

Sept. 20, 1971

TEIJI IGARASHI ET AL

3,605,734

MOUTH CLEANER

Filed Dec. 24, 1968

4 Sheets-Sheet 1

Fig. 2

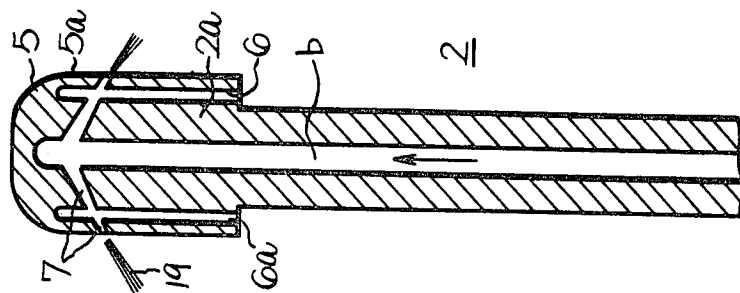
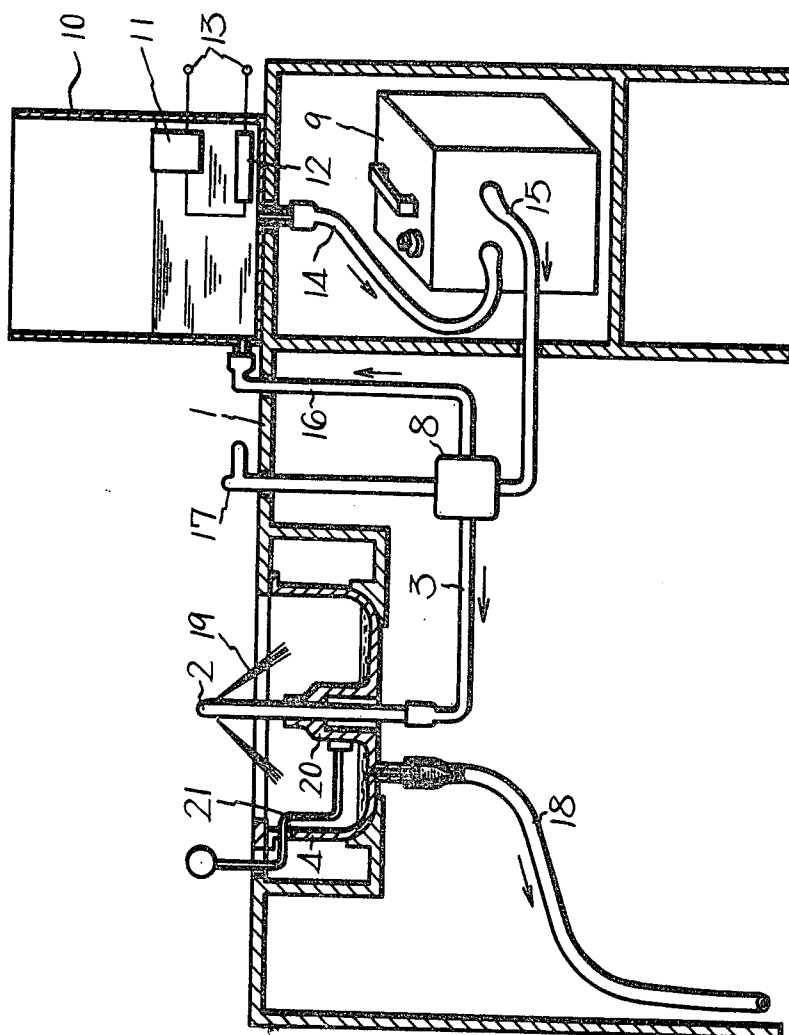


