

Jan. 24, 1967

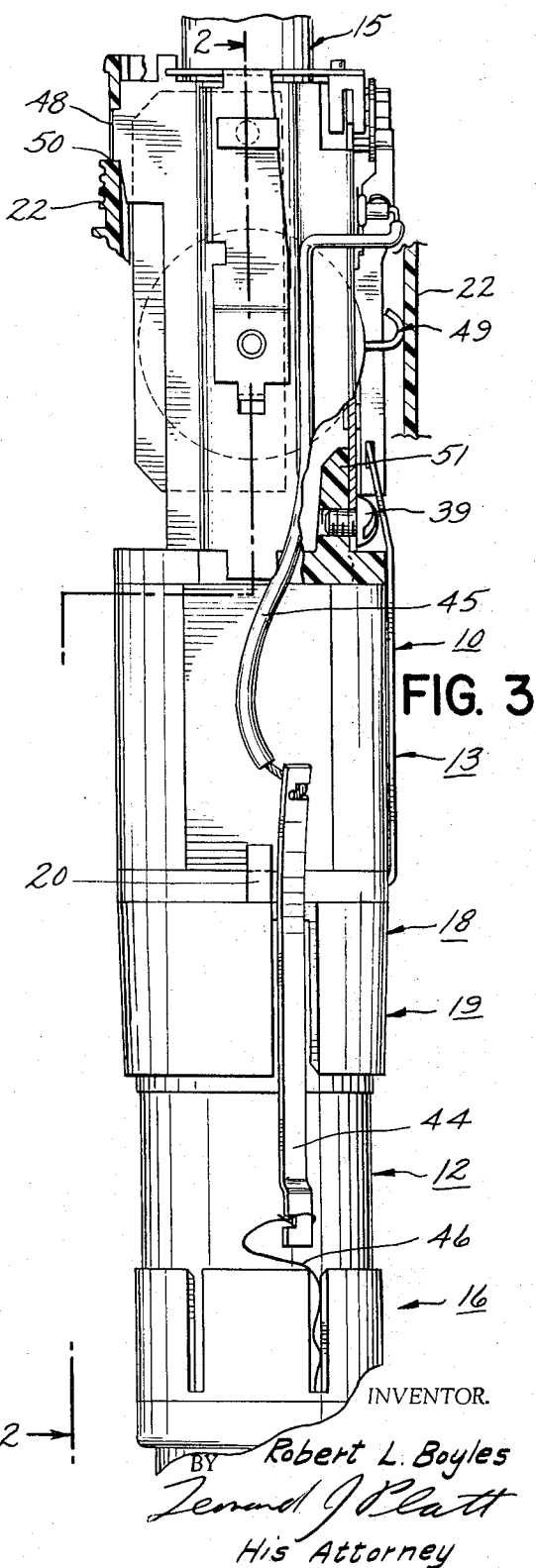
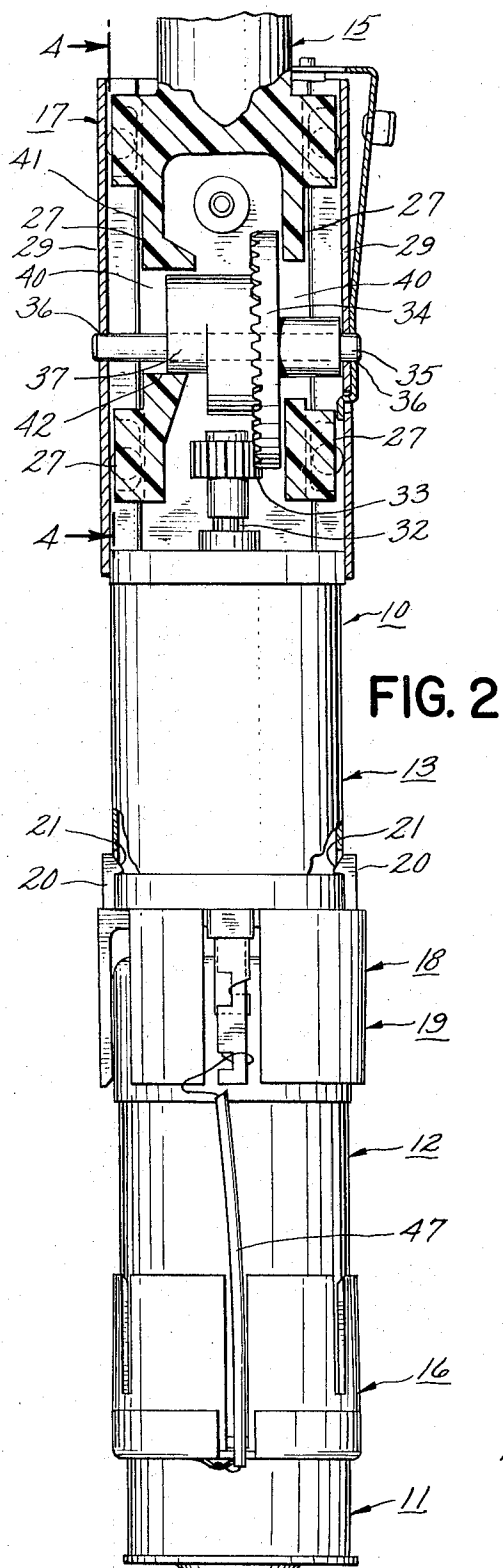
R. L. BOYLES

