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(71) Applicant: **TEUCO GUZZINI S.r.l.**
Via Passionisti, 40
I-62019 Recanati
(Macerata) (IT)

(72) Inventor: **Guzzini, Virgilio**
Contrada Duomo 13D
I-62019 Recanati (Macerata) (IT)

(74) Representative: **Faraggiana, Vittorio, Dr. Ing.**
Ingg. Guzzi & Ravizza S.r.l.
Via Vincenzo Monti 8
I-20123 Milano (IT)

(54) Localized hydromassaging device.

(57) A device (10, 110) for localized hydromassage of the body comprising a head which emits a stream of water in correspondence with one of its faces (14, 114) designed to be disposed facing the body of the user. The head contains transducer elements (15, 115, 215, 315) which introduce ultrasonic waves into said stream of water so as to produce an ultrasonic micromassaging action in the area of the body subjected to the stream of water.

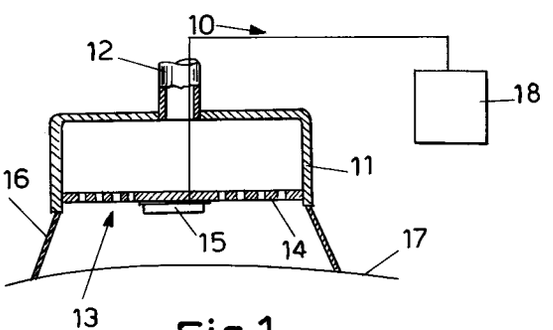

Fig.1

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This invention refers to an innovative localized hydromassaging device.

There are known localized hydromassaging devices composed of a head which dispenses jets of water, sometimes mixed with air, which can he brought close to or into contact with parts of the body so that the jets produce a beneficial hydromassaging effect on the skin.

The general scope of this invention is to provide an innovative localized hydromassaging device which combines the massaging action produced by a stream of water with a micromassaging action produced by generation of ultrasonic waves.

This scope is achieved, according to the invention, by providing a localized hydromassaging device for the body comprising a head which dispenses a stream of water in correspondence with one of its faces designed to be disposed facing the body, the head containing transducer elements which introduce ultrasonic waves into said stream of water.

The innovatory principles of this invention and its advantages compared to the known technique will be more clearly evident from the following description of possible exemplificative embodiments applying such principles, with reference to the accompanying drawings, in which:

- figure 1 shows a schematic cross-sectional view of a first hydromassaging device made according to the invention;
- figure 2 shows a schematic cross-sectional view of a second hydromassaging device made according to the invention;
- figure 3 shows a schematic enlarged cross-sectional view of a possible alternative embodiment of a detail of the hydromassaging device;
- figure 4 shows a schematic cross-sectional view of a further possible alternative embodiment of a detail of the hydromassaging device;

With reference to the figures, figure 1 shows a first device according to the invention, generically indicated by reference 10. It comprises a casing 11 which is internally supplied with a stream of water by means of a connection 12 to a source of water under pressure. The casing 11 is provided with nozzles 13, which produce jets of water directed towards the outside of the casing. For example, the nozzles 13 can be made in the form of a plurality of holes in a wall 14 of the casing 11.

Innovatively, disposed in contact with the stream of water is an ultrasonic wave emitting transducer element 15 controlled by an electronic circuit 18. The term "in contact" is used here to refer to an acoustic contact, that is to say, transmission of ultrasounds with minimum attenuation. For example, the transducer 15 can be a known piezoelectric transducer. The control circuit 18 can be a known generator of electric signals of suitable frequency, which is well known to the expert in the field and consequently not further described or shown since it is easily imaginable especially in the light of the following operative description.

The transducer element consequently produces ultrasonic waves which spread through the stream of water dispensed by the device.

To improve the transmission between transducer and water it can also be envisaged to connect the transducer to the plate 14, made for example in the form of a thin metal element, so as to produce ultrasonic vibration of the entire plate 14.

By directing the jets of water against a part of his body, the user consequently receives a massage produced by the normal stream of water as well as a massage produced by the component of ultrasonic waves conveyed by the water itself.