Fig. 1



INVENTORS
Teiji Igarashi
Kinji Ando

BY *Will, Sherman, Mami, Cross & Sons* ATTORNEYS

Sept. 20, 1971

TEIJI IGARASHI ET AL

3,605,734

MOUTH CLEANER

Filed Dec. 24, 1968

4 Sheets-Sheet 2

Fig. 3

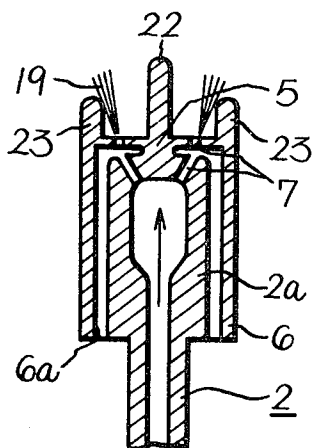


Fig. 4

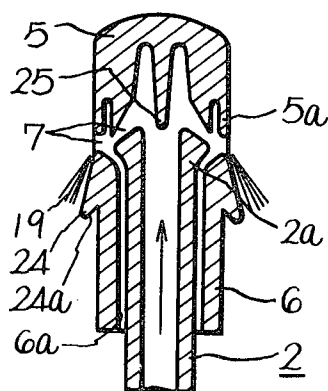


Fig. 5

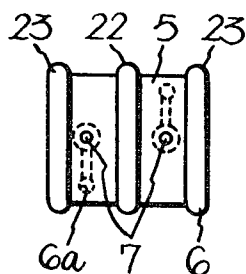
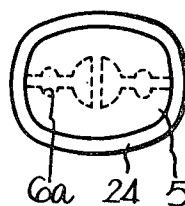


Fig. 6



INVENTORS
Teiji Igarashi
Kinji Ando
BY *Kell, Sherman, Mann, & Simpson* ATTORNEYS

Sept. 20, 1971

TEIJI IGARASHI ET AL

3,605,734

MOUTH CLEANER

Filed Dec. 24, 1968

4 Sheets-Sheet 3

Fig. 7

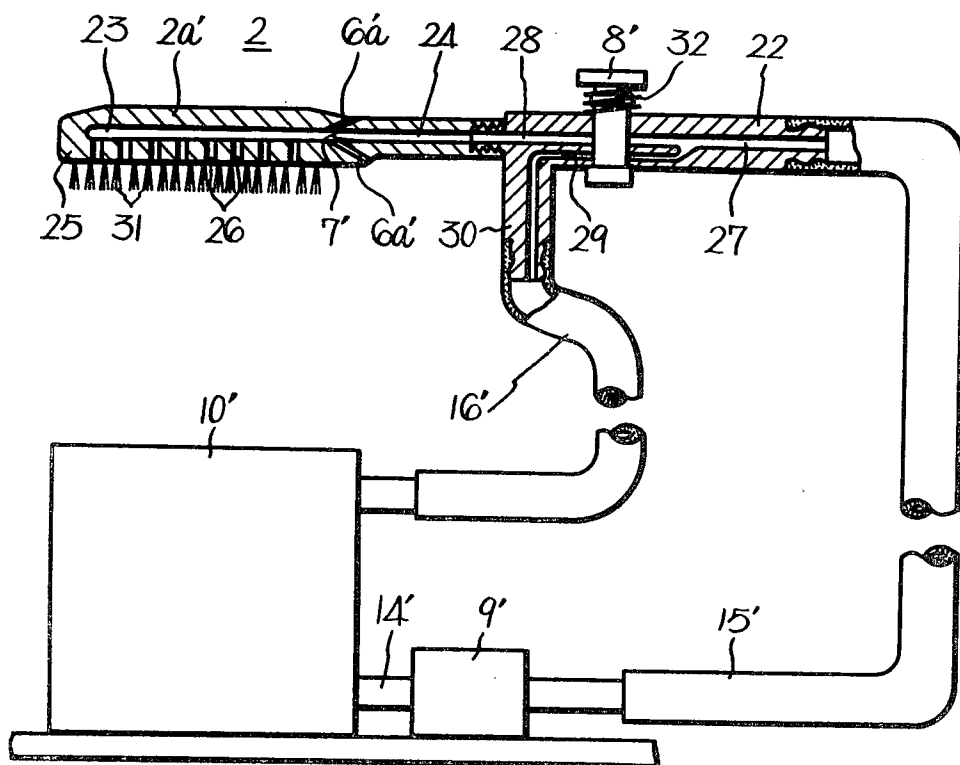
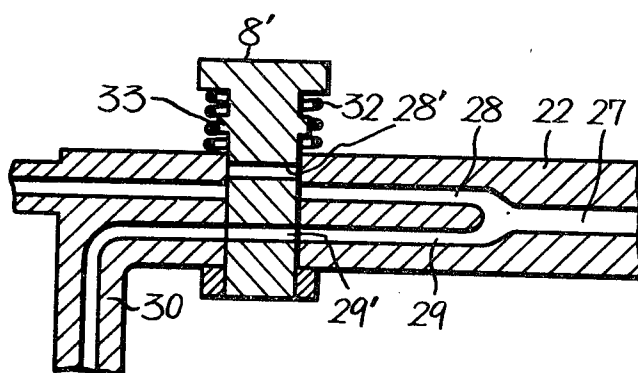


