July 10, 1962 F. HARTWIG ET AL 3,043,996

DRY SHAVER APPARATUS HAVING DIFFERENT POWER UNITS

Filed Jan. 23, 1959 4 Sheets-Sheet 1

Fig. 1

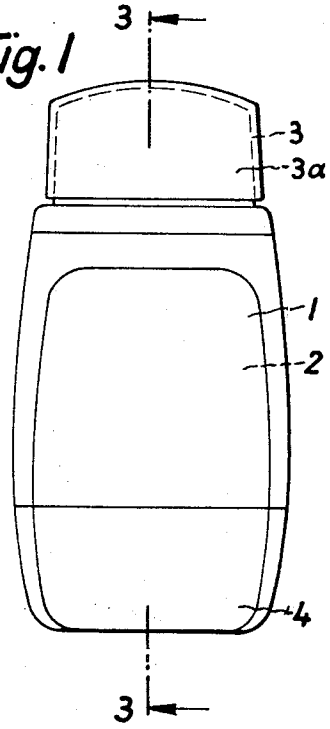


Fig. 4

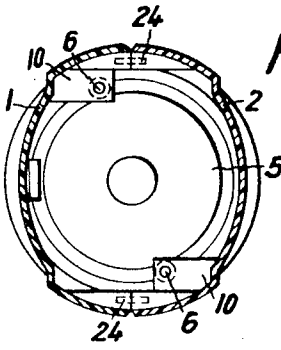


Fig. 5

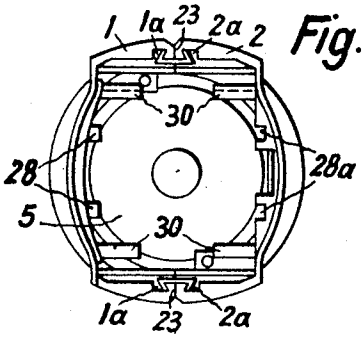


Fig. 6

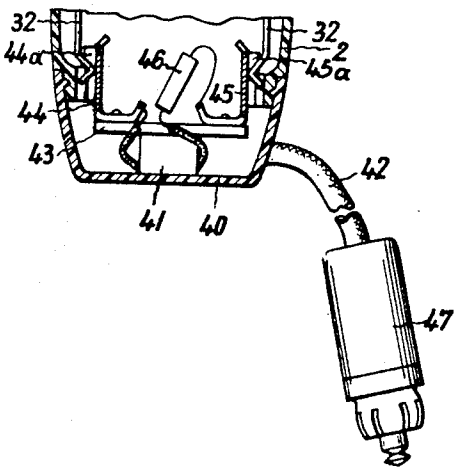
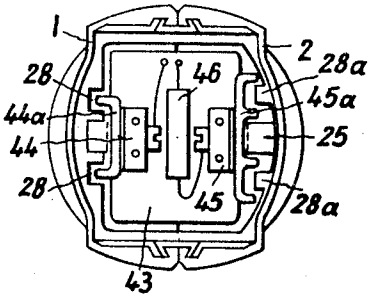