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TOOTHBRUSH POWER HANDLE ASSEMBLY

Filed April 2, 1964

3 Sheets-Sheet 2



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FIG. 4

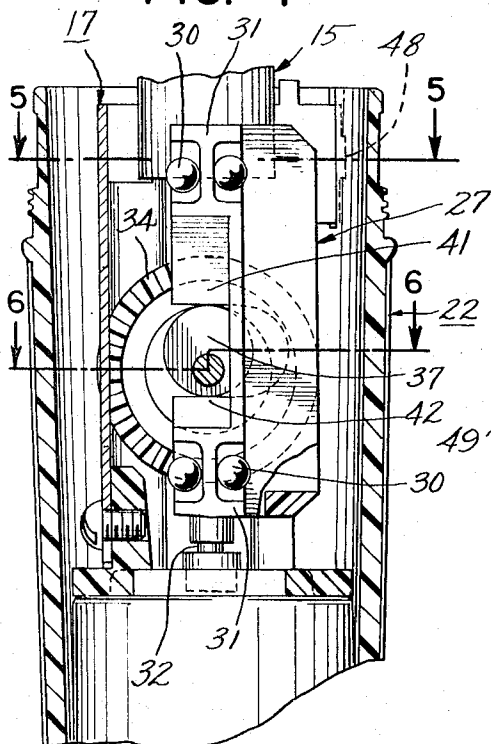


FIG. 5

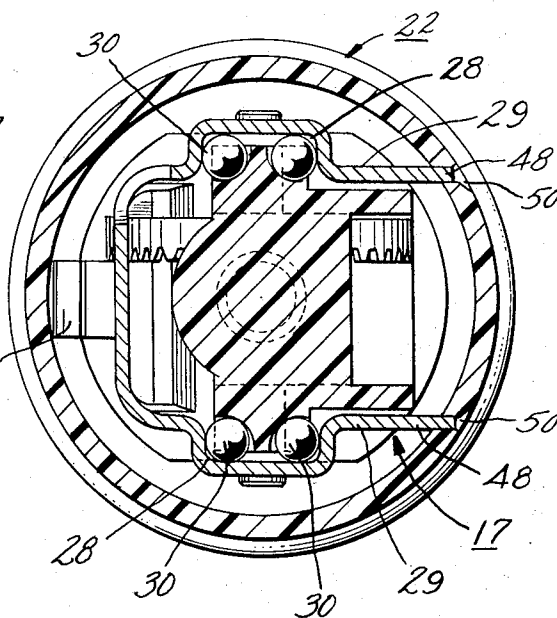
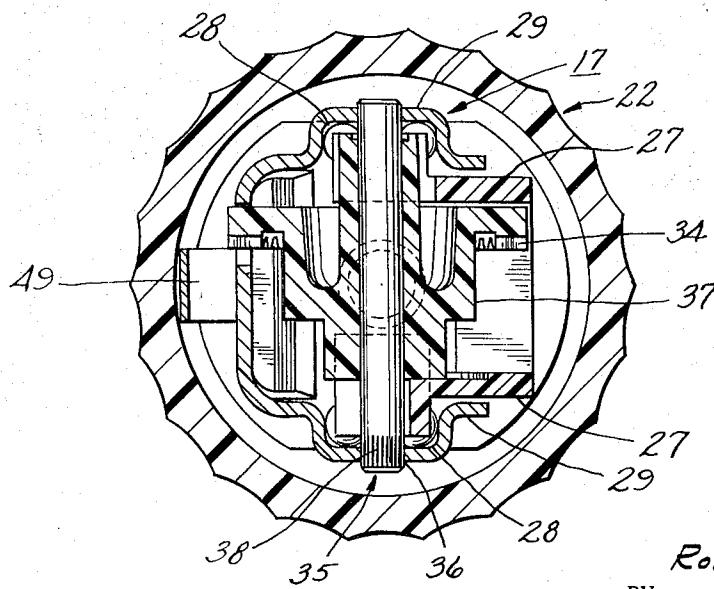


