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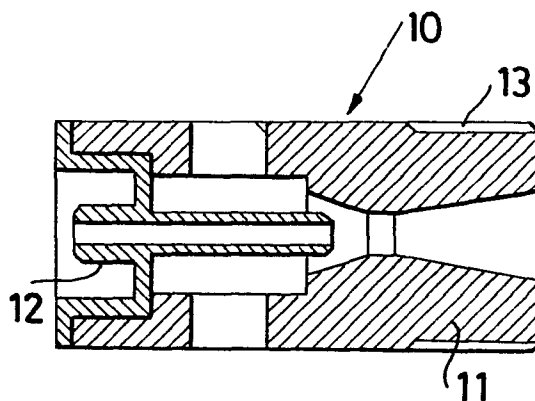
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⑤④ **Hydromassage nozzle.**

⑤⑦ With a nozzle comprising a cylindrical body having an axial passage in which is formed a venturi tube outflow section are provided an axial air inlet parallel to the axis of said venturi tube section and a supply of water transverse to the axis of said cylindrical body and upstream from said venturi section so that the nozzle can be mounted directly transversely in a duct for supply of water under pressure.



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"Hydromassage nozzle"

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The present invention relates to a hydromassage nozzle, specifically of the type applicable directly on the pipe bringing water under pressure. Hydromassage systems based on the principle of using a stream of water mixed with air have been known and widespread for many years. To supply the stream of water and for mixing it with air, nozzles fixed permanently in the walls of the tub or container in which the body of the person to be subjected to hydromassage is immersed are known and used.

Said nozzles must be connected to the pipe supplying water under pressure and to an air outlet so that in the case of tubs and systems having a certain number of nozzles the plumbing system becomes complicated and costly.

The main object of the present invention is to accomplish a hydromassage nozzle of an improved type which allows simplification of the plumbing system and greater flexibility in the arrangement and programming of the hydromassage nozzles. Another object of the present invention is to accomplish a nozzle of smaller size than those conventionally known while retaining the same functionality of operation.

These and other objects are achieved with the hydromassage nozzle according to the present invention which is characterized in that it

comprises a body for water supply and air mixing and a union connectable to said body and connected to a negative air pressure source, said body having a venturi tube section and being
5 equipped with water inlet openings made in the side wall thereof so that mounting the nozzle transversely to the pipe for supply of water under pressure arranges said openings transversely to the flow of water.

10 In conformance with a first embodiment of the nozzle according to the invention said union has a pipe for conveyance of air to the constricted section of the venturi where the air is mixed.

In conformance with a variant embodiment of the
15 nozzle according to the invention the air is conveyed to the outlet of said venturi tube section, the mixing thus taking place downstream therefrom.

The peculiar features and advantages of the
20 present invention will appear more clearly from the detailed description which follows of a preferred embodiment made with reference to the annexed drawings wherein:-

Fig. 1 is an axial cross-sectional view of the
25 nozzle according to the invention;

Fig. 2 is a partially cross-sectional view which shows the nozzle mounted on a pipe for supply of water under pressure;

Figs. 3 and 4 are cross-sections which show the
30 two components of the nozzle of Fig. 1;

Figs. 5 and 6 show schematically examples of use of the nozzles according to the invention in association with hydromassage tubs;

5 Fig. 7 shows another view of the nozzle according to the invention;

Fig. 8 is an axial cross-section in a view similar to that of Fig. 2 of another variant of the nozzle according to the invention;

10 Fig. 9 is an axial cross-section of the venturi tube component of the nozzle of Fig. 8;

Fig. 10 is an end view of the front or outlet component of the nozzle of Fig. 8;

Fig. 11 is a sectional view along plane XI-XI of Fig. 10;

15 Fig. 12 is an end view of the air suction union of the nozzle of Fig. 8; and

Figs. 13 and 14 are sections along planes XIII-XIII and XIV-XIV respectively of Fig. 12.

20 With reference to Figs. 1, 3 and 4 the nozzle according to the invention, which is indicated altogether by reference number 10, comprises a body 11 and a union for air 12.

25 The body consists of a substantially cylindrical block traversed axially by a duct 13 with differentiated section.

More specifically, in the duct 13 is provided a front section 14 for outflow with a venturi tube shape; an intermediate section 15 for inlet in transverse direction of the water and a section
30 upstream 16 in which the air suction union 12 is

housed.