Fig. 7



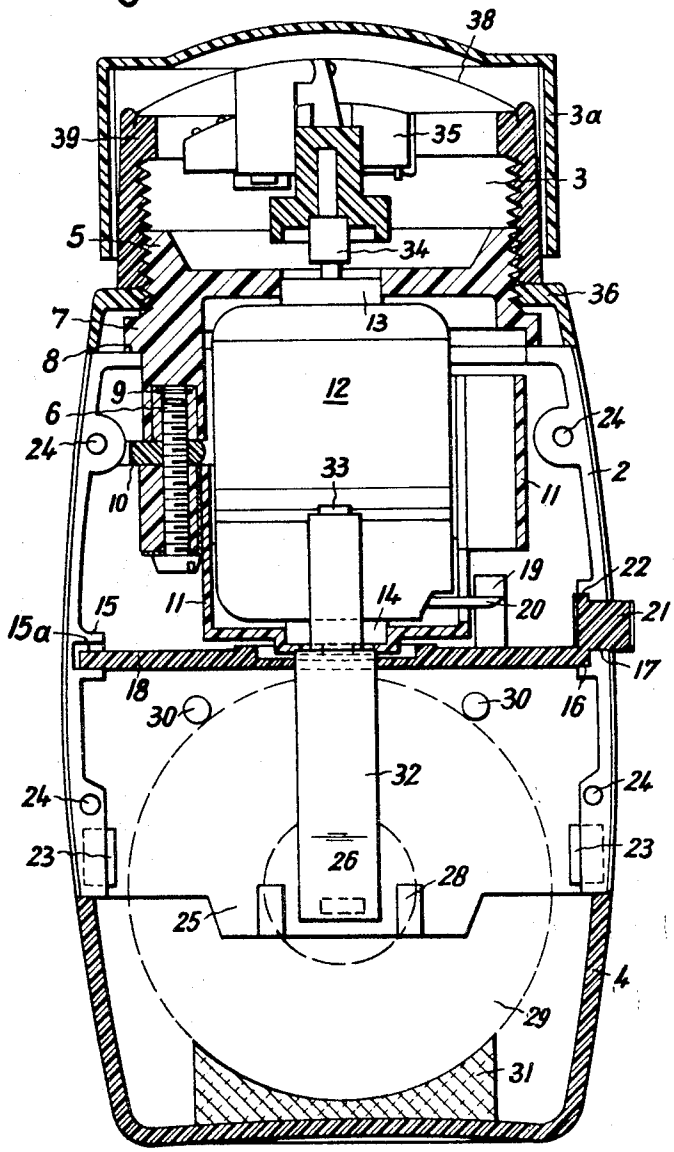
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DRY SHAVER APPARATUS HAVING DIFFERENT POWER UNITS

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Fig. 2



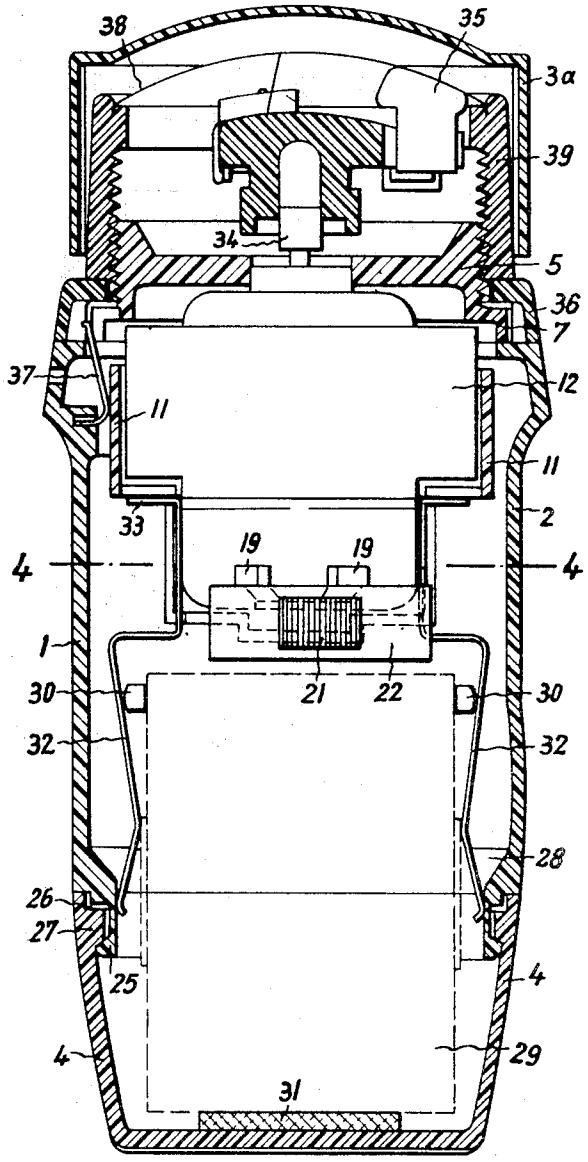
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Fig. 3



