of a pleasing outer appearance and well adapted for the purpose for which it is intended.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangements of parts without departing from the spirit of the invention as claimed.

In the accompanying drawing a preferred form of the invention has been shown.

In said drawing:

Figure 1 is a cross-sectional view of a preferred embodiment of my invention on the line 1—1 of Fig. 2;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view partially on the line 3—3 of Fig. 4;

Fig. 4 is a rear elevation of the device as it appears after removal of a back cover member;

Fig. 5 is a fractional sectional view like Fig. 3 showing a top cover and a contact member in positions which differ from their respective positions shown in Fig. 3;

Fig. 6 is a detailed fractional exploded view of a fan blade assembly;

Fig. 7 is a detailed fractional plan view of a first fan blade;

Fig. 8 is a detailed fractional plan view of a second fan blade;

Fig. 9 is a detailed fractional plan view of a third fan blade; and,

Fig. 10 is a detailed fractional plan view of a fourth fan blade.

Similar reference characters refer to similar parts throughout the several views.

In the drawing the numeral 1 denotes a housing of plastic material or the like which has a front wall 2, a pair of side walls 3, a top wall 4, as well as a bottom 5, and which is closed at the back by a removable back cover 7. The lower portion 10 of the housing 1 is increased in depth and has in its front section an upright groove 11, the bottom of which is provided with a hole 12. The interior of the housing 1 is subdivided by an intermediate horizontal wall portion 14 provided with preferably dovetail-shaped grooves 15, 16 and 17 (Figs. 3 and 4). A pair of ribs 20 preferably are extended over the outer sides of the side walls 3 for the purpose of limiting the movement of a cover member 21 which fits snugly over the increased lower portion 10 of the housing 1.

An electric motor 22, which preferably is a double magnet motor, is attached to the intermediate wall 14 by means of bracket members 23 whose lower portions are slidable in the groove 17. The shaft 24 of the motor 22 extends through the front wall 2 of the housing 1.

A first conductive member 25 of angular formation has a contact portion 27 which is extended through the hole 12, and a horizontal portion 30 upon which rests a top contact member 31 of a flashlight battery 32, which is indicated by dash-and-dotted lines in Figs. 3, 4 and 5 and which is placed into the housing 1 in an inverted position. A second conductive member 33 extends from one terminal 34' of the motor 22 through the groove 15, and along the inner side of the front wall 2 into the increased portion 10 of the housing 1, and has a lower end portion 34 which is located in close proximity to the contact portion 27 of the member 25. A third conductive member 35 has one of its ends connected to a second terminal 37 of the motor 22 and extends into the groove 16 at the lower side of the intermediate wall portion 14. That portion of the member 35 which is extended into the groove 16 has a downwardly bulged portion 40 which touches the conductive bottom portion of the inverted battery 32.

The cover member 21 has at the inner side of its front wall portion a centrally located rib portion 41, and a shield portion 42 in longitudinal alignment with the rib portion 41 extends beyond the lower edge of the cover member 21. The rib portion 41 extends into the groove 11, and the cover member 21 can be placed upon the housing 1 either from above (Fig. 5) or from below (Fig. 3). If it is placed upon the housing 1 from above (Fig. 5), the mem-

ber 21 covers a collapsible fan blade assembly 43, as may be seen in Figs. 1 and 2, and the shield portion 42 extends beyond the contact portion 27 and is in spaced relation thereto, so that the same cannot be depressed accidentally while the device is being carried in a handbag or in a pocket of a garment or the like. In this position the contact portion 27 is in spaced relation to the end portion 34 of the conductive member 33. If the cover member 21 is placed upon the housing 1 from below (Fig. 4) it will serve as a handle for facilitating the holding of the device; and the rib portion 41, extending into the groove 11, will force the contact portion 27 of the member 25 against the end portion 34 of the member 33. This causes the closing of an electric circuit, so that an electric current will pass from the contact member 31 of the battery 32 through the member 25, the member 33, the terminal 34, the motor 22, the terminal 37, the member 35, the bulged portion 40 thereof, back to the battery 32. Thus the motor 22 will run as long as the cover member 21 is in the position shown in Fig. 3. As soon as the member 21 is removed from this position of Fig. 3, the resiliency of the member 25 will cause the same to assume the position shown in Fig. 5, so that the motor 22 will cease to run.

