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H. R. FLATT
ELECTRICALLY OPERATED APPARATUS FOR PRODUCING
OSCILLATORY MOTION OF A TOOTHBRUSH
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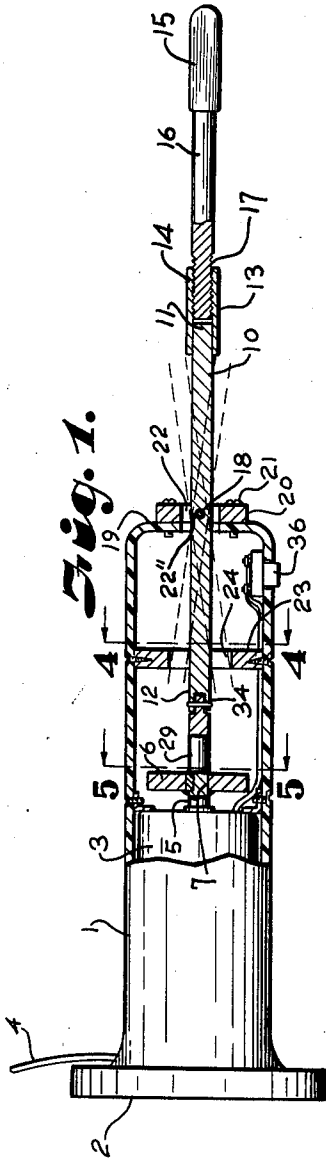


Fig. 1.

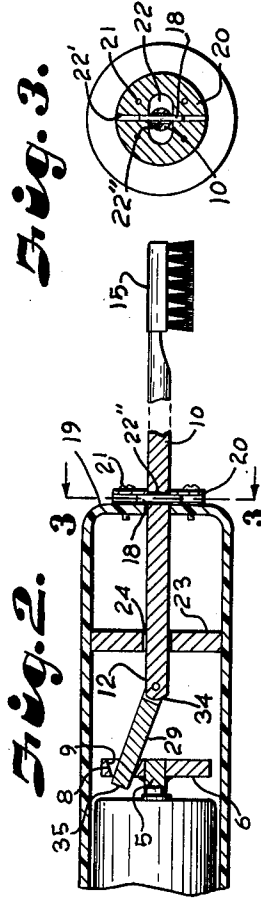


Fig. 2.

Fig. 3.

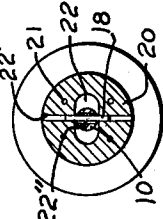


Fig. 6.

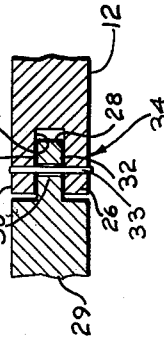
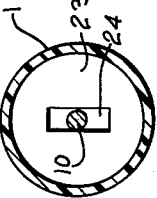


Fig. 5.



Fig. 4.



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ELECTRICALLY OPERATED APPARATUS FOR PRODUCING OSCILLATORY MOTION OF A TOOTHBRUSH

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4 Claims. (Cl. 74-48)

This invention relates to electrically operated toothbrushes.

The principal objects of the present invention are; to provide a hand-held electrically operated toothbrush holder which imparts a reciprocatory motion to the brush in the direction of the intervals between the teeth and permits the brush to be directed to any region of the tooth structure; to provide such a device which includes a novel mechanical linkage for translating rotary motion into reciprocal motion; to provide such a device which is simple in construction and, therefore, inexpensive to produce and market; and to provide such a device which comprises a convenient integral stand for maintaining the brush out of contact with the surroundings.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a side elevational view partly in section, showing the motion-translating linkage of this invention.

FIG. 2 is a fragmentary sectional view rotated 90 degrees from FIG. 1 showing the motion-translating linkage from a different vantage point.

FIG. 3 is a sectional view taken on the lines 3-3, of FIG. 2, showing the pin mounting of the projecting rod.

FIG. 4 is a sectional view taken on the lines 4-4, of FIG. 1, showing the stationary disc and guide slot therein.

FIG. 5 is a sectional view taken on the lines 5-5, of FIG. 1, showing the rotating disc with the offset aperture therein.

FIG. 6 is a detailed sectional view of the joint between the orbiting link and the projecting rod.