As can be clearly seen in Fig. 4 the union 12 comprises a flanged part 17 which is housed in the section 16 and a duct 18 aligned axially with the duct 13 and ending at a short distance from the mouth of the venturi section after traversing the entire section 15.

At said section 15 the body 11 has an opening 19 for water inlet.

Fig 2 illustrates specifically the mounting of the nozzle 10 in a pipe 20 for supply of water under pressure in the direction of the arrow 21.

Specifically the nozzle 10 is mounted transversely to the axis of the pipe 20 in a calibrated hole made in the wall opposite said pipe in such a manner that the outflow section protrudes into the hydromassage tub of which the wall 22 is represented.

To fix the nozzle to the tub the front part of the nozzle, i.e. of the cylindrical block forming the body 11, is threaded as indicated with reference number 23 and said threading is engaged by a shaped locking ring-nut 24 associated with a sealing gasket 27.

A pipe 25 for supply or suction of air is connected through an appropriate branch to the section 16 of the nozzle and specifically to the duct 18 of the union 12.

From the above description it appears clearly how with the present invention it is possible to

adapt the location of the nozzle on the basis of a given and possibly pre-existing provision of the plumbing piping.

5 Furthermore, the nozzle according to the present invention is smaller than heretofore known nozzles with no effect on functionality and reliability.

10 In particular it is possible with the nozzles according to the invention to accomplish hydro-massage arrangements such as those illustrated in Figs. 5 and 6; in the first figure under the tub 26 run the pipes 20 and 25 so that the nozzles 10 deliver a massage stream from the bottom of the tub 26.

15 In the arrangements of Fig. 6 the nozzles and the pipes 20 and 25 are positioned on the side of the tub.

20 The nozzle according to the invention allows ready programming of the operation of each nozzle on the basis of the hydromassage cycle and requirements.

25 The nozzle illustrated in Fig. 7 comprises a body 32 which has an axial duct having sections with different diameters and more specifically the inlet section or union 31, the outflow section 33 shaped as a venturi tube, and an intermediate section 34 in which is inserted the union 35 for air inlet. This union is shaped as an elbow in such a manner that its downstream end 36 is
30 aligned with the axis of the section 33 shaped as

a venturi tube while the upstream end has a flange 37 to be housed in a chamber 38 communicating with an air suction duct 39.

5 The flange 37 and hence the union 35 are held in position by a plug 40 and by the compression spring 41.

10 Referring now to Figs. 8-14 another embodiment of the nozzle according to the present invention, which differs from those illustrated in the above embodiments by the fact that the air is mixed with the water downstream from said section, before the actual outlet rather than inside the venturi tube section, is shown.

15 In Fig. 8 reference number 120 indicates the water supply duct which runs in the direction of the arrow 121 so that in this case also the nozzle is mounted transversely to the duct 120. The nozzle comprises a generally cylindrical body 111 in which are mounted a front end union, a venturi tube section 51, and a rear end union 52 for air inlet.

20 The union 52 is mounted on an appropriate hole made in the wall of the duct 120 and is illustrated in greater detail in Figs. 12, 13 and 14. More specifically, it comprises a manifold 53 for air inlet and three small tubes which extend to seats in corresponding holes made in the venturi tube section 51.

30 Inside the body 111 is formed an annular chamber 55 into which lead the ducts 54 conveying air to

the inlet of the outlet union 50.

Said outlet union 50, as can be seen in Figs. 10 and 11 is substantially conical excepting a small terminal counterflare and is fixed to the inside of the body 111 by threading 56 or a similar fastening means.

The venturi tube section 51 (shown in Fig. 9) is in turn mounted inside the body 111 by threading 57 or by a functionally equivalent means and protrudes toward the mouth of the outlet union 50.

As can be seen clearly in Fig. 8, mounting of the body 111 in a hole of the pipe 120 diametrically opposed to that where the rear union 52 is mounted leaves a space 119 through which the water, which flows in the duct 120 under appropriate pressure, penetrates the venturi tube section in the same manner as the nozzles illustrated in the previous figures except that in this case the air mixing, instead of taking place in the venturi tube section, takes place downstream therefrom.