Fig. 8



INVENTORS
Teiji Igarashi
Kinji Ando

BY *Teiji Igarashi, Kinji Ando* ATTORNEYS

Sept. 20, 1971

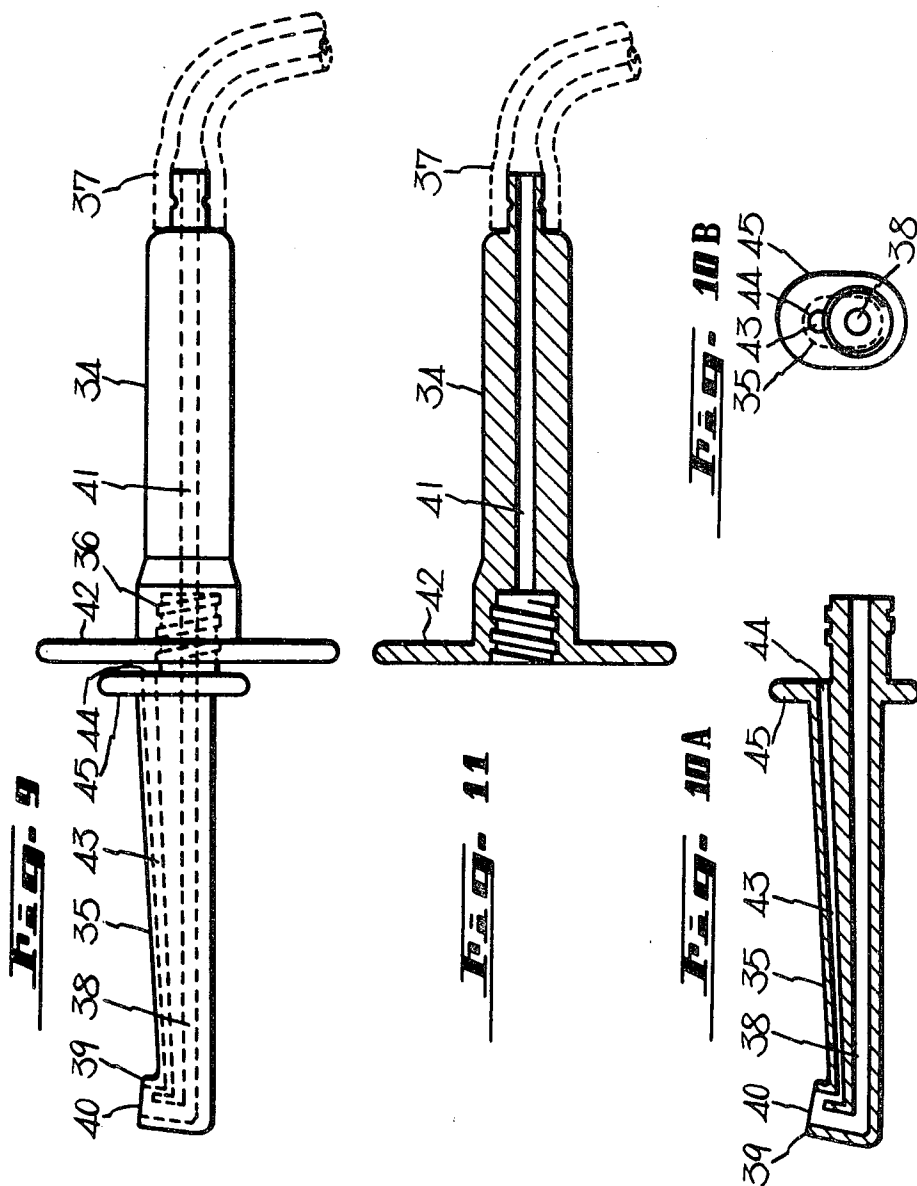
TEIJI IGARASHI ET AL

3,605,734

MOUTH CLEANER

Filed Dec. 24, 1968

4 Sheets-Sheet 4



INVENTORS
Teiji Igarashi
Kinji Ando

BY *Hill, Sherman, Morris, and Singer* ATTORNEYS

1

3,605,734

MOUTH CLEANER

Teiji Igarashi and Kinji Ando, Tokyo, Japan, assignors to Cosmo Denshi Kabushikikaisha (Cosmo Electronics Corporation), Tokyo, Japan