This offers a beneficial massaging action both at epidermal level and at a deeper level, depending upon penetration of the ultrasounds through the tissues.

Since water is the means of transmission of the ultrasounds, it may be advantageous to provide a baffle or peripheral edge 16 which forms a substantially closed chamber between the water dispensing surface 14 and the surface 17 of the body. The baffle 16 can be made either in rigid material, for example moulded in one piece with the casing 11, or with at least its free edge in pliable material, for example rubber. The baffle made of pliable material is advantageous in that it is more comfortable to use and adapts more readily to the surface of the body.

During use, the space defined by the edge 16 fills at least partially with water thereby facilitating the transmission of ultrasounds between the emitter 15 and the surface to be treated 17. The baffle 16 can also be useful to prevent excessive splashes of water in the surrounding area.

In addition to being made in the form of a closed-walled cup the baffle can also be made as a plurality of pliable elements. For example, the baffle can be made in the form of bristles of a brush, so as to provide a further massaging and/or superficial frictioning action as it is passed over the body.

Even though the transducer must transmit ultrasounds to the stream of water, its position can obviously differ from the one shown in figure 1.

Figure 2 for example shows an alternative disposition. For the sake of convenience, elements similar to those shown in figure 1 will be indicated in figure 2 with the same numbering as in figure 1 but increased by 100. Consequently, there is a device, generically indicated by reference 110,

comprising a casing 111 which is internally supplied with a stream of water by means of a connection 112 to a source of water under pressure. The casing 111 is provided with nozzles 113, which produce jets of water directed towards the outside of the casing, which are made for example in the form of holes in a wall 114 of the casing 111. A circumferential edge or baffle 116 similar to the baffle 16 of figure 1 can also be provided.

A transducer element 115 emitting ultrasonic waves (controlled by a circuit, not shown, similar to the circuit 18 of figure 1) is inserted in the chamber inside the casing through which the stream of water flows before it is ejected from the nozzles. The ultrasonic waves consequently propagate through the water which flows through said chamber before the water is ejected from the nozzles, thereby obtaining an excellent contact for transfer between the transducer and the water which is dispensed by the device.

In order to increase the massaging effect, the device 10 according to the invention can be provided with further mechanical massaging means. For example, as shown in figure 2, idle rollers can be provided, supported on the device by means of spindles parallel to each other and to the surface 117 to be treated, so as to run freely over the surface 117 when the device is moved over the latter.

The rollers can have patterned surfaces in order to facilitate the massaging action. As shown by way of example in figure 2, the rollers can for example be provided with radial massaging protrusions, made of rigid or rubbery material.

Figure 3 shows an enlarged view of an alternative embodiment of water dispensing nozzles, forming a device according to the invention. In said embodiment, the nozzles 213 which emit jets of water comprise a first portion or inlet duct 219 for admission of water into the latter and a second portion or outlet duct 220 for the jet of water. For example, the nozzles 213 can be obtained in the thickness of a plate 214 disposed in the device similarly to the plate 14 of figure 1.

Disposed along the duct conveying water into the nozzles are transducer elements 215 connected to a control circuit (not shown) similar to the one indicated by reference 18 in figure 1, in such a way that each transducer transmits ultrasonic waves to the water passing through the nozzle.

The water ejected by the nozzles thus transfers the ultrasonic component towards the body of the user.

Figure 4 shows a further embodiment of nozzles applying the principles of the invention. A nozzle 313 is composed of a portion 321 tightly rotatable in a housing to receive a flow of water from an inlet duct 319. The direction of the jets can be easily adjusted by rotating the spherical portion 321 in its housing.

The water flows through passages 322 (for example, three disposed radially equidistant) made in the portion 321.

Advantageously, disposed in each passage 322 is a duct 323 connected with an air passage 324. As it flows through the passages 322, the water under pressure sucks in air from the ducts 323. The jets of water ejected by the nozzles thus contain a certain percentage of air, thereby increasing, as is known, the massaging action.

