

This invention relates to a jet mounted on the handle member of an oral hygiene appliance in accordance with the preamble of the main claim.

A jet of this type is already known from DE-A-31 01 941 in which the jet tip of the mouthpiece has a jet plate in which bores are provided forming a ring of jets to deliver a multiple stream as well as a single jet delivering a single stream outside this ring. Arranged in the mouthpiece is an axially movable sliding member having secured to its end close to the tip a switchplate which is urged into sealing engagement with the jet plate by means of a spring. The switchplate has a passage bore configured and dimensioned such that the multiple-stream jets are exposed and the single-stream jet is covered in the one position whilst the multiple-stream jets are covered and the single-stream jet is exposed in the other position. Operation of the switchplate is via a piston and a tappet using a slide switch mounted on the grip of the handle member.

Overall, the switching mechanism described therein is rather complicated and bulky which becomes even worse by the geometric arrangement of the jets making it practically impossible to provide a slender jet structure which is easy to manipulate and to permit economical quantity production. Moreover, the large number of movable parts used for switching the jet from single to multiple stream is not conducive to ensuring satisfactory operational reliability in practical use. A solution of the problem of cleaning the jets from contamination or lime deposits is not even addressed.

Further, DE-A-30 44 025 discloses also a what is referred to as combination jet for the discharge of a single or multiple stream. The grip of the handle member is provided with two parallel liquid channels disposed in a longitudinally displaceable insert, which channels are connectible one at a time with the liquid inlet by means of a slide switch. The shaft member which is adapted to be slipped on the handle member has at its upper end two different types of jet and two parallel channels connectible with the liquid channels disposed in the handle member, with the one channel terminating in a single-stream jet and the other channel in a multiple-stream jet.

The combination jet according to DE-A-30 44 025 has a number of drawbacks. To begin with, the two liquid channels extending longitudinally side by side, in addition to incurring increased manufacturing expense, necessitate a thick shaft member which is therefore

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more difficult to manipulate. Furthermore, it involves additional sealing and, overall, a considerable increase in manufacturing cost. Finally, the two jets provided side by side on the upper end of the shaft member require a jet tip with a relatively large surface area, making precise orientation of the stream difficult.

The jet tip of the jet known from DE-C-20 50 687 has outlet openings whose diameters are in the range of about 0.1 mm to 0.5 mm, with the result that these can easily become clogged by contaminants or lime deposits. Such contamination is usually troublesome to remove using, for example, compressed air or a suitably thin needle.

To facilitate cleaning of the outlet openings in the jet tip, DE-C-22 00 083 proposed providing an axially movable insert in an aperture in the jet tip, which insert, with the jet operated in the so-called spraying position, is brought into sealing engagement with the border of the aperture by the liquid pressure prevailing in the jet tip, allowing liquid to be discharged through only a few grooves embedded in the border. If the jet is not being used, the insert can be easily brought to the so-called inner position in which the grooves embedded in the border of the aperture can be exposed and are hence easier to clean.

An improvement of the jet described in the foregoing is disclosed in DE-A-29 30 132. The arrangement is dimensioned such that a closure member slidably carried in a circular insert is adapted to be brought into a cleaning position so that grooves which in the spraying position of the closure member define the jet openings, are readily accessible for the purpose of cleaning by rinsing or, where appropriate, by brushing, in any case, using additional means.

It is a disadvantage of this known jet that - at least in the case of stubborn contaminants or lime deposits - it still necessitates cleaning of each individual groove separately by hand with an appropriate tool.

It is, therefore, an object of the present invention to improve upon a jet of the type initially referred to such that it does not exhibit the aforementioned disadvantages of known designs. Accordingly, the jet is to be of a particularly slender structure and require little sealing, it is to afford economy of manufacture in large-scale production, and it is to be highly reliable in practical use.



These requirements are satisfied by a jet incorporating the features of the main claim. Advantageous embodiments of reliably cleaning the jet openings without the use of additional means are described in the subclaims.

