

[54] ATTACHMENT FOR HYDROTHERAPY BATH

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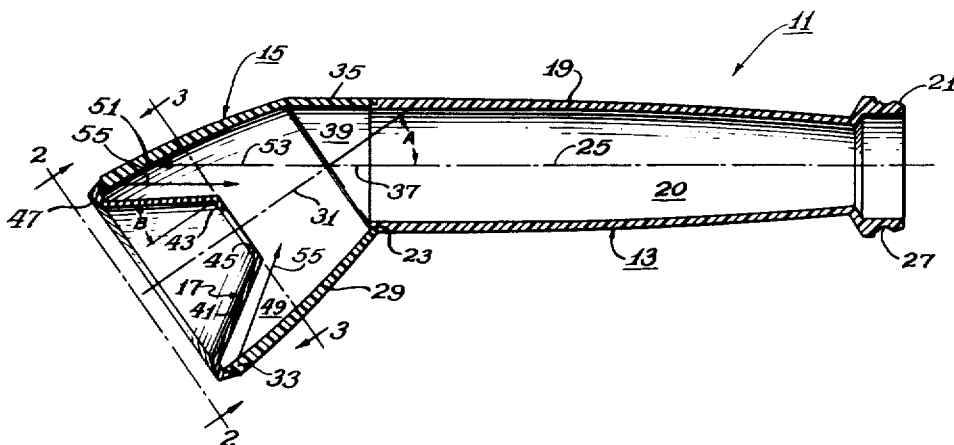
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