Disposed along the route of the stream of water before it is ejected by the nozzle is a transducer element 315 which emits ultrasonic waves, similar to the elements 15, 115, 215 described above, connected to a suitable electric generator (not shown).

In this way, ultrasonic waves are transmitted to the water before it is ejected from the nozzles.

As can be seen in figure 4, the nozzles 313 can be through housed in a wall 314 of the localized hydromassaging device. This wall can also be a wall disposed in the same way as the wall 114 of figure 2 and the duct 319 can be composed of the incoming water chamber inside the casing of the device as shown in figure 2.

At this point it will be clear that the intended scopes have been achieved by providing a localized massaging device comprising an ultrasonic massaging action.

It has been found that the depth of penetration of the ultrasounds into the body of the user and the efficacy of the treatment depend upon the relation between the frequency of the ultrasounds emitted by the transducers and the area of the body treated. That is to say, for each area of the body there are emission frequencies more effective than others.

It has been noted that the best results are obtained by providing the possibility of regulating the ultrasound emission between 0.2MHz and 5MHz, in particular between 0.5MHz and 3MHz. As can be easily imagined by the expert in the field, this can be easily obtained by suitably choosing the transducers, so that they can function within the desired frequency range, and by providing a generator for supplying power to the transducers which has an output frequency that can be regulated between 0.2MHz and 5 MHz, in particular between 0.5MHz and 3MHz. The regulation for example can either be continuous or achieved according to fixed steps. Fixed step regulation can be advantageous in order to simplify the use of the device. In fact, each frequency that can be selected can be indicated by its use (for example, hands, back, etc.) instead of by its actual frequency value, thereby making the apparatus easier to use.

In order to prevent the area of the body subjected to treatment from overheating, it has been found preferable not to exceed the power of $3W/cm^2$ as an effective value in ultrasonic emission.

Moreover, it has been found that the emissions can be obtained with an intermittent rather than a continuous pattern, for example by alternating emission periods with non-emission periods with a ratio ranging from 1/10 to 1/2, in particular in the region of 1/5.

For example, it is possible to obtain emission periods ranging from 0.1 to 5ms and non-emission periods ranging from 2 to 10ms. Advantageously, the emission periods can have a duration in the region of 1ms and the non-emission periods can have a duration in the region of 5ms.

The foregoing description of embodiments applying the innovative principles of this invention is obviously given by way of example in order to illustrate such innovative principles and should not therefore be understood as a limitation to the sphere of the invention claimed herein.

For example, if it is considered sufficient, the rollers themselves can perform the function of a baffle or container for the water. In this case, the baffle 116 can be eliminated, at least in the vicinity of the surface of the rollers.

The elements shown in the various figures can obviously be combined with one another. For example, the rollers 125 can be inserted in a device as shown in figure 1, just as the nozzles made as shown in figure 3 or 4 can be used in devices of the type shown in figure 1 or 2.

The device can be advantageously made in the form of a dispenser head connected by means of a flexible hose to the source of water (preferably hot), the electric cable connecting the transducers to the generator being disposed in the hose or coupled to it. For easy use, the dispenser head can be made for example in the form of a "hand shower" or the like. The device can obviously be integrated in shower cubicles or bath tubs, for use in the latter. Alternatively, it can also be integrated in devices for local treatment, such as plantar massagers or cervical massagers, etc..

Claims

1. Localized hydromassaging device for the body comprising a head which dispenses a stream of water in correspondence with one of its faces designed to be disposed facing the body, the head containing transducer elements which introduce ultrasonic waves into said stream of water.

2. Device as claimed in claim 1, characterized by the fact that the stream of water is divided into a plurality of jets.

3. Device as claimed in claim 2, characterized by the fact that the transducer elements introduce the ultrasonic waves into the stream of water before it is divided into jets.

4. Device as claimed in claim 2, characterized by the fact that the transducer elements introduce the ultrasonic waves into the stream of water after it is divided into jets.

5. Device as claimed in claim 1, characterized by the fact of comprising surfaces for resting it on a part of the body to be treated.