FIG. 6



INVENTOR.

Robert L. Boyles

BY

Edward Platt

His Attorney

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3,300,664

TOOTHBRUSH POWER HANDLE ASSEMBLY
Robert L. Boyles, Wayland, Mass., assignor to General
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6 Claims. (Cl. 310-50)

This invention relates to a power handle assembly for use with an electric toothbrush. More specifically, it relates to a power handle assembly which imparts reciprocal motion to a toothbrush.

Prior art toothbrush power handle assemblies have been constructed by assembling the power unit in a portion or portions of a casing, and then securing the casing portions together with various types of fastening devices. This manner of assembly necessitates the complete assembly of the power unit and housing before the power handle assembly can be tested. Should adjustment be required, the power handle assembly must be partially disassembled.

It is an object of this invention to provide an improved power unit for a toothbrush power handle assembly which may be assembled and tested outside of the handle casing and then easily inserted as a unit in the casing.

It is an object of this invention to provide a toothbrush power handle assembly construction which facilitates assembly and adjustment.

It is an object of this invention to provide a unitary frame upon which the various components of a power unit are assembled to form a complete power unit.

It is another object of this invention to provide a unitary frame which not only supports the power unit components, but is also provided with means for securing the power unit in a casing.

These objects are accomplished in accordance with this invention, in one form thereof, by providing a formed U-shaped unitary frame comprising a base portion, a pair of upstanding legs or side walls having channels formed therein, and a pair of tabs extending from the side walls. The various components of a power unit for a toothbrush power handle assembly are mounted on this unitary frame. A plunger which is mounted for reciprocal motion in the channels includes a toothbrush engaging portion. The power unit is completely assembled on the frame, and the electrical components wired, whereby the power unit may be tested and adjusted before being placed in a casing. A cylindrical casing which encloses the power unit is elastically deformed to an elliptical shape during insertion of the power unit within the casing. The return of the casing to its cylindrical shape causes the tabs on the upstanding legs to be engaged by the inner surface of the casing, thereby securing the power unit in the casing.

Other objects and further details of that which is believed to be novel in the invention will be clear from the following description and claims taken with the accompanying drawings wherein:

FIG. 1 is an exploded view of the toothbrush power handle assembly.

FIG. 2 is a top plan view of the power unit with the plunger and drive mechanism shown partially in section.

FIG. 3 is a side view of the power unit with portions broken away.

FIG. 4 is a sectional view taken substantially along line 4-4 of FIG. 2.

FIG. 5 is a sectional view taken substantially along the line 5-5 of FIG. 4.

FIG. 6 is a sectional view taken substantially along the line 6-6 of FIG. 4.