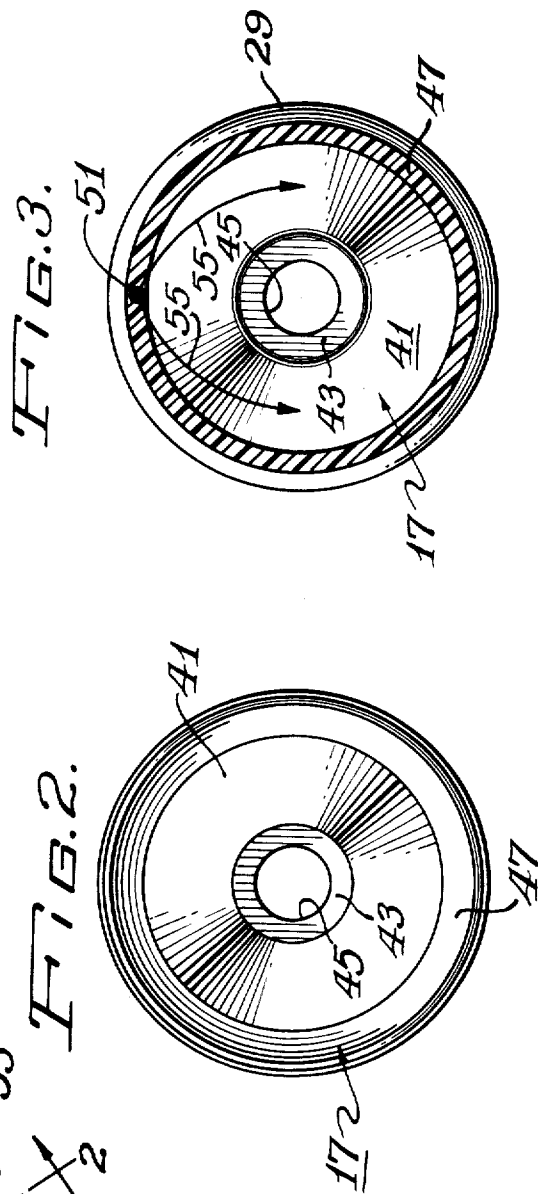
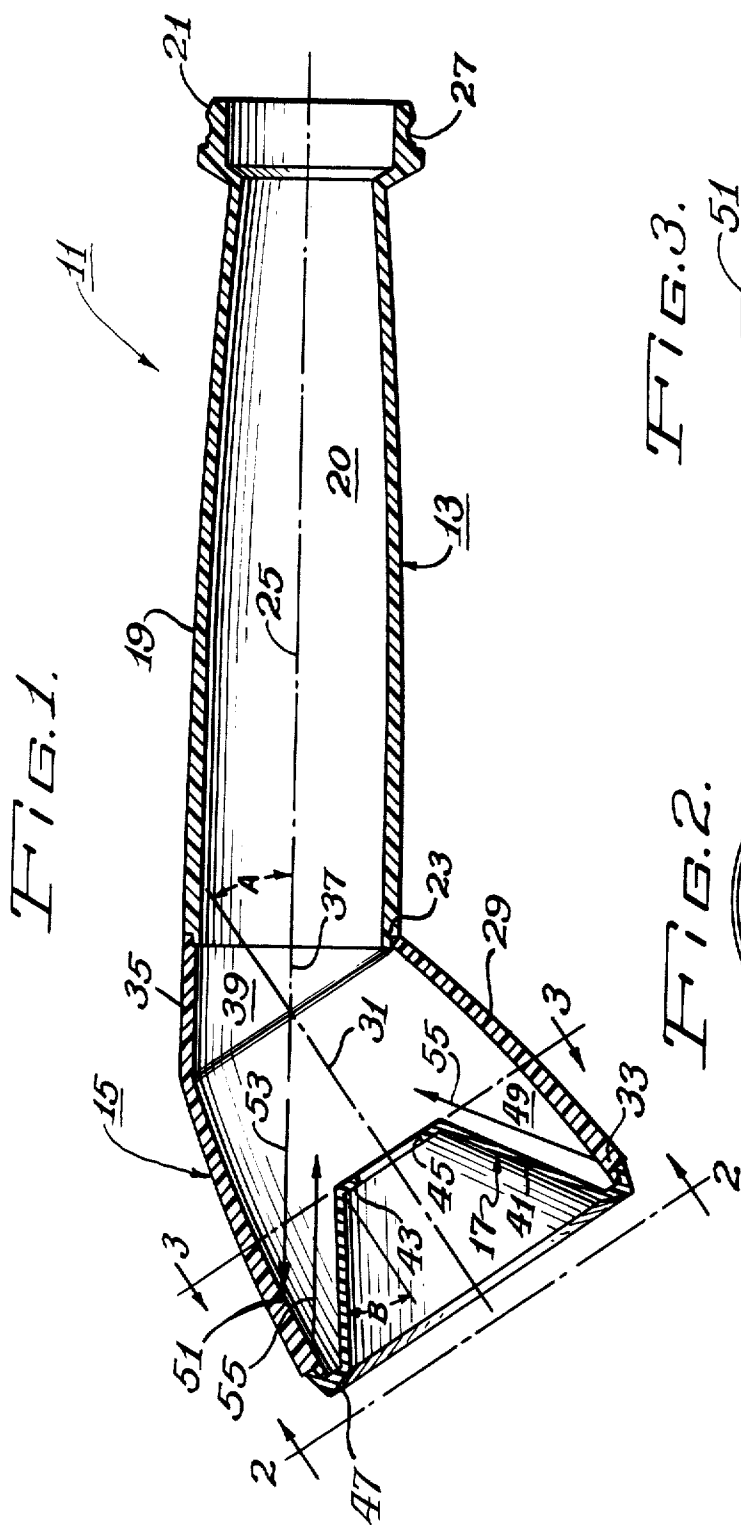
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ABSTRACT