Filed Dec. 24, 1968, Ser. No. 786,607

Claims priority, application Japan, Dec. 30, 1967,

42/110,872, 42/110,873

Int. Cl. A61h 9/00

U.S. Cl. 128—66

3 Claims

ABSTRACT OF THE DISCLOSURE

A mouth cleaner comprising a mouthpiece or a tube to be inserted into the mouth and a conduit pipe for supplying the tube with liquid, the tube being equipped at one end nozzles for jetting the liquid inward into the mouth and with an air inlet for mixing air bubbles with the liquid.

BACKGROUND OF THE INVENTION

This invention relates to a mouth cleaner, and more particularly to a mouth cleaner which is adapted such that minute air bubbles are mixed in pressurized fluid when jetted into the mouth and supersonic waves, produced when the air bubbles break and having effects similar to those given by massage, clean the mouth and prevent tooth decay and the development of alveolar blennorrhoea.

SUMMARY OF THE INVENTION

One object of this invention is to provide a mouth cleaner which, using liquid that contains air bubbles, washes with supersonic waves the mouth and every nook and corner of teeth and massages gums to prevent tooth decay and the development of alveolar blennorrhoea.

Another object of this invention is to provide a mouth cleaner which is adapted to prevent waste liquid from closing the air inlet and making the mixing of air bubbles uncertain and to forbid the liquid to stream in the reverse direction through the air inlet and stain hands when the mouthpiece or the tube inserted into the mouth is blocked at its end nozzles with the mouth wall, tongue or gum.

Other objects, features and advantages of this invention will become apparent from the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic arrangement diagram, partly in cross-section, of one example of a mouth cleaner according to this invention;

FIG. 2 is an enlarged cross-sectional view of one example of the principal part of the mouth cleaner according to this invention;

FIGS. 3 and 4 are enlarged cross-sectional views of cleaner;

modified forms of the principal part of the mouth

FIGS. 5 and 6 are plan views of the principal parts of the mouth cleaner exemplified in FIGS. 3 and 4;

FIG. 7 is a schematic arrangement diagram, partly in cross-section, of another example of the mouth cleaner of this invention;

FIG. 8 is an enlarged cross-sectional view of one portion of the mouth cleaner shown in FIG. 7;

FIG. 9 schematically shows another example of one unit of the mouth cleaner according to this invention;

FIG. 10A shows the principal part of the unit depicted in FIG. 9;

FIG. 10B is its end view; and

2

FIG. 11 is a cross-sectional view of a tubular grip of the mouth cleaner into which the mouthpiece shown in FIG. 10A is screwed.

DESCRIPTION OF THE PREFERRED

EMBODIMENTS

Referring to FIG. 1, a description will be given in connection with one embodiment of this invention. Reference numeral 1 indicates a case inside and outside of which are installed various elements of the mouth cleaner. The mouth cleaner of this invention consists of a tubular member 2 which is to be inserted into the mouth and a flexible conduit pipe 3 which supplies liquid to the tubular member. From the center of a vessel 4 for liquid installed inside the case 1 the tubular member 2 protrudes upward outside the case 1. The upper end of a channel *b* in the middle of the tubular member 2 is closed by a cap 5 and the cap and the tubular member constitute an outside pipe 6. Through the space made between the top of the wall 2*a* of the tubular member and the wall 5*a* of the cap 5 the liquid pushed upward from the tubular member goes out. Such spaces are made at two points, which form nozzles 7. The nozzles 7 are formed obliquely downward against the axis of the tubular member and the liquid is jetted from the nozzles toward the inside of the mouth. The angle of the nozzle 7 to the axis or the central channel of the tubular member can be widened to the maximum of 90 degrees. Therefore, the liquid will never be jetted directly toward the throat. The outer channel formed between the tubular member 2 and the cap 5 has an opening at the lower end 6*a* and the open air comes in freely from there. So when liquid runs upward inside the tubular member 2 as shown by an arrow and is jetted obliquely from the nozzles to the outside, the air is sucked in from the lower opening 6*a* due to the negative pressure produced inside the outer channel. This air, when mixed with liquid, forms air bubbles and the liquid containing numerous air bubbles is jetted from the nozzles 7 to the outside.