My new and improved fan blade assembly 43 consists of four fan blades 44, 45, 46 and 47 as well as a washer 50. The blade 44 has a circular hub portion 51 from which extends a cylindrical section 53 and a lateral lug section 54. The blade 45 has a hub portion 55 from which extends a lateral lug section 57, and which is provided with a central bore 60 and a peripheral cut-out 61. The blade 46 has a hub portion 62 from which extends a lateral lug section 63 and which is provided with a central bore 64 and a peripheral cut-out 67. The blade 47 has a hub portion 70 provided with a central bore 71 and a peripheral cut-out 72. The cylindrical section 53 of the blade 44, which is secured to the shaft 24, extends first through the bore 60 of the blade 45, then through the bore 64 of the blade 46, then through the bore 71 of the blade 47, and finally through the washer 50. The lug portion 54 of the blade 44 engages the cut-out 61 of the blade 45; the lug portion 57 of the blade 45 engages the cut-out 67 of the blade 46; and the lug portion 63 of the blade 46 engages the cut-out 72 of the blade 47. Thus the blades 45, 46 and 47, which are rotatable on the cylindrical portion 53 of the blade 44, can swing at an angle of about forty-five degrees relative to each other and to the blade 44. This allows a folding of the blades 44, 45, 46 and 47 one upon the other, as shown in Figs. 1 and 2, so that the cover member 21 can be placed over the same. The unfolding takes place automatically in the following manner: When the shaft 24 starts to rotate, the blade 44 will turn with it, and after the blade 44 has turned about forty-five degrees, the portion 54 has passed through the cut-out 61 and causes the blade 45 to rotate also. After another forty-five degrees of rotation, the portion 57 of the blade 45 has passed through the cut-out 67 and will cause a rotation of the blade 46. After still another forty-five degrees of rotation the portion 63 of the blade 46 has passed through the cut-out 72 of the blade 47 and will cause a rotation of the blade 47, so that then the fan blade assembly is unfolded, as shown in Figs. 3 and 4. The air resistance will cause the blades to remain in the unfolded position during the running of the motor 22.

Since certain changes may be made in the above article and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which as a matter of language might be said to fall therebetween.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent is:

1. A device of the character described comprising a housing having a groove in its lower portion, an electric motor mounted on said housing, a source of electric current having two terminals and being provided in said housing, a shaft driven by said motor, a plurality of fan blades on said shaft being foldable one upon the other, a circuit breaker within said housing having a resilient portion extending into the groove in the lower portion of said housing and tending to maintain the circuit breaker in a position in which an electric current controlled thereby is interrupted, conductive means electrically connecting one terminal of said source of electric current directly to said motor and connecting the second terminal of said source of electric current over said circuit breaker to said motor, and a cover member adapted for being placed either over said fan blades or over the lower portion of said housing and having a rib portion as well as a shield portion extending beyond the outer extremity of the cover member, said rib portion engaging the groove in the lower portion of said housing when the cover member is placed over said lower portion thereby forcing the resilient portion of said circuit breaker to close the circuit controlled by the circuit breaker, and when said cover member is placed over said fan blades the shield portion of the cover member extending over the resilient portion of said circuit breaker.

2. An automatic battery-operated fan comprising a housing having a groove in its lower portion, an electric motor mounted on said housing, a shaft driven by said motor having an end portion laterally extending beyond said housing, a battery having two terminals being provided in said housing, fan blades mounted on the aforementioned end portion of said shaft, a circuit breaker within said housing having a resilient portion extending into the groove in the lower portion of said housing and tending to maintain the circuit breaker in a position in which an electric current controlled thereby is interrupted, a first conductive member electrically connecting a terminal of said battery over said circuit breaker to said motor, a second conductive member insulated from said first conductive member electrically connecting the other terminal of said battery to said motor, and a cover member adapted for being placed either over said fan blades or over the lower portion of said housing and having a rib portion as well as a shield portion extending beyond the outer extremity of the cover member, said rib portion engaging the groove in the lower portion of said housing when the cover member is placed over said lower portion thereby forcing the resilient portion of said circuit breaker to close the circuit controlled by the circuit breaker, and when said cover member is placed over said fan blades the shield portion of the cover member extending over the resilient portion of said circuit breaker.

3. An automatic battery-operated fan comprising a housing a reduced upper portion and a widened lower portion provided with a recessed wall section forming a vertical groove and having a hole, an electric motor within said housing, a shaft driven by said motor having an end portion laterally protruding beyond the upper portion of said housing, a flashlight battery invertedly inserted into said housing having two terminals, fan blades mounted on the aforementioned end portion of said shaft, a circuit breaker within said housing adapted for electrically connecting a first one of the terminals of said battery to said motor and having a resilient portion of which a section extends through said hole into the groove formed by the recessed wall section of the lower portion of said housing and tending to interrupt the electrical connection of the first terminal of said battery to said motor, conductive means connecting the second terminal of said battery to said motor, and a cover adapted to be placed either over said fan blades or over the lower

portion of said housing and having a rib portion as well as a shield portion extending beyond the outer extremity of the cover, said rib portion engaging the groove formed by the recessed wall section of the lower portion of the housing when the cover is placed over said lower portion thereby forcing the section of the circuit breaker which extends through said hole to cause an electrical connection of the first terminal of said battery to said motor, and when said cover is placed over said fan blades the shield portion of the cover extending over the section of the circuit breaker which extends through said hole.

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