Referring more in detail to the drawings:

The reference numeral 1 generally indicates an elongated housing containing the operating mechanism of this invention. The housing 1 is formed so as to be conveniently held in the hand and carries at the rearward end thereof a pedestal 2 which supports the housing 1 in a vertical position when the device is not in use. The housing 1 contains an electric motor 3 preferably of the type operable with the usual 60-cycle alternating current found in most households. The motor 3 receives current through electric transmission wires 4.

The motor 3 contains a shaft 5 extending longitudinally of the housing 1 and adapted to be rotated at approximately 360 r.p.m. by said motor, although such speed is not critical. A disc 6 is secured at the center 7 thereof to the shaft 5 for rotation therewith in a plane transverse to the housing 1. The rotating disc 6 contains an aperture 8 therethrough which is offset from the center thereof. The aperture 8 extends substantially longitudinally of the housing 1, but is formed by sloping bearing edges 9 for a purpose hereinafter described.

A rod 10 having an outer end 11 and an inner end 12 projects outwardly of the housing 1 and also extends inwardly thereinto substantially longitudinally of the housing 1. The outer end 11 has a collar 13 fixed thereto which extends forwardly of the outer end 11 and terminates in an internally threaded cylindrical portion 14. The cylindrical portion 14 is adapted to receive a toothbrush 15 supported upon a shaft 16 carrying a threaded end 17. It is apparent that various toothbrushes similar

to the toothbrush 15 may be interchanged therewith to provide sanitary convenience for several persons in a household who wish to use separate toothbrushes with a single electrically operated toothbrush holder.

A pin 18 is mounted transversely to the housing 1 on the forward end 19 thereof by means of a plate 20 retained thereon with screws 21. The plate 20 contains a slot 22 therethrough for receiving the rod 10, and a bore 22' intersecting the slot 22. The pin 18 is maintained in the bore 22' and extends through a transverse receiving hole 22'' in the rod 10 to pivotally secure the rod 10 with respect to the housing 1 and at a location spaced forwardly from the rotating disc 6. A stationary member or disc 23 is secured transversely in the housing 1 and between the pin 18 and the rotating disc 6. The stationary disc 23 has a slot 24 therethrough extending in a direction transversely of the pin 18, and adapted to receive and guide the rod 10 in a lateral reciprocal path about the pin 18 (as indicated by the broken lines in FIG. 1) but preventing substantial movement at right angles to said path. The inner end 12 of the rod 10 extends through the slot 24 and terminates in a joining means in the form of a pair of integral spaced ears 25 and 26 each having an inner surface 27 and 28 which are mutually parallel and positioned at right angles to the extending direction of the slot 24.

A link 29 has a forward end 30 exhibiting spaced opposed parallel outer surfaces 31 and 32 positioned respectively in contacting or closely spaced relation with respect to the inner surfaces 27 and 28 of the ears 25 and 26. A pin 33 extends through the ears 25 and 26 and the forward end 30 of the link 29 transversely to the inner surfaces 27 and 28 forming a joint 34 which is pivotable only in a plane parallel to the inner surfaces 27 and 28.

The rearward end 35 of the link 29 extends into and through the aperture 8 which acts as a retainer therefor. The edges 9 of the aperture 8 surrounds the rearward end 35 and provides a bearing surface to support the rearward end 35 during rotation of the disc 6, but permits relative movement therebetween.

The rotating disc 6 imparts an orbital path to the rearward end 35 of the link 29. The inner end 12 of the rod 10, however, is permitted movement only in a lateral direction as guided by the slot 24 about the pin 18. It can, therefore, be seen that the vertical component of motion imparted to the rearward end 35 (as seen in FIG. 2) cannot be imparted to the rod 10, but is passively permitted by the bending or pivoting of the joint 34. The horizontal component of the orbital path, however, cannot produce a bending or pivoting of the joint 34, but rather, is transmitted to the inner end 12 of the rod 10, producing a lateral reciprocatory motion about the pin 18 which produces a corresponding reciprocating or vibratory path of the toothbrush 15 in an upwardly and downwardly direction which facilitates cleaning of the teeth.

A push button switch 36 may be mounted on the housing 1 to provide a convenient control for actuating the motor 3 to initiate the reciprocatory motion of the toothbrush.