It is known that when minute air bubbles contained in liquid become extinct, supersonic waves are produced in the liquid and that liquid containing supersonic waves has effects similar to those of massage and does a very effective washing. Consequently, if the upper part of the tubular member 2 with the cap 5 attached is inserted into the mouth and the liquid containing air bubbles is jetted toward the inside of the mouth, the mouth can be effectively cleaned and at the same time gums and mouth wall will be treated with massage.

The tubular member 2 is connected with a liquid tank 10 through a conduit pipe 3, a change-over cock 8 and a pump 9. So liquid is supplied from this tank 10. The tank 10 contains either plain water or some medical liquid. If necessary, an electric heater 12 which can be controlled by a bimetal 11 is installed inside the tank 10 to keep the liquid at an appropriate temperature. Terminals 13 will be connected with a suitable power source.

The tank 10 and the pump 9 are connected with a conduit pipe 14. The liquid coming from the tank 10 streams to the pump 9, then to a conduit pipe 15 and to the change-over cock 8. The change-over cock 8 operated by a lever 17 changes the flow of the liquid coming from the pipe 15 either to the tubular member 2 through the conduit pipe 3 or back to the tank 10 through another pipe 16. A pipe 18 is to abandon waste liquid from the vessel 4.

FIGS. 3 to 6 shows modifications of the principal part of this invention, in which similar elements to those in FIG. 2 are identified by similar reference numerals.

In FIGS. 3 and 5 nozzles 7 are directed obliquely up-

ward against the axis of the tubular member 2 and their openings are located symmetrically on both sides of a central projectile 22 on the upper surface of the cap 5. On the top surface of the cap 5 are three projectiles: one in the center and one each on both sides of the central one. The central projectile 22 is taller than the other two 23. So if the central projectile is held between the lower and the upper teeth, the liquid containing air bubbles will be jetted from the nozzles 7 to the outer side of the gums. In this case, if the tubular member is held loosely and the person who holds it shakes his head horizontally, the mouth cleaner will massage up to the furthest part of the outside of the gums. In this case the liquid containing air bubbles will be jetted obliquely upward to the sides but will be stopped by the gums and will not run deep into the throat.

FIGS. 4 and 6 show nozzles 7 directed obliquely downward against the axis of the tubular member 2. Outside the cap 5 and just below the nozzles 7 there is provided a flange 24. So when the cap is inserted into the mouth, the inside edge of the flange 24 is held at the inner ends of the teeth and the cap 5 is held at predetermined place. Incidentally reference numeral 25 indicates a wall which divides the flow of the liquid into two equal volumes at the upper end of the tubular member 2 for the right and left nozzles.

If the upper end of the tubular member is inserted into the mouth and liquid containing minute air bubbles is jetted from the nozzles of the above structure toward gums and the inner walls of the mouth, supersonic waves will be produced inside the mouth as referred to above and have the effects similar to those given by massage and clean the gums, teeth, etc. Therefore, cleaning with the device of the present invention prevents the development of alveolar blennorrhoea, removes foreign elements caught between teeth and prevents tooth decay. If desired, in order to let the tubular member 2 rotate within a limited area, it is possible to insert the tubular member 2 into a boss 20 of the vessel 4 and let the vessel 4 and the tubular member 2 move round by an arm 21.

FIG. 7 schematically shows, partly in cross-section, the arrangement of another embodiment of this invention.

The present device consists of a means 9' which gives pressure to washing liquid and the mouthpiece or the portion 2' to be inserted into the mouth. The latter is provided with means for supplying air bubbles to the washing liquid when it is jetted into the mouth. A motor pump is one example which provides pressure to the washing liquid. Liquid flows from the tank 10' through a pipe 14' and runs to the mouthpiece 2' through a flexible pipe 15' and a grip 22 equipped with a change-over cock 8'. To mix air bubbles with the washing liquid, the same method as explained in connection with FIG. 2 is adopted. The mouthpiece 2' is cylinder-shaped and small enough to be movable within the mouth. The cylinder has inside an inner pipe-shaped room 23. At one end of the cylinder 2a' is a channel 24 leading to the inner room 23 and the channel is narrowed and constitutes a nozzle 7' in the neighborhood where it is connected with the inner room.