Embodiments of the invention will be described in greater detail in the following with reference to the accompanying drawings. In the drawings,

FIG. 1 is a schematic representation of the handle member of an oral hygiene appliance;

FIG. 2 is a longitudinal sectional view of a jet tip, with the core piece in the right-hand part of the Figure being shown in its first extreme position and the jet tip delivering a multiple stream, while in the left-hand part of this Figure the core piece is shown in its second extreme position in which the jet tip delivers only a single stream;

FIG. 3 is a section taken on the line III-III of Figure 2, with the left-hand part of this Figure showing the core piece and the helical spring rotated by 30° about their common axis in opposition to the direction of arrow A;

FIG. 4 is a top plan view of the jet tip of Figure 2; and

FIG. 5 is a schematic representation of the device causing the core piece to switch from the one extreme position to the other after each depression.

Figure 1 shows a handle member 1 of an oral hygiene appliance not shown, which is operated by an electric pump or only by means of the pressure of the water line, with the handle member being inserted into a holder 2 attached to the oral hygiene appliance. The handle member 1 consists essentially of a handgrip 3 in which a liquid supply line 4 connected to the oral hygiene appliance terminates, and of a shaft member 5 exchangeably inserted into the handle member 3 and connected with the handle member 3 in sealing fashion by means of a knurled nut 6. Liquid flows pulsewise or continuously from the drive part of the oral hygiene appliance into the handle member 3 and thence into the shaft member 3 which has a jet at its free end with a jet tip 7 from which a multiple stream or optionally a single stream or a multiple stream is discharged.



In accordance with Figures 2, 3 and 4, the jet tip 107 consists essentially of a cylindrical liquid chamber 108 which is supplied by a line 109 extending through the shaft member 105, and of a core piece 11 vertically slidable in an aperture 110 formed in the upper side of the liquid chamber 108. The liquid chamber 108 which is formed from a circular side wall 127 has its lower side bounded by an insert 115 on which a centering piece 116 extending into the interior of the liquid chamber 108 is formed, said centering piece including two rectangular grooves 117 and tapering above the two grooves 117 into a cylinder 118 of reduced diameter. The core piece 111 has a core 113 which terminates in an outlet opening 112 and is engaged by the centering piece 116, thereby providing a guide for the core piece 111 during a vertical movement.

A helical spring 114 having its one end bearing against the insert 115 and its other end against the underside of the core piece 111 in an annular groove 119, biases said core piece with a force sufficient to press a bevel 120 formed on the core piece 111 so firmly against a rounded lower edge 121 of the border of the aperture 110 that water is not allowed to pass between the border of the aperture 110 and the contour of the core piece 111.

According to the left-hand part of Figure 2 in which the core piece 111 is shown in its upper position, the above-mentioned seal provided between the aperture 110 and the core piece 111 allows liquid to be discharged only through the outlet opening 112, that is, the jet tip 107 delivers a single stream. In this position, the liquid supplied via the incoming line 109 flows around the centering piece 116 and rises in the two rectangular grooves 117 up into the core 113, finally arriving at the outlet opening 112.

If the core piece 111 is pressed downwardly against the force exerted by the helical spring 114, it will lock into the position shown in the right-hand part of Figure 2. The device providing this locking action will be described in more detail further below in connection with the explanation of Figure 5. Depression of core piece 111 causes the cylindrical upper end 118 to penetrate the outlet opening 112, thereby removing any contaminants or lime deposits therefrom.

With the core piece 111 in its lower position, the bottom part of the centering piece 116 seals off the core 113 of the core piece 111 and thus the outlet opening 112 relative to the liquid chamber 108. At the same time, however, six semicircular outlet openings 122 become exposed which are formed by the contour of the

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core piece 111 and by six recesses 135 embedded in the border of the aperture 110 (Figure 4) and which, in the upper position of the core piece 111, were sealed off by the bevel 120 and the rounded lower edge 121 of the border of the aperture 110 on the one side and were largely closed by semicylindrical noses 123 formed on the core piece 111 on the other side. Thus, the liquid flowing from the liquid chamber 108 is only discharged through the six outlet openings 122 when the core piece 111 is in the position shown in the right-hand part of Figure 2. The jet tip 107 then acts as a multiple-stream jet.

Every time the core piece 111 is brought from the lower to the upper position, the outlet openings 122 are freed of any contaminants or lime deposits by the noses 123 engaging them.