The improved nozzle assembly disclosed discharges a pulsating stream of water without the use of any mechanical, moving parts. The nozzle assembly is designed for usage with a hydrotherapy bath and affords a soothing and relaxing water massage action.

8 Claims, 3 Drawing Figures





ATTACHMENT FOR HYDROTHERAPY BATH

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to an improved pulsating nozzle assembly, and more particularly, to an improved pulsating nozzle assembly for use with a hydrotherapy bath.

For a number of years, hydrotherapy baths have been utilized to provide a water massaging action for relief of minor body aches and pains. Heretofore, a continuous stream of water has been discharged from the pump of the hydrotherapy bath to afford this massaging action. Nevertheless, it has been recognized that a discharge consisting of a pulsating stream of water might afford a beneficial massaging action with respect to certain types of minor muscular aches and pains. Nozzle assemblies, utilizing a variety of different arrangements and types of mechanical moving parts and capable of converting a continuous stream of water into a pulsating stream, have been available. However such nozzle assemblies have not come into common usage with hydrotherapy baths because of their relatively high manufacturing cost and because of problems with their reliability when utilized in a whirlpool bath environment.

I have discovered, through experimentation, an improved nozzle assembly which, when connected with the continuous stream discharge of a hydrotherapy bath pump, provides a pulsating stream of water that affords a soothing, relaxing and beneficial water massaging action. This improved nozzle assembly includes a tubular handle, a tubular nozzle head and a frusto-conical cap member, all of which can be made of molded plastic. The assembly does not include any mechanical, moving parts, and thus, can be manufactured relatively inexpensively. Moreover, since the improved nozzle assembly does not employ any mechanical, moving parts, there is virtually nothing to wear out or to be repaired, and therefore, the improved assembly has a relatively long, trouble-free "life" expectancy.

I am not certain as to why my improved nozzle assembly is able to provide a pulsating discharge stream. Based on experimentation, I believe, however, that the design of the nozzle head and the arrangement of the cap member and handle with respect to the nozzle head causes turbulence in the nozzle head which, in turn, results in the pulsating discharge. More specifically, the nozzle head is a tubular member which is attached, at one end thereof, to the tubular handle. The central longitudinal axis of the nozzle head is disposed at an acute angle, preferably approximately 35°, with respect to the central longitudinal axis of the handle. The frusto-conical cap member is attached to and closes the other end of the nozzle head. The cap member includes a truncated, conical side wall, a circular end wall, which closes the smaller diameter end of the side wall and which includes a central discharge aperture therein, and an annular base which extends radially outwardly from the larger diameter end of the conical side wall and which is attached to the other end of the nozzle head. The cap member is disposed within the nozzle head so that its end wall is within the nozzle head and projects toward the one end of the nozzle head and so that an annular space, having a generally triangular cross-section, is defined between the conical side wall and the nozzle head. Experimentation has shown that

the stream of water flowing through the handle is directed into this annular space where it there divides and flows around and out of the annular space back into the portion of the nozzle head adjacent to the one end thereof. As a result of the turbulence thus caused, a pulsating discharge stream is emitted from the nozzle head through the central aperture in the end wall of the cap member.

In view of the foregoing, it is a primary object of the present invention to provide an improved liquid nozzle assembly which, without the use of any mechanical, moving parts, affords a pulsating discharge stream.

Another object of the present invention is to provide an improved nozzle assembly of the type described which may be utilized with a hydrotherapy bath to provide soothing, relaxing and beneficial pulsating water massaging action to muscular aches and pains.

These and further objects and advantages of the present invention will become apparent from the following description of the preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical, cross-section view of the preferred embodiment of the improved nozzle assembly of the present invention.

FIG. 2 is a view taken along the line 2—2 of FIG. 1 illustrating one end of the cap member of the improved nozzle assembly of the present invention.

FIG. 3 is a view taken along the line 3—3 in FIG. 1 illustrating the other end of the cap member of the improved nozzle assembly of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, the improved nozzle assembly of the present invention is shown generally at 11. This assembly 11 comprises a handle 13, a head 15 and a cap member 17.

The handle 13 is made of a molded plastic, such as ABS Marbon Cylolac, T grade, and includes a tubular side wall 19 which defines a liquid flowpath 20 through the handle from its one end 21 to its other end 23. The central longitudinal axis 25 of the handle 13 is a straight line and is coaxial with the central longitudinal axis of the liquid flowing through the flowpath 20 of the handle 13. An outer peripheral groove 27 is molded in the end 21 of the handle 13 and is adapted to receive a mating, inner peripheral ridge formed in the coupling portion of the distal end of a flexible hose, not shown. This hose is utilized to connect the handle 13 with the discharge outlet of a hydrotherapy bath pump, not shown, so that the continuous stream of water discharged from this pump will flow to and through the flowpath 20 in the handle.

The nozzle head 15 comprises a tubular, side wall member 29 made of molded plastic, such as ABS Marbon Cylolac, T grade. The central longitudinal axis 31 of the tubular side wall member 29 is a straight line. One end 33 of the side wall member 29 is open.

