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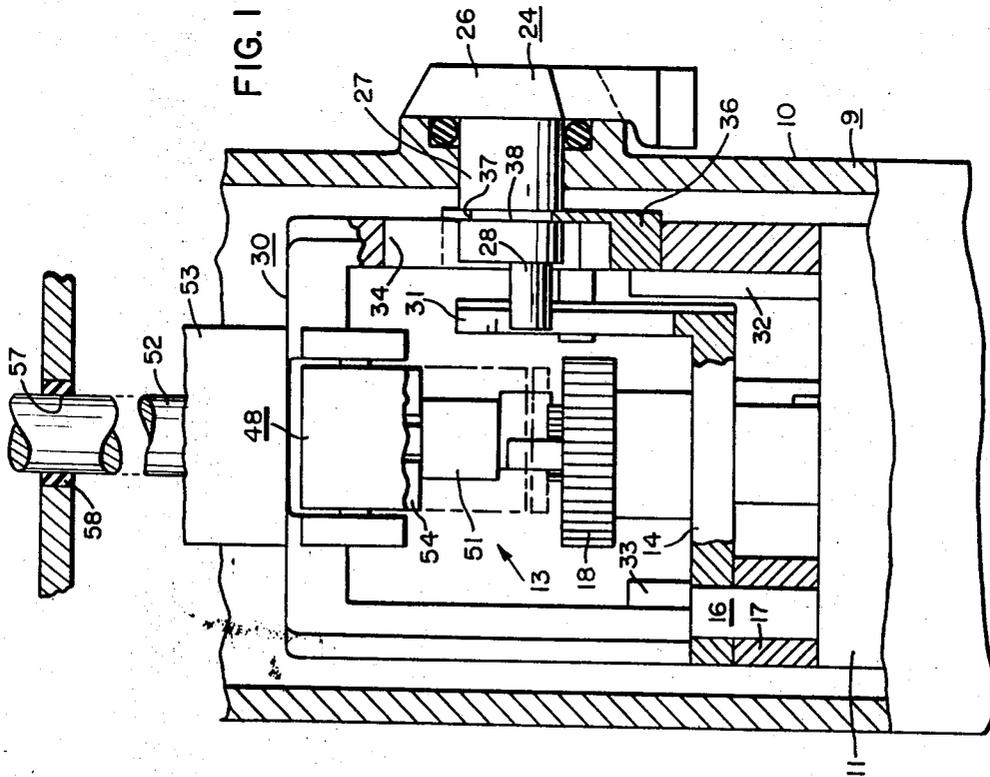
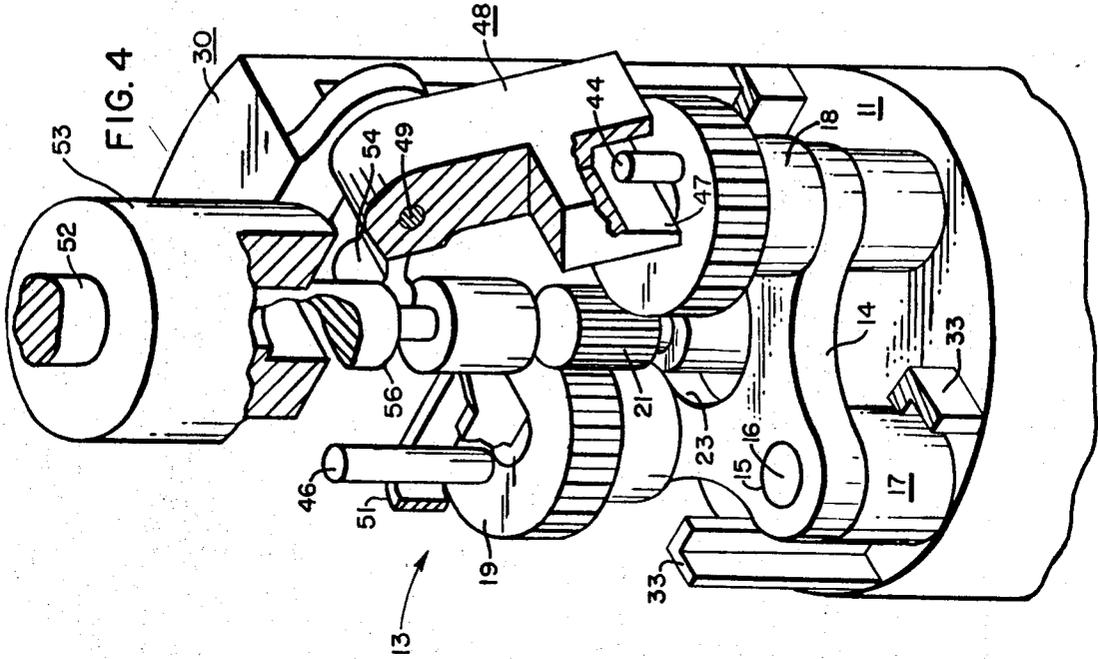
P. J. KIRCHER