6. Device as claimed in claim 5, characterized by the fact of comprising an area for emission of the stream of water, at least partially surrounded peripherally by means for laterally containing the water, defining with their free edge at least part of the resting surface.

7. Device as claimed in claim 6, characterized by the fact that the containing means comprise a substantially continuous lateral wall having at least its free edges made of relatively pliable material.

8. Device as claimed in claim 5, characterized by the fact that the resting surface is at least partially defined by idle rollers.

9. Device as claimed in claim 1, characterized by the fact that the division is obtained by passage of the stream of water through a perforated wall.

10. Device as claimed in claim 9, characterized by the fact that the perforated wall is in contact with said transducers.

11. Device as claimed in claim 1, characterized by the fact that the division is obtained by passage of the stream of water through nozzles having air-water mixing ducts.

12. Device as claimed in claim 1, characterized by the fact that the stream of water is dispensed by pivoting nozzles.

13. Device as claimed in claim 1, characterized by the fact of comprising a flexible hose for feeding the stream of water to it.

14. Device as claimed in claim 1, characterized by the fact that the ultrasonic waves have a frequency ranging from 0.2MHz to 5MHz.

15. Device as claimed in claim 14, characterized by the fact that the ultrasonic waves have a frequency ranging from 0.5MHz to 3MHz.

16. Device as claimed in claim 1, characterized by the fact that the ultrasonic waves have a power below $3W/cm^2$.

17. Device as claimed in claim 1, characterized by the fact that the ultrasonic waves are emitted by alternating emission periods and non-emission periods with a ratio ranging from 1/10 to 1/2.

18. Device as claimed in claim 17, characterized by the fact that the ratio is in the region of 1/5.

19. Device as claimed in claim 17, characterized by the fact that the emission periods range from 0.1 to 5ms and the non-emission periods range from 2 to 10ms.

20. Device as claimed in claim 19, characterized by the fact that the emission periods have a duration in the region of 1ms and the non-emission periods have a duration in the region of 5ms.