An elbow-like connecting portion 35 is molded integrally on the other, opposite end of the side wall member 29, although, of course, the head 15 and portion 35 could be separate parts that are joined together as for example, by solvent welding. The central longitudinal axis 37 of the connecting portion 35 is coaxial with the axis 25 of the side wall member 19. These axes 25—37

intersect and form an acute angle A with the axis 31 of the nozzle head 15. Preferably angle A is 35°. A liquid flowpath 39 is defined through the connecting portion 35 and its central longitudinal axis is coaxial with the axis 37 and thus, with the axis 25. The distal end of the connecting portion 35 is attached, as for example, by solvent welding, to the end 23 of the handle 13 so that a continuous, straight and substantially uniform diameter liquid flowpath 20-39 is defined in the handle and connecting portion.

The cap member 17 is generally frusto-conical and is made of molded plastic, such as ABS Marbon Cyclocac, T grade. The cap member 17 includes a truncated, conical side wall 41 which forms an angle B with the vertical. Preferably the angle B is 30°. An integrally molded circular end wall 43 closes the smaller diameter end of the side wall 41. A circular, central liquid discharge aperture 45 is molded in the end wall 43 so that the central longitudinal axis of the aperture 45 is coaxial with the center of the end wall and with the axis 31 of the nozzle head 15 when the cap member is mounted in head 15 as hereinafter described.

A generally annular, integrally molded base member 47 extends about and radially outwardly from the larger diameter end of the side wall 41. The annular base 47 is attached, as for example, by solvent welding, to and closes the end 33 of the tubular, side wall member 29.

When the cap member 17 is mounted in head 15, as shown in FIGS. 1-3, the end wall 43 of the cap member 17 is disposed within the side wall member 29 and projects toward the connecting portion 35. The end wall 43 is disposed in a plane that is perpendicular to the axis 31 of the side wall member 29 and that is located approximately midway the end of the side wall member 29. Preferably, the plane of the end wall 43 is located at a point, between 40 to 50% of the distance from the end 33 to the other end of the side wall member 29.

An annular space or volume 49 is defined between the portion of the side wall member 29 adjacent to the end 33, the conical side wall 41, the annular base 47 and a plane including the end wall 43. The annular space 49 has a generally triangular cross-section, in a plane parallel to the axis 31 of the handle 15, and is in communication with the remaining interior of the head 15.

When the end 21 of the handle 13 is connected, via a flexible hose, with the outlet of a pump, such as is used with a hydrotherapy bath, a continuous stream of water, under pressure, flows through the flowpath 20 of the handle 13. This stream of water continues flowing interruptedly through the connecting portion 35 of the head 15. This stream next flows through the head 15, along and aligned with the axes 25-37, as extended, until it intersects the annular space 49. The water stream then impinges, as a stream, upon the side wall 29 at a spot indicated at 51. The arrow, as indicated at 53 in FIG. 1, diagrammatically illustrates the water stream as it approaches and impinges upon the spot 51. Thereafter, the water stream divides; the major portions flowing around the annular space 49, i.e. around the conical side wall 41. Nevertheless water is continuously also flowing back into the portion of the interior of the head 15 which is not within the annular space 49. Arrows, as indicated at 55 in FIGS. 1 and 3, diagrammatically illustrate, generally, the flow pattern of the por-

tions of the water stream after its impingement upon the spot 51. The turbulence in the head 15 caused by this flow pattern results in a pulsating stream of water being discharged from the head 15 through the aperture 45.

A nozzle assembly embodying the present invention has been constructed and has proved to function satisfactory. In this nozzle assembly, the handle 13 is 5.5 inches in length, and the diameter of the flow path 20 adjacent to the end 23, is 1.18 inches. The tubular, side wall member 29 of the head 15 is 2.125 inches in length and its diameter gradually enlarges until it is 2.20 inches at the the end 33. The angle A between the axis 31 and the axes 25-37 is 35°.