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Fig. 8

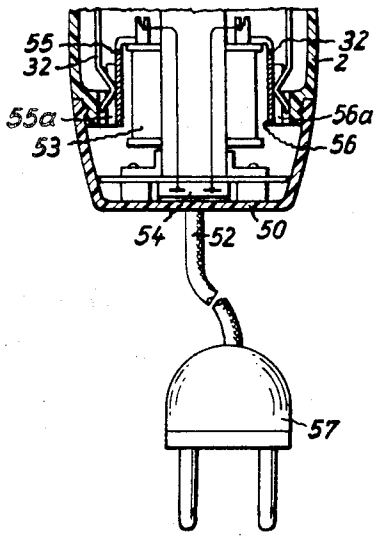


Fig. 10

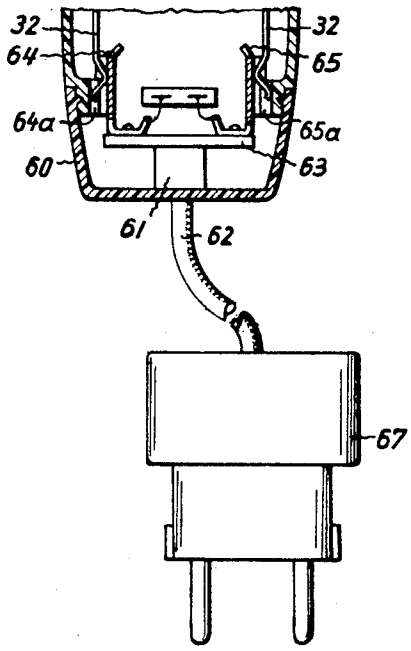


Fig. 9

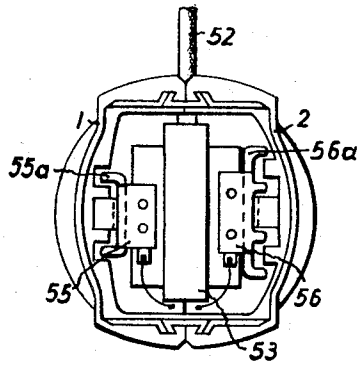
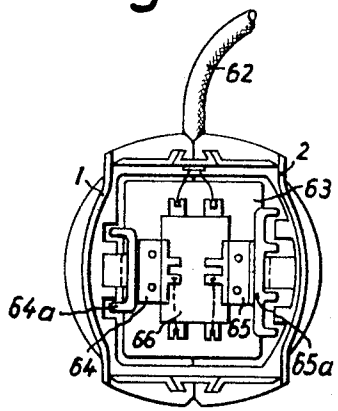


Fig. 11



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United States Patent Office 3,043,996 Patented July 10, 1962

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DRY SHAVER APPARATUS HAVING DIFFERENT POWER UNITS

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Filed Jan. 23, 1959, Ser. No. 788,587
Claims priority, application Germany Jan. 23, 1958
8 Claims. (Cl. 318—17)

The present invention relates to shaving apparatus.

More particularly, the present invention relates to a dry shaving apparatus of the type shown in co-pending application Serial No. 771,145, filed October 31, 1958. That application discloses and claims a shaver incorporating a shaving head and a motor connected thereto for driving the same, which shaver is adapted to be electrically energized in any one of a number of different ways. The present application is particularly concerned with construction of the casing for such a shaver.

Shaving apparatus generally have a casing composed of two mirror-symmetrical shell halves in which the shaver proper is inserted, or is screwed to one of two halves. Beside such vertical partitioning of the casing, horizontal partitioning is sometimes used, albeit that the two casing parts can no longer be mirror-symmetrical. In either case, the two halves form a closed housing or casing so that there is no possibility of equipping the shaver with different exchangeable means which would allow the shaver to be energized in different ways, i.e., either from a battery carried by the shaver or from an outside source of electrical energy, such as a battery or a power line.

There exist dry shavers which make use of batteries, generally dry cell batteries, which, while exchangeable for fresh batteries, cannot be replaced by a different type of electric energy source. Such shavers have a more or less sleeve-like housing closed at one end by a removable cap or the like which allows the exchange of batteries.

It is an object of the present invention to provide a dry shaving apparatus which overcomes the above disadvantages.

It is another object of the present invention to provide a dry shaver which can be built and assembled rapidly and economically.

The objects of the present invention also include the provision of a dry shaver which can readily be energized in any one of a number of different ways.