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

What I claim and desire to secure by Letters Patent is:

1. An apparatus for producing reciprocatory motion comprising; an elongated housing; rotating means contained in said housing; an eccentric member rotated by said rotating means in a plane transverse to said housing;

a rod having an outer end projecting from said housing and an inner end extending thereinto; means pivotally securing said rod intermediate the ends thereof to said housing at a location spaced forwardly from said eccentric member; a stationary member secured in said housing between said rod-securing means and said eccentric member; said stationary member having a slot there-through extending laterally of said housing and adapted to receive and guide said rod inner end in a lateral path but preventing substantial movement at right angles to said path; said rod inner end extending through said slot and terminating in a joining means; a link having a forward end and a rearward end, said link forward end being joined by said joining means to said rod inner end forming a joint pivotable only in a plane transverse to the extending direction of said slot, said link rearward end being maintained in operational relation with respect to said eccentric member whereby said link rearward end is directed in an orbital path which is translated to a reciprocatory path for said rod outer end.

2. In an electrically operated toothbrush, a motion converting device comprising; an elongated housing forming a handle; rotating means contained in said housing; an eccentric member rotated by said rotating means in a plane transverse to said housing; a rod having an outer end projecting from said housing and an inner end extending thereinto; means pivotally securing said rod intermediate the ends thereof to said housing at a location spaced forwardly from said eccentric member; a stationary member secured in said housing between said rod-securing means and said eccentric member; said stationary member having a slot therethrough extending laterally of said housing and adapted to receive and guide said rod inner end in a lateral path but preventing substantial movement at right angles to said path; said rod inner end extending through said slot and terminating in a joining means; a link having a forward end and a rearward end, said link forward end being joined by said joining means to said rod inner end forming a joint pivotable only in a plane transverse to the extending direction of said slot, said link rearward end being retained on said eccentric member and offset from the axis of rotation of said eccentric member whereby said link rearward end is directed in an orbital path which is translated to a lateral reciprocatory path for said rod outer end.

3. In an apparatus for producing oscillatory motion the combination of; a supporting means; a prime mover supported by said supporting means; a shaft extending longitudinally from said prime mover and adapted to be rotated thereby; an eccentric member secured to said shaft for rotation therewith in a plane transverse to said shaft, said rotating eccentric member having a retainer offset from the axis of said shaft; an elongated rod having an outer end and an inner end, said rod extending substantially longitudinally of said shaft; means for pivotally securing said rod intermediate the ends thereof at a location on said supporting means spaced forwardly from said eccentric member; a stationary member secured on said supporting means transversely of said shaft and between said pivotal securing means and said eccentric

member, said stationary member having a slot there-through extending laterally of said shaft and adapted to receive and guide said rod in a lateral path about said pivotal securing means but preventing substantial movement at right angles to said path; said inner end extending through said slot and terminating in a joining means; a link having a forward end and a rearward end, said link forward end being joined to said inner end by said joining means forming a joint pivotable only in a plane perpendicular to said slot, said link rearward end being secured by said retainer whereby said eccentric member imparts an orbital path to said link rearward end which is translated to a lateral oscillatory path in said rod outer end.

4. In an electrically operated toothbrush, a motion converting device comprising the combination of; an elongated housing formed to be held in the hand; an electric motor contained in said housing; a shaft extending longitudinally of said housing and adapted to be rotated by said motor; a disc secured at the center thereof to said shaft for rotation therewith in a plane transverse to said housing, said rotating disc having an aperture there-through offset from the center thereof and extending substantially longitudinally of said housing; a rod having an outer end projecting from said housing and an inner end extending substantially longitudinally thereinto; a first pin mounted transversely to said housing and pivotally securing said rod to said housing at a location spaced forwardly from said rotating disc; a stationary disc secured transversely in said housing and between said first pin and said rotating disc, said stationary disc having a slot therethrough extending in a direction transversely of said first pin and adapted to receive and guide said rod in a lateral reciprocal path about said first pin but preventing substantial movement at right angles to said path; said rod inner end extending through said slot and terminating in a pair of integral spaced ears each having a mutually parallel inner surface at right angles to the extending direction of said slot; a link having a forward end and a rearward end, said link forward end exhibiting spaced opposed parallel outer surfaces respectively positioned in closely spaced relation with respect to said inner surfaces of said ears; a second pin extending through said ears and link forward end transversely to said inner surfaces forming a joint pivotable only in a plane parallel to said inner surfaces; said link rearward end extending into said aperture whereby said rotating disc imparts an orbital path to said link rearward end which is translated to a lateral reciprocatory path for said rod outer end.

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