The distance between the end wall 41 of the cap member 17 and the inside surface of the annular base 47 is 0.993 inches. The diameter of the circle formed at the intersection of the planes of the conical side wall 41 and the annular base 47 is 1.98 inches. The maximum, external diameter of the cap member is 2.43 inches. The angle B, which the side wall 41 forms with the vertical, is 30°. The discharge aperture 45 has a diameter of 0.50 inches. A pulsating stream of water is discharged from this nozzle assembly when it is connected with a pump pumping at a rate of 40 gallons per minute (at approximately 8 p.s.i.).

In conclusion, it should be noted that while a preferred embodiment of the present invention has been described above, obvious modifications to the improved pulsating nozzle assembly 11 could be made. Therefore, the specific embodiment described hereinabove is to be considered in all respects as illustrative and not restrictive, the scope of the present invention being indicated by the appended claims rather than the foregoing descriptions, and all changes that come within the meaning and range of equivalency of the claims are, thus, intended to be embraced therein.

What is claimed is:

1. An improved pulsating nozzle assembly for aqueous liquid being pumped under pressure by a liquid pump, comprising:

handle means including a first tubular side wall which has a first end and a second end and which defines a first, liquid flowpath therethrough from the first end to the second end, with the longitudinal axis of the first tubular side wall constituting a straight line and with the longitudinal axis of the first tubular side wall constituting the centerline of the first liquid flowpath;

means adjacent to the first end of the first tubular side wall for connecting said first liquid flowpath with the outlet of the liquid pump;

nozzle head means including:

a second tubular side wall which has a first end and a second end, with the longitudinal axis of the second tubular side wall constituting a straight line; and

means, including a third tubular side wall, for interconnecting the second end of the first tubular side wall with the first end of the second tubular side wall, the interconnection means defining a second liquid flowpath therethrough, with the longitudinal axis of the third tubular side wall constituting a straight line and being substantially coaxial with the longitudinal axis of the first tubular side wall, and with the longitudinal axis of the second tubular side wall intersecting, at an

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acute angle, the longitudinal axes of the first and third tubular side walls;

frustro-conical cap member including a truncated, conical side wall having a first end and a second end, a circular end wall at and closing the first end of the conical side wall and an annular base extending radially outwardly from the second end of the conical side wall, with the mean diameter of the annular base being less than the diameter of the second tubular side wall, adjacent to its second end, and being greater than the diameter of the end wall of the frustro-conical cap member;

an aperture formed in the end wall of the frustro-conical cap member, with the axis of the aperture being coaxial with the longitudinal axis of the second tubular side wall and with the center of the end wall;

means for attaching the annular base of the frustro-conical member with the second end of the second tubular side wall so that the frustro-conical member is disposed within the second tubular side wall, with the end wall of the frustro-conical member projecting toward the first end of the second tubular side wall, so that an annular space, having a generally triangular cross-section, is defined between the annular base wall, the second tubular side wall and the conical side wall of the frustro-conical member, and so that the longitudinal axis of the first tubular side wall, as extended, is intersecting of this annular space.

2. The improved pulsating nozzle assembly described in claim 1 wherein the angle between the longitudinal axis, as extended, of the first tubular side wall and the

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longitudinal axis of the second tubular side wall is approximately 35°.

3. The improved pulsating nozzle assembly described in claim 1 wherein the end wall of the frustro-conical member is disposed in a plane which is perpendicular to the longitudinal axis of the second tubular side wall portion and which is located approximately midway between the first and second ends of the second tubular side wall.

4. The improved pulsating nozzle assembly described in claim 1 wherein the angle, from the vertical, of the conical side wall of the frustro-conical cap member is approximately 30°.

5. The improved pulsating nozzle assembly described in claim 2 wherein the end wall of the frustro-conical member is disposed in a plane which is perpendicular to the longitudinal axis of the second tubular side wall portion and which is located approximately midway between the first and second ends of the second tubular side wall.

6. The improved pulsating nozzle assembly described in claim 2 wherein the angle, from the vertical, of the conical side wall of the frustro-conical cap member is approximately 30°.

7. The improved pulsating nozzle assembly described in claim 3 wherein the angle, from the vertical, of the conical side wall of the frustro-conical member is approximately 30°.

8. The improved nozzle assembly described in claim 7 wherein the angle between the longitudinal axis of the first tubular side wall, as extended, and the longitudinal axis of the second tubular side wall portion is approximately 35°.

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