By reference to FIG. 1 of the drawings, it will be seen that in the preferred embodiment of this invention a power unit 10 comprises a charger 11, a battery 12, a rotary electric motor 13, a ratchet switch mechanism 14, and

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a reciprocating plunger 15. The charging coil or charger 11 is attached to the battery 12 by the coil holder 16. The battery in turn is attached to the motor 13 by the battery holder 18. The battery holder comprises a resilient insulating sheath 19 into which the battery is inserted, and resilient tabs 20 which extend away from the battery and engage the motor 13. The tabs 20 are provided with hooked ends 21 which engage matching pockets in the motor, as is best seen in FIG. 2. The motor is in turn attached to the formed frame 17 by a bolt 39 which passes through a hole in the base portion of the frame and is threaded into an upstanding lug 51 on the motor as can be best seen in FIG. 3. The power unit 10 is inserted in a cylindrical case 22, the charger end first. After placing the power unit 10 within the cylindrical case 22, a gasket or boot 23 is placed over the plunger and the cylindrical case, thereby sealing the power unit from the external atmosphere. The gasket is held over the plunger and the cylindrical case by a cover 24, which also secures the switch button 25 to the power handle assembly.

The reciprocating plunger mechanism is mounted within the formed frame 17 as is best shown in FIGS. 2 and 4 through 6. The plunger 15 includes a toothbrush-engaging portion 26 and two parallel spaced arms 27 extending from the toothbrush-engaging portion. The plunger 15 is supported for reciprocating motion with respect to the frame by a pair of U-shaped channels 28 formed in the upstanding legs or side walls 29 of the frame 17. Ball bearings 30, which are provided to reduce the friction between plunger 15 and the U-shaped channels 28, are received in H-shaped projections 31, two of which are formed on each of the parallel spaced arms 27.

In order to impart reciprocating motion to the plunger 15, a motion translation system is provided. The shaft 32 of the rotary electric motor 13 is provided with a pinion 33, which meets with a face gear 34. A shaft 35, which supports the face gear 34, extends transversely between the side walls 29, and is supported at each end by holes 36 in the side walls. The face gear 34 which is formed integrally with an eccentric cylindrical cam 37 is shown in cross section in FIG. 6. The face gear and cam are mounted for rotation on shaft 35. A serrated portion 38 is provided on the shaft 35 and engages one of the holes 36 in the side walls of frame 17 to prevent rotational and axial movement of the shaft.

Each of the arms 27 is provided with a slot or aperture 40, through which the ends of the shaft 35 pass. These slots 40 are elongated in the direction of the reciprocal motion of the plunger so that the plunger may reciprocate without the plunger arms 27 engaging the shaft 35. Reciprocal motion of the plunger 15 within the frame 17 is caused by engagement between the cam 37 and the inwardly projecting vertical abutments 41 and 42 formed on the inner surface of one of the arms 27 of the reciprocating plunger 15. The abutments 41 and 42 are formed on the sides of one of the apertures 40. Rotation of the cam 37 in response to the rotation of motor shaft 32, causes the cam to alternately engage the abutments 41 and 42 to cause reciprocating motion of the plunger with respect to the housing.

By reference to the power unit 10 shown in FIG. 1 and by reference to FIGS. 2 and 3, the integrally assembled and wired power unit 10 is best understood. Lead 43 connects one terminal of the motor 13 to the switch 14. Conducting strap 44 and conductor 45 connect one terminal of the battery to the remaining terminal of the switch. The closing of ratchet switch 14 causes the battery to be connected to the motor, through a series circuit comprising the strap 44, conductor 5, the contacts of switch 14, lead 43, and a direct connection between one of the brushes of the motor and the second battery terminal. Connec-

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tion is made between the charger terminals and the battery terminals by a charger lead 46 and the conducting strap 44, and a lead 47.

After all of the elements of a power unit have been assembled on the unitary frame 17, and the proper electrical connections made between the battery, switch and motor, it is possible to test the power unit for proper mechanical and electrical performance before inserting it in a case. Should the testing reveal improper operation, it is relatively easy to make the required adjustments, as no part of the power unit has been made inaccessible by assembly in a portion of the case.

The cylindrical case 22, which is made of a deformable resilient plastic, is squeezed into an elliptical configuration to permit insertion of the power unit within the case. The tabs 48 which extend from the upstanding side walls 29 of the frame, and the pressure finger 49 which is formed to project from the base of the frame, are used to secure the power assembly within the cylindrical case 22. The power unit is inserted within the case with the tabs 48 and pressure finger 49 being in alignment with the longer axis of the deformed, elliptically shaped case. The case is then released so that slots 50 in the cylindrical case engage and secure the tabs 48, while the pressure finger 49 abuts the inner wall of the case diametrically opposite the engagement of the tabs with the slots.