It is clear that in this case, too, one of the basic advantages of the present invention is maintained, i.e. direct mounting on the water supply duct with important structural and installation simplifications.

The present invention has been described for a preferred embodiment it being understood that conceptually and mechanically equivalent modifi-

ations and variants are possible and foreseeable
without exceeding its limits and understood fur-
thermore that each feature is to be considered
both individually and in combination with the
5 others.

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CLAIMS

1. Hydromassage nozzle characterized in that it comprises a body for supply of water and mixing of air and a union which can be mounted in said
5 body and connected to an air suction, said body having a venturi tube section and said union having a pipe for conveyance of air to the constricted section of the venturi, said body being equipped with inlet apertures for water made
10 in its side wall so that mounting of the nozzle transversely to the pipe for supply of water under pressure arranges said nozzles transversely to the water flow.

2. Hydromassage nozzle according to claim 1
15 characterized in that said union is mounted in said body and has a pipe to bring air to the constricted section of said venturi tube.

3. Hydromassage nozzle according to claim 1
20 characterized in that said supply body is mounted in two diametrically opposed holes made in the walls of a duct for supply of water under pressure so that said body is arranged transversely to the direction of flow of the water.

4. Nozzle according to claim 1 characterized
25 in that said air conveyance pipe of said union traverses the entire inlet section of water under pressure.

5. Hydromassage nozzle according to claim 1
30 characterized in that supply of water under pressure to said venturi tube section takes place

axially and said union is shaped as an elbow with the downstream end aligned and proximate to the inlet section of said venturi tube while the upstream end has a flange to be housed in a
5 separate chamber communicating with a duct communicating freely with the exterior, said flange being secured in said chamber by closing devices with the interposition of a compression spring.

6. Hydromassage nozzle according to claim 1
10 characterized in that said body and said union are mounted independently in their respective diametrically opposed holes in the water supply duct, said union being connected to said body by at least one small air supply tube to an annular
15 chamber which surrounds the venturi tube section so that the water and air are mixed downstream from the venturi section.

7. Hydromassage nozzle according to claim 6
characterized in that in said body is mounted a
20 venturi tube section communicating directly in upstream direction with the space remaining between said union and the rear end of said body, in said body there being mounted a truncated-cone outlet union.