3,546,501

DUAL MOTION TOOTHBRUSH

Filed Dec. 27, 1968

3 Sheets-Sheet 1



WITNESSES

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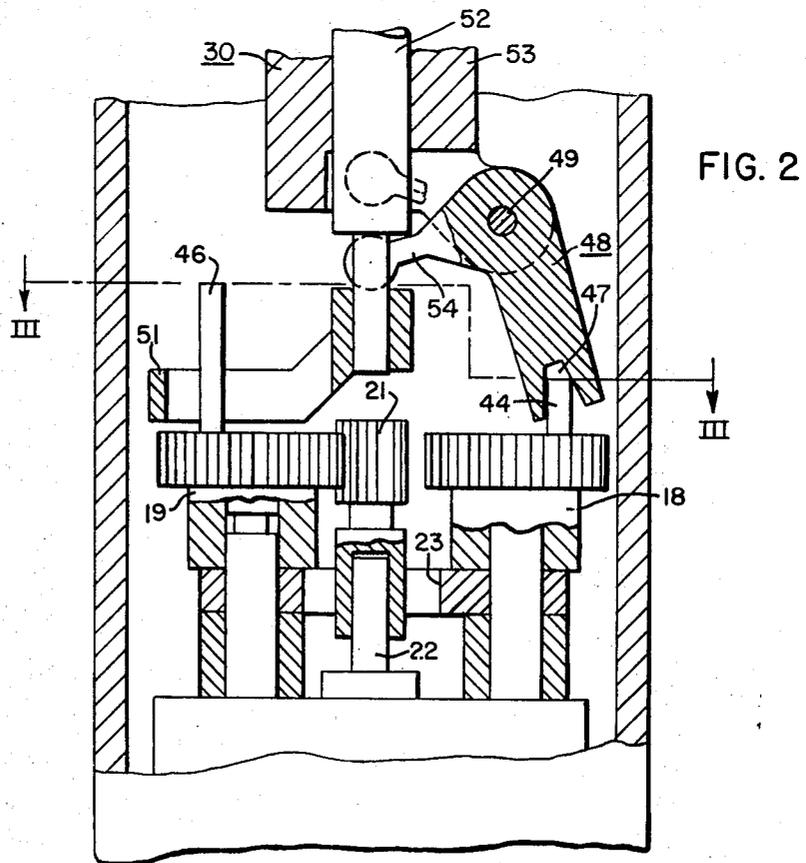
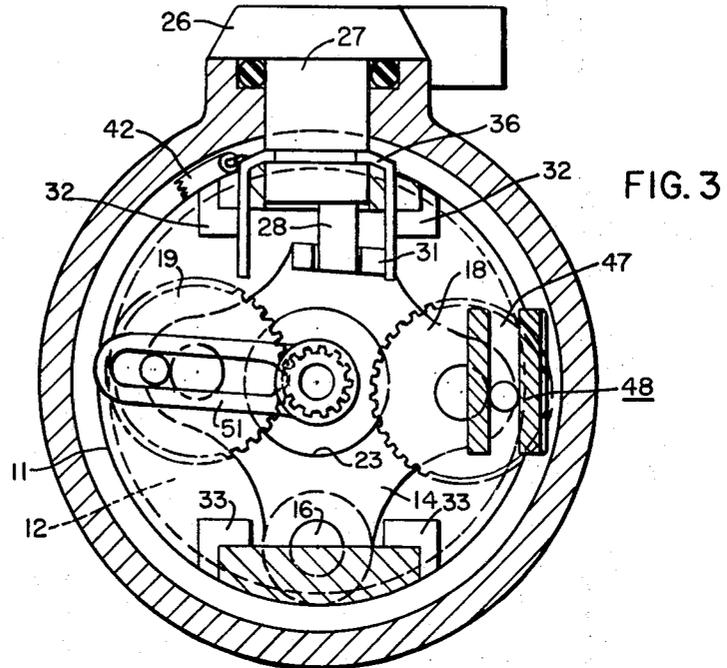
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DUAL MOTION TOOTHBRUSH

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8 Claims

ABSTRACT OF THE DISCLOSURE

A power operated toothbrush capable of two distinct modes of operation without the necessity of motor reversal. A shiftable gear frame supporting a pair of gears is mounted such that one or the other of the gears can be brought into engagement with a drive pinion attached to the output shaft of the motor. Each of the gears is provided with an eccentrically located pin for imparting movement to either a bell crank or a lever depending on which gear is being driven. The bell crank serves to impart reciprocatory motion to the brush while the lever effects oscillatory movement thereof.