With the above objects in view, the present invention mainly resides in a shaving set which comprises a work unit and a plurality of power units. The work unit incorporates two shell halves which together form an elongated casing, end plate means arranged at one end of the casing and forming a shaving head, and a motor connected to the shaving head for driving the same. Each of the power units has a power supplying means and is adapted to be coupled to and uncoupled from the casing at the oposite end thereof in such a manner that whenever any one of the power units is coupled with the work unit, the power supplying means of such power unit is electrically connected to the motor of the work unit and the thus-coupled units together form a shaver capable of being held by hand.

Additional objects and advantages of the present invention will become apparent upon consideration of the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side view of a shaving apparatus according to the present invention;

FIG. 2 is a longitudinal sectional view taken in the plane separating the two shell halves, the shaver being used in conjunction with a power unit incorporating a battery;

FIG. 3 is a longitudinal sectional view taken along line 3—3 of FIG. 1, i.e., in a plane normal to that of FIG. 2;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a bottom view of the shaver, with the cap removed;

FIG. 6 is a fragmentary sectional view of the shaver used in conjunction with a power unit enabling the shaver to be operated on an outside battery;

FIG. 7 is a plan view of the fragmentary construction shown in FIG. 6;

FIG. 8 is a fragmentary sectional view of the shaver used in conjunction with a power unit enabling the shaver to be operated on house current;

FIG. 9 is a plan view of the fragmentary construction shown in FIG. 8;

FIG. 10 is a fragmentary sectional view of the shaver used in conjunction with a modified power unit enabling the shaver to be operated on house current; and

FIG. 11 is a plan view of the fragmentary construction in FIG. 10.

Referring now to the drawings, and to FIGS. 1 to 5 thereof in particular, there is shown a dry shaver having a round shaving head. FIG. 1 shows the basic construction of the shaver, which includes two mirror-symmetrical shell halves **1** and **2** that together form an elongated housing or casing, the shaving head **3** which is arranged at one end of the casing, and a removable cap **4** at the opposite end of the casing. A protective cap **3***a* is provided for the shaving head **3** when the shaver is not in use.

FIG. 2 shows the shaver on an enlarged scale, with the front shell half **1** being removed so as to facilitate illustration of the interior of the casing, and with the shaving head **3** and the cap **4** being shown in section. Also, the circular top end plate **5**, to which each of the shell halves **1** and **2** is affixed in a manner more fully described below, is shown at the left in somewhat rotated position so as to permit illustration of the manner in which driving motor **12** is attached, the latter being a small D.C. motor. The actual position of the parts is shown in FIG. 4.

An annular flange **7** of the end plate means **5** abuts against the upper edges **8** of the shell halves **1** and **2**, as may best be seen in FIGS. 2 and 3. The end plate means **5** is formed with two downwardly extending threaded journals **9** which abut against two inwardly extending ledge portions **10** of the shell halves **1** and **2**, respectively.

A cup-shaped element **11** which surrounds the lower half of the motor **12** abuts against the underside of the ledge portions **10**, and two screws **6**, only one of which is shown in FIG. 2, serve to fasten together the cup-shaped element **11**, the two shell halves **1** and **2**, and the end plate means **5**, so that the shell halves and the motor, which is held in place by the cup-shaped element **11**, are secured to the end plate means by the same screws.

The motor **12** is formed at each axial end with a central boss portion **13**, **14**, and the end plate means **5** and the bottom of the cup-shaped element **11** are formed with cut-outs adapted to receive these boss portions, respectively, so that the motor is properly centered with respect to the shaving head. In this way, the motor **12** is both secured and centered without any screws actually passing through the motor proper. Such an arrangement is particularly desirable where small motors having plastic casings are used, since breakage or deformation is avoided.

The shell halves **1** and **2** are formed with aligned inwardly protruding portions **15** that are located at touching edges of the shell halves. These protruding portions **15** are at approximately the middle of the shell halves and are formed with aligned grooves **15***a*. Diametrically opposite these protruding portions, the shell halves are formed at their opposite touching edges with aligned grooves **16** and cut-outs **17**.

One end of an elongated switch actuator element **18**

is pivotally received in the aligned grooves 15*a*, whereas the other end of the element is formed with a head 21 and a covering shield 22, the head projecting through the cut-outs 17 and the shield being slidably arranged in the grooves 16. The element 18 is an integral one made of a suitable plastic material, with the shield 22 being inherently elastic so that element 18 is properly mounted for movement between two positions.