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Fig.3

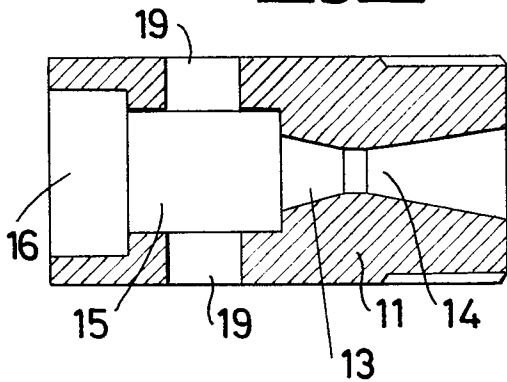


Fig.1

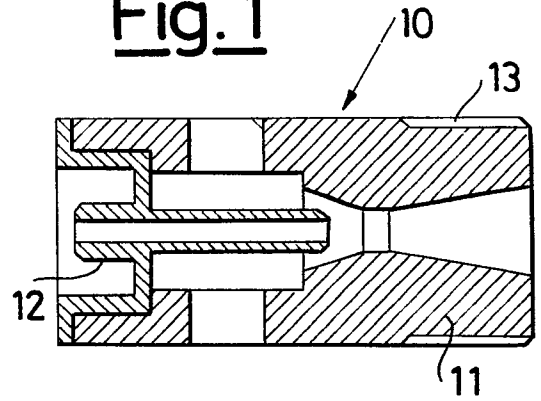


Fig.2

Fig.4

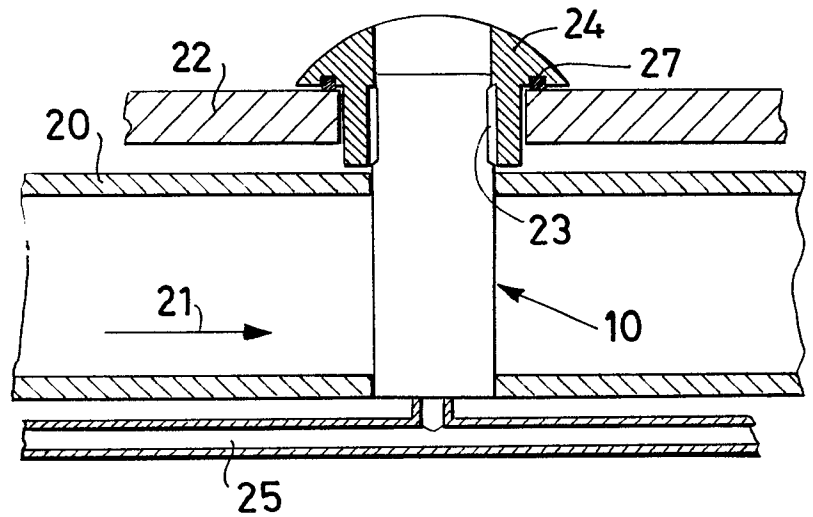
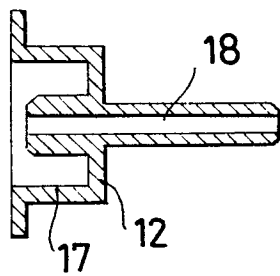


Fig.5

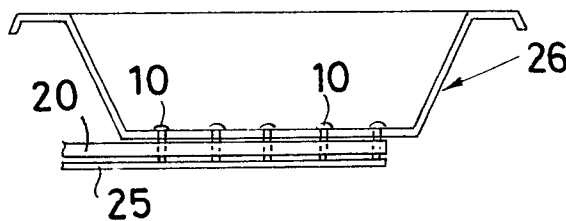


Fig.6

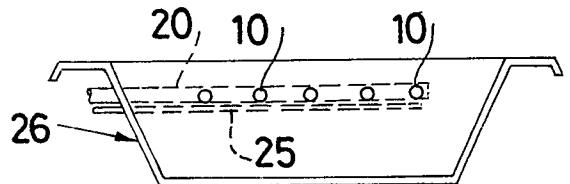
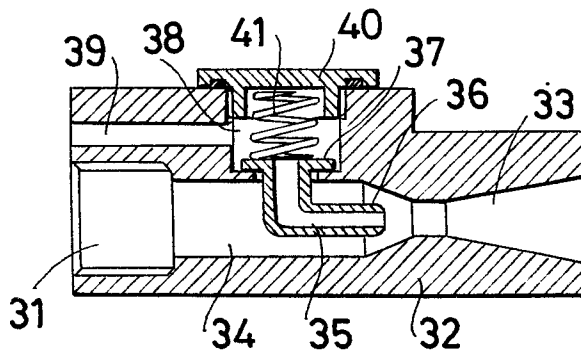
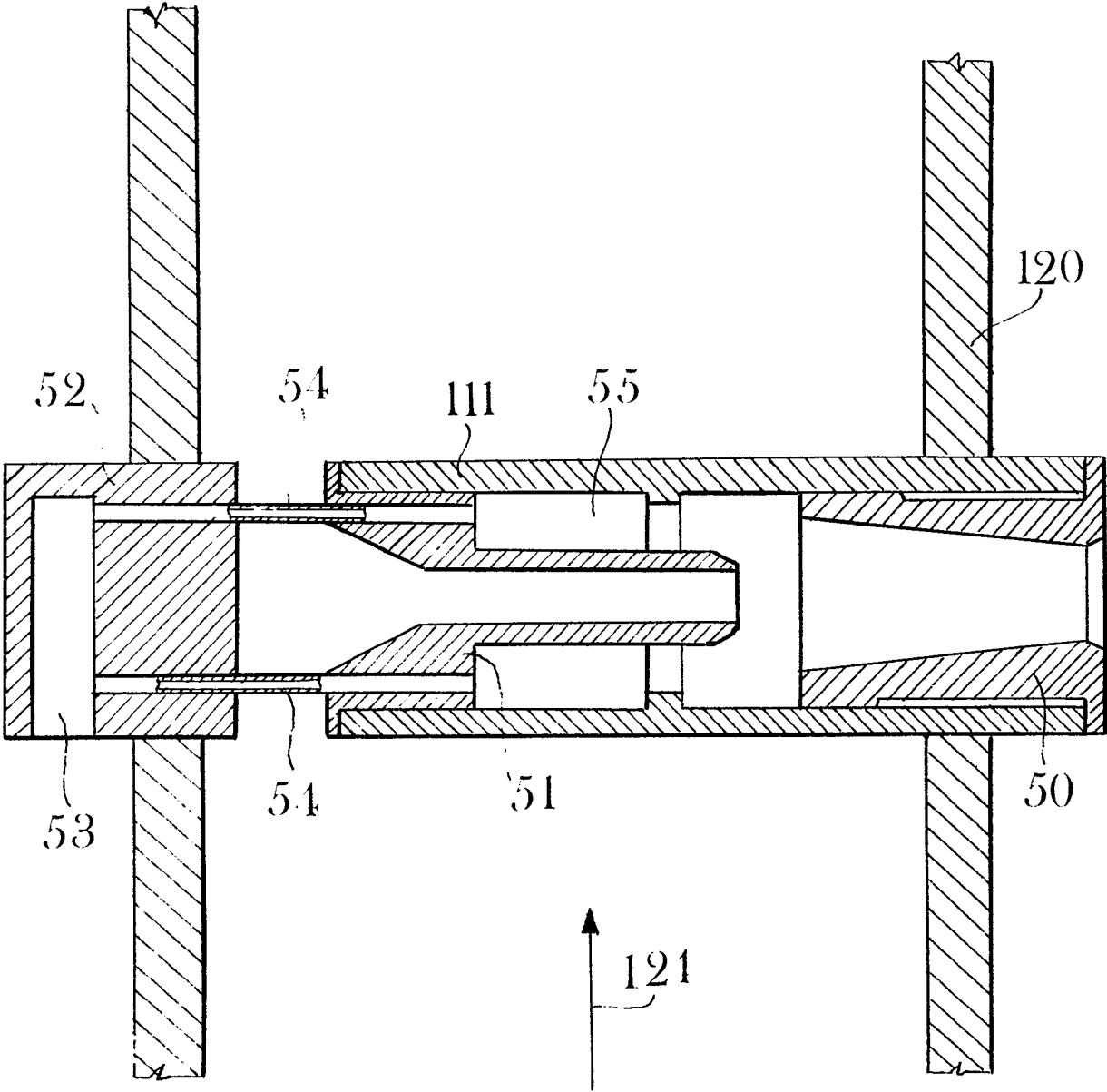