In the neighborhood where the nozzle 7' and the inner room 23 are connected are holes 6a' which communicate with the open air. The open air is introduced into the inner room 23 through these holes. In other words, the washing liquid provided by the pump 9' runs through the flexible pipe 15' and flows into the channel 24 and, when it is jetted from nozzle 7' into the inner room 23, the pressure in the neighborhood where the inner room 23 and the nozzle 7' are connected becomes lower than that of the atmosphere. Therefore, the air sucked in from the air channel 6a' will be involved in the jetted liquid, pulverized and become minute air bubbles in the washing liquid. To jet the liquid containing air bubbles into the mouth, on one side wall 25 of the cylindrical member 2a' a large number of jet nozzles 26 leading from outside to the inner room 23 are drilled open. So the washing

liquid is jetted from these nozzles 26 into the mouth. Incidentally it is all right that the portions of the walls 25 where these nozzles are not drilled open constitute an ordinary tooth brush.

The grip 22 is, for example, cylindrically L-shaped and its elbow is to be screwed into the mouthpiece or the portion which is to be inserted into the mouth.

Inside the grip 22 is a passage 27 which sends washing liquid to the mouthpiece 2'. The passage 27 forks off in two 28 and 29. Inasmuch as the grip 22 is screwed into the cylindrical member 2a', the inner room 23 in the cylindrical member 2a' and the passage 24 communicate with each other. While the passage 29 leads to the one end 30 of the grip 22 and, by the flexible pipe 16', communicates with the tank 10' of washing liquid. A change-over cock 8' is installed substantially at right angles to the passages 28 and 29 and crossing the grip 22 at a proper point. The cock 8' can be operated freely and hermetically to move upward and downward at right angles to the axis of the grip 22.

FIG. 8 shows an enlarged cross-sectional view of the change-over cock 8' shown in FIG. 7. The cock 8' has two passages 28' and 29' which can alternately communicate with the passages 28 and 29 respectively in the lengthwise direction of the grip. Ordinarily the cock 8' is pushed up by a spring 32 to block the passage 28 and open the passage 29 alone. Consequently the washing liquid in the tank 10' runs through the pump 9' and the conduit pipe 15' and the passage 27. Then it runs back to the original tank 10' through the conduits 29, 29' and the conduit pipe 16'.

If against the force of the spring, the cock 8' is forced down and its stopper 33 reaches the cylindrical body 22 of the grip, the passage 29 will be blocked and only the passage 28 will be opened. So the washing liquid will run from the tank 10' through the pump 9', the conduit pipe 15' and the channels 27, 28 and 28' to the passage 24 inside the mouthpiece 2'. When the washing liquid is jetted at high speed from the nozzle 7' made at the end of the channel 24 into the inner room 23 inside the cylindrical member 2a' the air sucked in from the air inlets 6a' will turn to minute air bubbles and mix with the washing liquid, which in turn will be jetted from jet openings 26 toward the walls of the mouth 25. Though FIG. 8 shows two channels 28' and 29' in the cock 8' which alternately communicate with channels 28 and 29 in FIG. 7, it is possible to reduce the number of channels to one and yet the one channel will easily perform the same function as explained above. Incidentally it is permissible to use any fluoride compound as the washing liquid and to replace the air by oxygen. Moreover, if city water is used as the washing liquid, the pump 9' can be done away with.

FIG. 9 is a schematic front view of another embodiment of the present invention. The present device consists of a tubular grip 34 and a mouthpiece or a portion 35 to be inserted into the mouth. The latter can easily be screwed into the former at one end. In other words, the mouthpiece is detachable. The other end of the tubular grip 34 is connected with another pipe 37 such as rubber one. The mouthpiece 35 has a central channel 38 running parallel with the axis of the mouthpiece and the channel has an opening 40 at its end portion 39. The tubular grip 34 has also a channel 41 running in the direction of its axis, which communicates hermetically with the channel 38 of the mouthpiece 35 when the latter is screwed in. Thus, the water or washing liquid from the conduit pipe 37 is jetted from the opening at the end of the mouthpiece.

In the present embodiment, a flange 42 is formed in or provided to the tubular grip 34 or the mouthpiece 35. The reason is as follows: if there were no flange, when the end portion 39 of the mouthpiece 35 is held upward, the fluid jetted will run along the mouthpiece 35 and the tubular grip 34 and will eventually wet user's hand or sleeve. If a flange 42 is attached, the waste fluid that may

5

run along the mouthpiece 35 will be stopped by the flange 42 and drip from its rim causing no wetting to hand or sleeve.