The switch actuating element 18 carries two upwardly extending tines 19 arranged on opposite sides of a switch lever 20 of the motor 12, so that by pivoting the actuating element 18, the motor 12 may be energized and de-energized.

As is best shown in FIGS. 2 and 5, the shell halves 1 and 2 are formed near the end of the casing opposite to that at which the shaving head is attached, with grooves 1*a* and 2*a* within which clamps 23 are arranged, the purpose of these clamps being to prevent any sliding movement of the shell halves relative to each other. Additionally, fastening pins, which may be in the form of fitting pins or adapter sleeves 24, are embedded in enlarged portions of the shell halves that are formed near the edges at which they join so as firmly to secure the shell halves to each other without requiring tongues adapted to receive retaining springs. This is particularly desirable when the shell halves are made of plastic according to the extrusion process, since the manufacture is not rendered complicated. At the same time, the shell halves are properly fitted to each other and are sufficiently reinforced.

The shell halves 1 and 2 are additionally formed with inwardly projecting tongues 25 having outwardly opening recesses 26. The latter are adapted to receive inwardly projecting portions 27 of the end cap 4 which is preferably also made of plastic. The cap is part of a power unit which incorporates a battery 29 as a power supplying means, and so as to assure electrical connection of proper polarity between the motor 12 and the battery 29, suitable indexing means are provided which will allow the battery to be attached to the casing in but one position. These indexing means are in the form of grooves 28 and projections 28*a* formed in the projecting portions 25, and the battery carries correspondingly shaped brackets (not shown) which will allow the battery to be inserted only in such a position that voltage of the correct polarity is supplied to the motor 12.

The position of the battery within the casing is determined by suitable positioning means which may be in the form of transverse studs 30 die-cast or otherwise suitably attached to the shell halves. The battery is kept in place by being pressed against these studs 30 by the cap 4 through the intermediary of a resilient layer 31 interposed between the battery and the bottom of the cap. The location of the studs 30 is such that when the cap 4 is removed, the battery protrudes so as to be readily accessible for manual removal from the casing.

Contact springs 32 which serve as connections from the battery to the motor also press against the battery. The upper ends of these contact springs, which are in the form of leaf springs, are of reduced width and are embedded in suitable slots of the cup-shaped element 11, and the uppermost ends 33 are soldered to the lead-in wires of the motor 12. The arrangement of the parts, therefore, is such that any thrust exerted on the leaf springs 32 in axial direction of the casing during insertion of the battery, as well as any lateral pressure exerted on the leaf springs, is taken up by the cup-shaped element 11 or by the shell halves 1 and 2 directly, so that no mehcanical force is exerted either on the motor 12 or on the soldered ends of the springs 32.

The rotatable cutting head of the shaver is mounted directly upon the upper end of the shaft 34 of the motor 12. The upwardly extending annular edge of the end plate means 5 is formed with an external thread, upon which a ring 36 is threaded so as to be nearly in contact with the upper edges 8 of the shell halves 1 and 2. The lower part of the ring 36 is threaded internally, and the free end of a leaf spring 37 engages this thread so that the ring 36 can be used as an adjustment ring for axially moving the sleeve 39 which carries the shear blade 38. In this way, the pressure between the shear blade and the shearing knives which are resiliently mounted in the shaving head 35 proper can be adjusted.

FIGS. 6 and 7 show the same work unit as described above when used in conjunction with a different power unit. The latter comprises a cap 40 which carries a binding post 41 to which an extension cord 42 is attached. The binding post also carries a terminal block 43 on which two contact pieces 44 and 45 are mounted. When the cap is mounted on the shell halves 1 and 2, these contact pieces 44 and 45 are in contact with the contact springs 32. One of the two wires of the extension cord is connected to the contact piece 45 by way of a current limiting resistor 46.

The extension cord 42 has attached to its free end a plug 47 which is shown as being of the type adapted to be connected to a motor vehicle battery by way of a conventional cigar lighter socket. In this way the shaver can be energized from an external D.C. power source.

In order to avoid the possibility of polarity error, the contact pieces 44 and 45 carry indexing elements 44*a* and 45*a*, respectively, the configurations of which are such as to correspond to the grooves 28 and projections 28*a* formed in the projecting portions 25.