BACKGROUND OF THE INVENTION

This invention relates, in general, to domestic appliances and, more particularly, to power operated toothbrushes.

In order to facilitate hygienic care of the teeth and gingival areas, a variety of power operated devices have been developed which are currently available to the consumer. The variety of such devices can be attributed to the long existing controversy as the efficacy of one brushing motion versus another. The most generally accepted of these devices employ mechanisms for imparting either pure oscillatory or pure reciprocatory motion to the toothbrush, acceptance being with laymen and dentists alike.

Normally, only one or the other of the above-mentioned motions is produced by any one power unit. One known exception to this is found in a power operated toothbrush which produces simultaneous oscillatory and reciprocatory motion. It will be apparent that this combination of motions neither satisfies the advocate of pure oscillatory motion nor the advocate of pure reciprocatory motion.

Since power operated toothbrushes can be purchased in accordance with one's preference as to motion, it is possible to satisfy all the members of a single family but only at the additional expense of buying a second, or even a third power toothbrush, if the preferences of all the members of the family do not coincide. For that matter, a single user may desire two separate power units if he brushes, for example, different portions of his teeth and gingival areas in different directions or by applying different motions thereto.

The need for a single power operated toothbrush capable of producing dual motion has been recently fulfilled in the prior art by the provision of having a reversible motor. While it is true that the reversible motor combined with motion transfer means yields the dual mode of operation desired, it is also true, that the required switching arrangement in motion transfer mechanism are quite intricate and costly.

Accordingly, the general object of this invention is to provide a new and improved power operated toothbrush.

It is a more particular object of this invention to provide an improved motion transfer mechanism, in a power operated toothbrush, which mechanism does not require a reversible motor and the complicated switch arrangement associated therewith.

SUMMARY OF THE INVENTION

Briefly, the above-cited objects are accomplished by the provision of a power operated toothbrush wherein the motion transfer mechanism is shifted into and out of engagement with the output of the motor. This is accomplished through manipulation of an actuator knob which in prior art constructions serves as an electrical switch actuator. By shifting the motion transfer mechanism the switching arrangement is completely eliminated.

The motion transfer mechanism comprises a pair of gears mounted on a shiftable gear frame, shifting of which, as mentioned above, is accomplished through the actuator knob. Movement of the knob, which in the preferred embodiment of the invention, is rotational, effects engagement of one or the other of the gears with a pinion carried by the output shaft of the motor. Each gear is provided with a pin eccentrically mounted along the diameter thereof. One pin engages a bifurcated or slotted arm of a bell crank to effect reciprocating movement of the shank member on which the toothbrush is mounted. The other of the pins engages an elongated slot in a lever arm attached to the shank member resulting in an oscillatory movement of the shank member about its longitudinal axis.

Further objects and advantages of the present invention will become more apparent when considered in view of the drawings in detailed description of the preferred embodiment.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view, partly broken away, of a power actuated toothbrush representing the invention;

FIG. 2 is an elevational view, partly broken away, of the device shown in FIG. 1, but rotated 90° clockwise from the position shown in FIG. 1;

FIG. 3 is a cross-sectional view taken along the line III-III of FIG. 2;

FIG. 4 is a perspective view of a motion transfer mechanism forming a part of the invention; and

FIG. 5 is a perspective view of the mechanism shown in FIG. 4, but viewed from a different angle.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, especially FIGS. 1 and 2, reference character 9 designates generally a power handle for a toothbrush. The handle 9 comprises an elongated hollow casing 10 having disclosed therein a motor 11, battery 12 generally disposed therebeneath (see FIG. 3), and a motion transfer mechanism generally indicated as 13.

The motion transfer mechanism 13 comprises a gear frame 14 shiftable mounted on top of the motor 11 by means of a pin 16 received in an aperture 15 of the frame and supported on a cylindrical support bearing 17. The frame 14 has rotatably supported on opposite sides thereof, a pair of gears 18 and 19, which are selectively engageable with a pinion 21 fastened to the output shaft 22 of the motor 11. The output shaft 22 extends upwardly through a central opening 23 in the frame 14 so that the pinion 21 is disposed intermediate the gears 18 and 19.

An actuator structure 24 comprises a knob 26, made from any suitable material, for example, plastic. The structure 24 further comprises a metallic shaft 27 provided with an eccentrically disposed pin 28 on the end thereof opposite the end associated with the knob. The structure 24 which is mounted in a manner to be discussed hereinafter, serves to shift the gear frame 14 through engagement of the pin 28 with one or the other of the walls defining an elongated slot 29 of a coupling member 31, which engagement is effective through rotation of the knob 26.