In the above embodiment, the tubular grip 34 and the mouthpiece 35 are two separate things and constitute an integral body only when they are joined to each other by screwing. But they can be manufactured as one integral body. In this case, the mouthpiece 35 will have a central channel 38 and along with it will be made an air inlet 43 and its one end will be opened in the neighborhood of the opening 40 of the channel 38. The other end 44 of the air inlet 43 will be opened to the open air.

If, coming through the central channel 38, the water or washing fluid is jetted forcefully from the end opening 40, it will lower the pressure in the neighborhood of the opening 40 and the air will be sucked in from the opening 44, pass through the channel 43 and will be mixed with the water or the washing fluid at the opening 40. When the air bubbles die out in the mouth supersonic waves are produced there and clean the inside of the mouth and massage teeth gums. Incidentally, it is better if the end portion 39 of the mouthpiece 35 is bent relative to the axis of the mouthpiece at a certain angle, for the bend will prevent the jet stream going direct to the throat.

Moreover, it is recommendable to install a flange 45 at the opening 44 at the basis of the air inlet 43. For, even if it streams down along mouthpiece, the waste fluid will be stopped by the flange 45 and drop from its rim. So in no case will the fluid cross over the flange 45 and close the air inlet 43 by covering the opening 44 at the basis of the air inlet 43.

Consequently, thanks to the flange 45 the air will freely be sucked in and the creation of air bubbles is assured, which have the effect of cleaning the inside of the mouth and massaging it. Moreover, this flange 45, being placed in parallel with the flange 42 mentioned before, assures a better joint function. For, if in the course of the use of the present mouth cleaner of this invention the jet nozzle 40 is blocked completely or partly by the inner wall of the mouth, gum or tongue, the stream of the washing fluid from the central channel 38 will run back instead of being jetted into the mouth, to the air inlet 43 and there is a fear that it will be jetted from the opening 44 at the basis of the air inlet 43. But even if it is jetted from here, the force of the liquid being jetted will be reduced by clashing against the flange 42 and will drip from the rim of the flange.

Therefore, in this case, too, the defects of the liquid being sprayed to hands, arms or any other part of the body will effectively be eliminated. Incidentally in the device of this invention, if a proper cock is installed in the tubular grip 34, it will become easy to add or reduce or stop the fluid pressure by simply adjusting the rotation by a thumb.

6

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of this invention.

We claim as our invention:

1. A mouth cleaner comprising:

a tubular member to be inserted into a mouth, said tubular member having an axial passage extending to nozzle means at one end thereof for jetting a stream of liquid into the mouth, said tubular member having air inlet means for producing air bubbles in said stream, said air inlet means having a channel with one end opened to the open air and the other end being opened adjacent to said nozzle means so that air is sucked into the one end through the channel and out of the other end into the stream of liquid; a source of liquid at a desired pressure;

conduit means interconnecting said source of liquid to the passage of the tubular member and including a tubular grip portion to which said tubular member is coupled;

first flange means attached to said tubular grip and spaced from the one end of the channel of said air inlet means whereby a user's hand or sleeve is prevented from being drenched with the waste fluid from said nozzle means; and

second flange means attached to said tubular member and located adjacent to the one end of the channel of said air inlet means and between said nozzle means and said one end of the channel so that waste liquid is prevented from being sucked into said one end of said channel to close said air inlet means.

2. A mouth cleaner as defined in claim 1,

said tubular member being detachably coupled to said tubular grip and having said nozzle means formed at a distal end thereof and said first flange being formed at an end adjacent said grip;

said second flange being spaced from said first flange to form a space therebetween;

the other end of said air inlet means opening between said flanges.

3. A mouth cleaner as defined in claim 2,

said air inlet channel extending axially of said tubular member and the other end of said channel opening at a side of said second flange means confronting said first flange means.

References Cited

UNITED STATES PATENTS

1,658,645	2/1928	McGee	-----	239—530X
2,087,511	7/1937	Gould	-----	128—229UX
3,214,775	11/1965	Murov et al.	-----	128—66UX
3,496,933	2/1970	Lloyd	-----	128—66

LAWRENCE W. TRAPP, Primary Examiner