As can be seen from Figures 2 and 4 and from Figure 5, the locking action of the movable core piece 111 in its upper and lower positions is accomplished by a so-called cardioid control device. Formed on the insert 115 is a rib 124 in which two recesses 126 and 129 are cut out such that a nose 125 remains between them. The core piece 111 has a projection 128 as well as an indentation which is engaged by the upper bent end 130 of the helical spring 114. The lower bent end 131 of the helical spring 114 is mounted in a nose 132 formed on the insert 115.

Figure 3 shows the core piece 111 in its upper position in which the projection 128 lies above the nose 125. In this position, the bevel 120 of the core piece 111 is firmly pressed against the rounded lower edge 121 of the border of the aperture 110 by a biasing force of the helical spring 114. If the core piece 111 is depressed, its projection 128 is guided in the recess 126 until the lower tip of the projection 128 strikes a projection 133 of the recess 126. If the core piece 111 is subsequently released, the upper tip of the projection 128 locks into a corresponding indentation 134 of the nose 125, thereby locking the core piece 111 in its lower position.

By contrast to the position identified by I in Figure 5, in the position identified by II the core piece 111 is considerably rotated about its own axis in the direction of the arrow identified by A in Figure 3. As a result, the helical spring exerts a torsional force acting in opposition to the direction of the arrow A, which force, following another depression, causes the projection 128 to assume the position marked III, finally returning the projection 128 to the position marked I after the core piece 111 is released again.

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Patent Claims

1. A jet mounted on the handle member of an oral hygiene appliance, with a jet tip (107) from which optionally a single or multiple stream can be discharged for oral and dental hygiene, with a core piece (11) displaceable between two extreme positions, said core piece exposing in its first extreme position only outlet openings (122) for a multiple stream and in its second extreme position only one outlet opening (112) for a single stream, with the liquid path extending through a shaft member (105) to the jet tip (107) remaining unchanged when the switch member is displaced, characterized in that the core piece (111) is arranged in an aperture (110) of the jet tip (107), and that the exit for the single stream is provided within the stream cross sectional area of the multiple stream.

2. A jet as claimed in claim 1, characterized in that the core piece (111) is automatically locked in one of the two extreme positions by the mechanical tension exerted by a spring (114) and is moved into the other extreme position where it is likewise automatically locked on any sufficient amount of displacement in opposition to the tension exerted by the spring (114).

3. A jet as claimed in claim 1, characterized in that a core (113) terminating in the outlet opening (112) for the single stream is formed in the core piece (111).

4. A jet as claimed in claim 1, characterized in that the core piece (111), aside from a few recesses (135) in the area of the jet tip (107) adjoining the aperture (110), is positively guided in the latter, with the outlet openings (122) for the multiple stream being formed by the recesses (135) and by the contour of the core piece (111).

5. A jet as claimed in claim 3 and claim 4, characterized in that the rear wall of the jet tip (107) includes a centering piece (116) projecting into the interior thereof and provided with at least one groove (117), said centering piece serving as a guide means for the core (113) of the core piece (111) and, in the first extreme position (right-hand part of FIG. 2) of the core piece (111), sealing off its core (113) against the influx of liquid, and that the core piece (111) includes a bevel (120) which, in the core piece second extreme position (left-hand part of FIG. 2), is in sealing engagement with the lower edge of the border of the aperture (110) of the jet tip (107).

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6. A jet as claimed in claim 4, characterized in that the core piece (111) includes noses (123) along its contour which are so shaped that, as a result of their motion within the recesses (135), the outlet openings (122) for the multiple stream are freed of deposits and contamination.

7. A jet as claimed in claim 5, characterized in that the centering piece (116) includes a cylindrical upper end (118) which, for the purpose of removing contaminants or lime deposits, engages the outlet opening (112) for the single stream during its transition from the second to the first extreme position, thereby freeing said opening of deposits or contaminants.

8. A jet as claimed in claim 2, characterized in that the displacement and locking of the core piece (111) can be accomplished by means of a projection (128) of the core piece (111), said projection being guided by a cardioid control device.

9. A jet as claimed in claim 8, characterized in that the spring (114), in addition to its compressive or tensile force, also exerts a force in another direction, for example, a torsional force, on the core piece (111), said force ensuring that the core piece (111) is moved from the one extreme position to the other each time it is depressed.

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