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Pairs of L-shaped channel members 32 and 33 carried by the motor casing receive opposed legs of an inverted substantially U-shaped support structure 30. One of the opposed legs has an opening 34 through which the pin 28 and shaft 27 extend in order to engage the coupling member 31. Mounted on the last mentioned leg in registry with the opening 34, is an element 36 which serves to retain the actuator structure 24. To this end the shaft 27 is provided with a reduced area 37 and an adjacent shoulder 38, the former of which is received in a slot 39 in the element 36, and the latter of which, engages the side of the element 36 nearest the opening 34. Such engagement prevents withdrawal of the actuator structure through an opening 41 in the casing 10 once the power handle has been assembled.

An electrical lead 42 attached to the electrically conducting element 36 on the one end, is attached at its other end to the negative side of the battery 12. An electrical lead 43 is attached to the positive brush of the motor 11 and to the positive side of the battery 12 while the negative brush of the motor is attached to the metallic gear frame 14. It can now be seen that a closed circuit can be established between the motor and the battery through rotation of the knob 26 which causes engagement of the pin 28 with the coupling member 31. The circuit referred to may be traced in one direction from the pin 28 to the shaft 47, element 36, lead 42, and to the negative side of the battery, and in the other direction, to the coupling member 31, gear frame 14 and to the negative brush of the motor.

The gears 18 and 19 are, respectively, provided with pins 44 and 46 which are eccentrically mounted along the diameters thereof. The pin 44 is received in a slotted end 47 of a bell crank 48 which bell crank is pivotally mounted to the support bracket 30 by means of a pin member 49. It will be appreciated that when the eccentric pin 44 is rotated with the gear 18, it effects oscillatory movement of the bell crank.

The pin 46 is received in the slot of a slotted arm 51 which arm is secured to the lower end of a brush mounting shaft 52. The shaft 52 extends upwardly from the arm 51 through a collar member 53 forming a part of the bracket 30. It can now be seen that rotation from the pin 46 imparts oscillatory motion or movement of the arm 51 and, consequently, the shaft 52 about the longitudinal-axis. Since the shaft 52 is free to move through the collar 53, the motion given to the bell crank 48 is imparted to the shaft 52 through engagement of a bifurcated end 54 of the bell crank with the shoulder 56 of the shaft 52. The shaft 52 extends through an opening 57 in a seal member 58 disposed in the upper end of the casing 10.

Since numerous changes may be made in the described apparatus and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. A power handle for a toothbrush, said power handle comprising:
a hollow casing,
brush supporting structure protruding through one end of said casing,
a unidirectional motor and associated drive means,
means for transferring motion to said brush supporting structure from said drive means,
said drive means being operable in only a unidirectional mode by said motor and said motion transfer means being selectively operable to positively drive said brush supporting structure in either one of at

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least two distinct motions different from the motion of said drive means,

one of said distinct motions comprising an oscillatory motion about the axis of the longitudinal extent of said brush supporting structure.

2. Structure as specified in claim 1 wherein:

said motion transfer means comprises a gear frame supporting a pair of gears, said gear frame being shiftably mounted to enable selective engagement of one or the other of said gears with said drive means.

3. Structure as specified in claim 2 wherein:

each of said gears is provided with means for engaging members capable of producing oscillatory motion, one of said members engaging said brush supporting structure such that it effects reciprocatory movement thereof and the other of said members engaging said supporting structure such that it effects oscillatory movement thereof.

4. Structure as specified in claim 2 including:

an electrical circuit comprising said gear frame, and an actuator means extending through said casing and engageable with said gear frame for manually effecting shifting of said gear frame and simultaneously closing said electrical circuit.

5. Structure as specified in claim 4 wherein:

said actuator means comprises a transversely extending shaft having a pin eccentrically mounted on the end thereof and engageable with a coupling member forming a part of said gear frame.

6. Structure as specified in claim 3 wherein:

said one of said members comprises a bell crank, and said another of said members comprises a slotted arm affixed to said brush supporting structure.

7. Structure as specified in claim 6 wherein:

said means for engaging members capable of oscillatory motion comprise eccentrically mounted pins carried by said gears.

8. A power handle for a toothbrush, said power handle comprising:

a hollow casing,
brush supporting structure mounted in said casing and having one end protruding therefrom,
a unidirectional motor in said casing,
a battery for supplying power to said motor,
means interconnecting said brush supporting structure and said motor, said interconnecting means providing positive drive means imparting either one of two distinct modes of operation to said supporting structure,

at least one of said two modes of operation comprising an oscillatory motion about the axis of the longitudinal extent of said brush supporting structure, and mechanical means for selectively rendering said interconnecting means operable in one or the other of said modes of operation.

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