FIGS. 8 and 9 show the same work unit in conjunction with yet another power unit. The latter comprises a cap 50 which carries a terminal block 51 to which the extension cord 52 is connected. The terminal block carries a transformer 53 capable of transforming 110/125 v. or 220 v. A.C. to the voltage of motor 12, as well as a rectifier 54 for rectifying this A.C. to D.C. The transformer occupies the same space which the battery 29 occupied while the work unit was coupled with the power unit shown in FIGS. 1 to 5. The transformer carries contact pieces 55 and 56 which have suitable indexing elements 55*a* and 56*a* attached thereto for preventing the possibility of polarity error.

The cord 52 has attached to its free end a conventional male plug connector 57 adapted to be plugged into an ordinary house current outlet socket, so that the shaver may be operated from an external A.C. source.

FIGS. 10 and 11 show a shaver the power unit of which differs from that shown in FIGS. 8 and 9 in that the transformer instead of being within the shaver proper is carried by the connector plug, so that the weight of the shaver itself is materially reduced. Thus, the power unit shown in FIGS. 10 and 11 incorporates a cap 60 which carries only a binding post 61 for the extension cord 62, a terminal block 63, two contact pieces 64 and 65 which carry indexing elements 64*a* and 65*a*, respectively, and a rectifier 66.

The free end of the cord 62 has the transformer-carrying plug 67 attached thereto.

It will be seen from the above that irrespective of which power unit is used, the work unit may readily and easily be assembled thanks to the casing and motor mounting arrangement illustrated and described. Furthermore, the availability of a plurality of power units enables the shaver to be operated from any one of a number of different power sources, such as a battery carried by the shaver or an external battery, or an external source of alternating current. Thus, the term "power supplying means" as used throughout the instant specification and claims is deemed to include means which incorporate a source of electrical energy as well as means which do not by themselves incorporate such a source but which are connectible to one.

It will be understood that this invention is susceptible to modifications in order to adapt it to different usages and conditions, and, accordingly, it is desired to com-

prehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. A casing body work unit comprising a pair of similar reversed casing halves with each of said halves having an inwardly extending ledge portion, an end plate closing one end of said casing body and having portions thereon extending into said casing body to contact one face of said ledge portions, said end plate adapted to position a shaving head of a dry shaver, a cup-shaped element within said casing body and having portions contacting the opposed faces of said casing half ledge portions, an electric motor mounted within said cup-shaped element and operatively connected to said shaving head, a pair of threaded fastening members passing through the respective corresponding portions of said casing halves, end plate, and cup-shaped element to secure said components together, and an end cap having a power supply unit therein for said motor detachably mounted on the other end of said casing body.

2. The combination defined in claim 1 further comprising a switch actuator for said motor, said switch actuator comprising an elongated actuator element one end of which is pivotally received in a recess formed in aligned inwardly protruding portions of said shell halves that are located at touching edges thereof, said actuator element in the region of its other end being slidably arranged in aligned cut-outs of said shell halves located at the opposite touching edges thereof.

3. The combination defined in claim 2 wherein said switch actuator is including a resilient covering shield.

4. The combination defined in claim 1 further comprising clamping means inserted in grooves formed in said shell halves near said opposite end of said casing for preventing sliding movement of said shell halves relative to each other and fastening pins for further securing said shell halves to each other to prevent lateral displacement thereof.

5. The combination defined in claim 1 further comprising contact springs for supplying electrical energy to said motor, said contact springs being attached to said cup-shaped element in such a manner as to be capable of withstanding thrust and pressure.

6. The combination defined in claim 5 wherein said contact springs are in the form of leaf springs the free ends of which abut said shell halves.

7. The combination defined in claim 1 wherein said shell halves at said opposite end of said casing are formed with inwardly projecting tongues having outwardly opening recesses adapted to receive inwardly projecting portions of said end cap said tongue being formed with indexing cuts-cuts cooperating with indexing means carried by said power unit for assuring electrical connection of proper polarity between said motor and the power supply means of said power units.

8. The combination defined in claim 1 wherein one of said power units is a battery and wherein said casing further is provided with die-casted positioning studs for positioning a battery as a power supply unit coupled to said work unit.

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