The power unit having been assembled on a unitary frame, wired and tested and now inserted in the cylindrical case, it is only necessary to enclose the open end of the case with the gasket or boot 23 and the cover 24, to complete the assembly of the toothbrush power handle assembly.

While a preferred embodiment of the invention has been shown, various other modifications and embodiments of the invention will be apparent to those skilled in the art, and it is intended to cover by the appended claims all said modifications as fall within the scope thereof.

What I claim is:

1. In an electric toothbrush, a power handle assembly comprising:
 - (a) a power unit including a unitary frame,
 - (b) a motor, a reciprocating plunger mechanism driven by said motor, and a switch for controlling said motor, all mounted on said unitary frame,
 - (c) a casing for containing said power unit having an inner wall,
 - (d) tab means extending outwardly from said unitary frame, said tab means having end surfaces frictionally engaging said inner wall,
 - (e) means extending from said frame in a direction opposite said tab means for resiliently urging said tab means outwardly so that the end surfaces are in tight frictional engagement with said inner wall to thereby securely hold said unitary frame within said casing.
2. The electric toothbrush power handle assembly defined in claim 1 wherein said unitary frame is provided with a pair of parallel spaced tabs projecting from said unitary frame, and a pressure finger extending from said unitary frame in a direction opposite said tabs, said tabs and said pressure finger engaging the inner wall of said casing to hold said power unit in position within the casing.
3. The electric toothbrush power handle assembly defined in claim 1 wherein the casing is made of a deformable resilient material and is provided with at least one slot on its inner surface so that the power unit may be inserted in the casing with said tab positioned within said slot.

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4. In an electric toothbrush a power unit comprising:
 - (a) a U-shaped frame having a base and two legs, a channel being formed in each of said legs,
 - (b) a motor attached to said frame, said motor including a shaft and a pinion mounted on said shaft,
 - (c) a plunger having projections protruding outwardly therefrom, said projections being mounted for reciprocating motion in said channels,
 - (d) a second shaft extending between said legs and supported thereby,
 - (e) a gear and cam mounted on said second shaft for rotation together, said gear being driven by said pinion and said cam engaging said plunger for effecting reciprocating motion thereof to cause reciprocating motion of a toothbrush.
5. In an electric toothbrush a power unit comprising:
 - (a) a U-shaped frame having a base and two legs, a channel being formed in each of said legs,
 - (b) a motor attached to said frame, said motor including a shaft and a pinion mounted on said shaft,
 - (c) a plunger comprising a toothbrush handle receiving portion, a pair of parallel spaced arms extending from said handle receiving portion, projections extending outwardly from said arms, said projections being received in said channels for supporting said plunger for reciprocating motion with respect to said frame, and a pair of abutments extending inwardly from one of said arms,
 - (d) a second shaft extending between said legs and supported thereby,
 - (e) a gear and cam mounted on said second shaft for rotation together, said gear being driven by said pinion and said cam engaging said abutments for effecting reciprocating motion of said plunger and a toothbrush attached thereto.
6. In an electric toothbrush a power unit comprising:
 - (a) a U-shaped frame having a base and two legs, a channel being formed in each of said legs,
 - (b) a motor attached to said frame, said motor including a shaft and a pinion mounted on said shaft,
 - (c) a plunger comprising a cylindrical toothbrush-engaging portion, a pair of parallel spaced arms extending from said toothbrush-engaging portion, a pair of projections extending outwardly from each of said arms, an elongated aperture being formed in each of said arms, a pair of inwardly extending abutments formed on the sides of one of said apertures,
 - (d) a second shaft extending between said legs and supported thereby, said second shaft passing through said apertures,
 - (e) a gear and cam mounted on said second shaft for rotation together, said gear being driven by said pinion and said cam engaging said abutments for effecting reciprocating motion of said plunger with said shaft reciprocating in said apertures, the reciprocating motion of said plunger causing reciprocating motion of a toothbrush attached thereto.

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MILTON O. HIRSHFIELD, *Primary Examiner.*

D. F. DUGGAN, *Assistant Examiner.*