Fig.7



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FIG. 8



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Fig.9

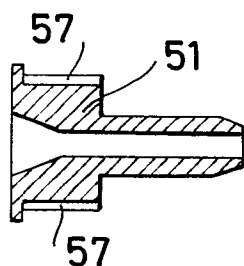


Fig.10

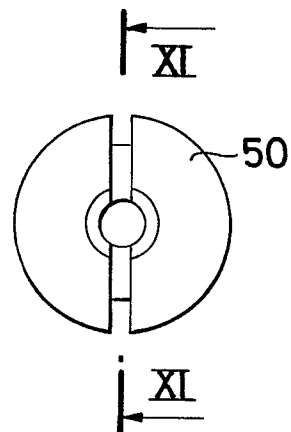


Fig.11

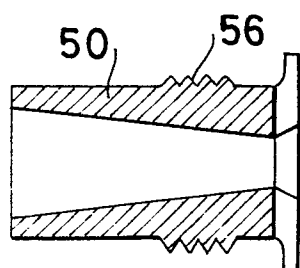


Fig.12

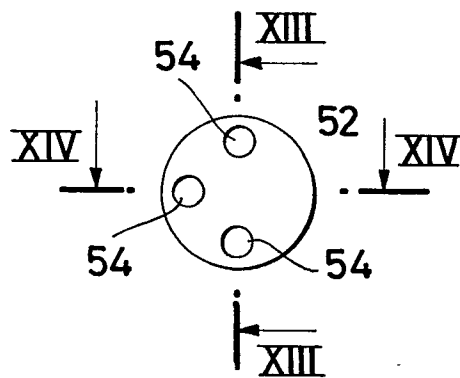


Fig.13

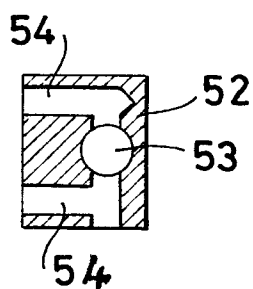


Fig.14