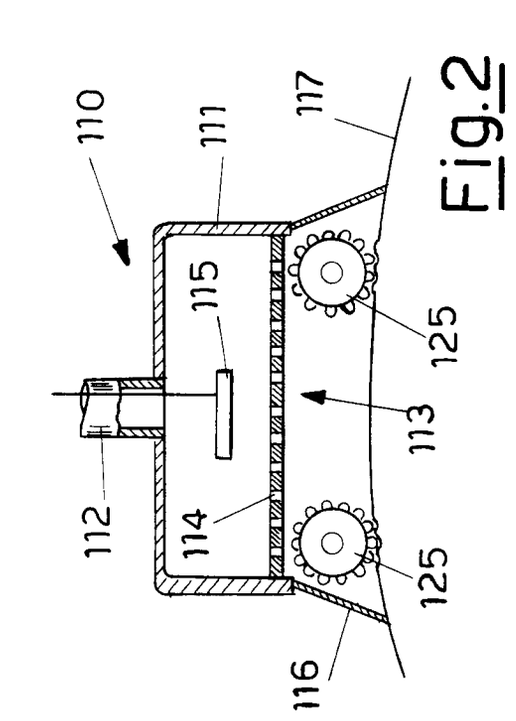

Fig.2

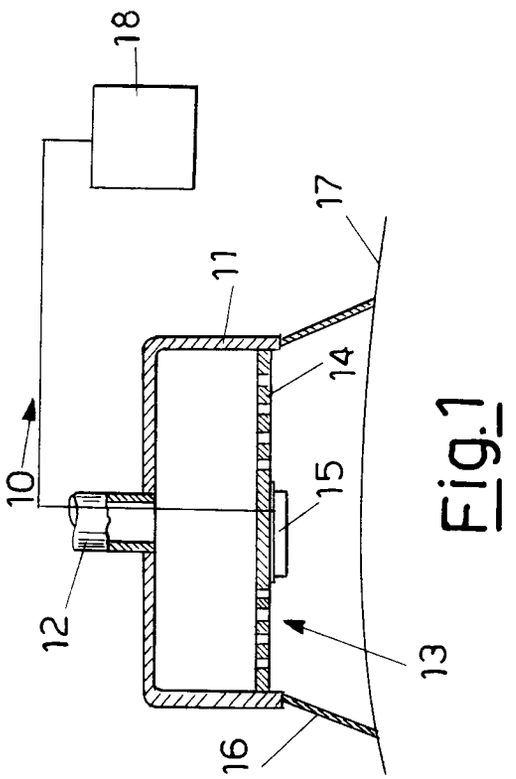

Fig.1

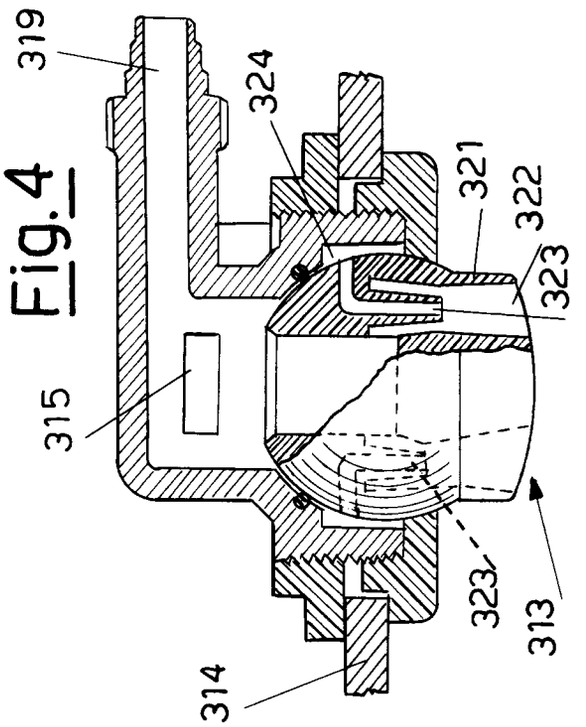

Fig.4

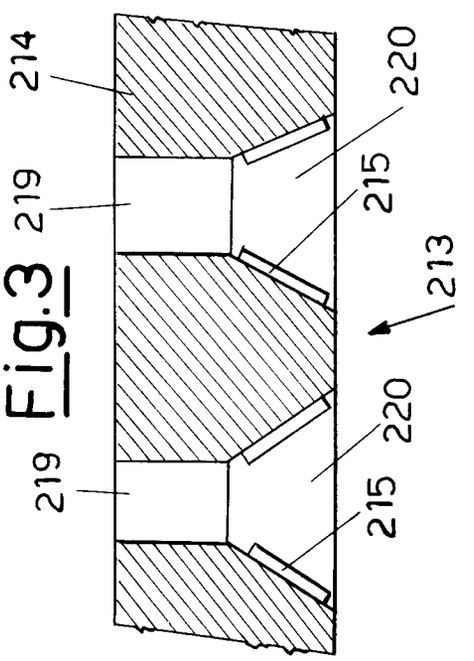

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 3143

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	FR-A-2 531 335 (SATELEC) * page 3, line 14 - line 30; figures 1,2,6 * ---	1-3,5,9, 10 6,14-18	A61H23/02
Y	EP-A-0 442 278 (PETER KRAUTH GMBH.) * column 2, line 46 - column 3, line 9; figure 3 * ---	6	
Y	DE-A-32 07 892 (FRENKEL) * abstract; figure * ---	14-16	
Y	DE-A-30 33 598 (ROBERT BOSCH GMBH.) * page 5, paragraph 2; figure 2 * ---	17,18	
X	US-A-4 945 901 (BUNCKE, JR.) * column 1, line 63 - column 2, line 8; figures * ---	1,2,4,9, 10,13	
A	GB-A-196 951 (JONES ET AL.) * claim 1; figures 1,2 * ---	7,8	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A61H
A	EP-A-0 168 823 (JACUZZI EUROPE SPA) * abstract; figure 1 * -----	11,12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 December 1994	Jones, T

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