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(54) **APPARATUS FOR DRY HYDRO-THERAPY BODY MASSAGE IN A RECLINED POSITION**

VORRICHTUNG ZUR TROCKENEN HYDROTHERAPIEKÖRPERMASSAGE IN EINER LIEGEPOSITION

APPAREIL DE MASSAGE CORPOREL PAR HYDROTHÉRAPIE SÈCHE EN POSITION INCLINÉE

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## Description

### CLAIM OF PRIORITY

**[0001]** This application claims priority to U.S. Nonprovisional Application No. 16/800,490, filed on February 25, 2020, which claims priority to U.S. Provisional Application No. 62/811,928, filed February 28, 2019.

### FIELD OF INVENTION

**[0002]** The present disclosure relates generally to apparatus for applying a massaging effect to the body of a user and, more particularly, to dry hydro-therapy body massage apparatus utilizing a fluid spray assembly for massage effect.

### BACKGROUND

**[0003]** Massage is a time-honored and effective therapy for muscular injuries, strains and general soreness. However, although massage is recommended by many physicians for such purposes, this therapy has limited availability due to a scarcity of trained, qualified masseurs. As a result, many devices and apparatus have been proposed in the past for producing a massage-like manipulation of a user's body by various means, ranging from mechanically or electrically-generated vibrations or pulsations, usually accompanied by heating, to pulsations of pressurized water, applied either in a wet environment, such as partially submerging the user's body in a bath device, or in a dry environment in which a fluid spray assembly is housed in a fluid-tight bed or chair-type structure for applying a massaging effect to the user's body without requiring the user to disrobe.

**[0004]** Representative examples of the latter form of apparatus, often commonly referred to as dry hydro-therapy massage, are disclosed in U.S. Pat. Nos. 4,635,620; 4,751,919; 4,757, 808; 4,908,016; 4,976,256; 5,074,286; 5,713,834; and 6,036,663. Such apparatus have met with moderate success, and efforts continue within the relevant industry to expand their acceptance, availability and usefulness.

**[0005]** The majority of such known hydro-therapy massage apparatus are in the form of a bed-type structure having an essentially horizontal user support surface on which the user may lay in a recumbent position. Advantageously, the horizontally recumbent position of the user's body in such bed-type structures enables the massaging fluid spray to be applied via a manifold device arranged for lengthwise travel within the interior of the apparatus in an essentially linear path of travel alongside the body of a user, allowing either a portion or the entire length of the user's body to be treated by the hydro-therapy massage.

**[0006]** On the other hand, one of the perceived disadvantages of a bed-type dry hydro-therapy apparatus is that the supine disposition of the user is not conducive to enabling the user to engage in other activities during the operation of the apparatus, e.g., reading, watching television, operation of a laptop computer or other personal electronic device, etc. Additionally, experience has shown that many individuals feel uncomfortable using a massage apparatus in public in which they are required to lie down on the machine. Many users suggest that a reclined or seated disposition would lead them to feel less vulnerable. For such reasons, a desire has been expressed in the industry for a dry hydro-therapy massage apparatus wherein the user rests in a generally seated disposition during operation of the apparatus, allowing the user to read a book or magazine, watch television, or remain otherwise occupied with other activities.

**[0007]** Some known apparatus to address this need include a chair for performing dry hydro-massage on a user in a seated position. While such chair apparatus have met with a reasonable degree of success, a limitation of the apparatus is that due to the position of the user being in a seated position, the force exerted on the upper body portion of the user by the pressurized water jets may cause the user to slide along the support surface on which the user is disposed. As such, it is not uncommon for the pressurized water jets to not make contact with the optimal position on the user for achieving the desired massage results. As such, the need remains for hydro-therapy massage apparatus in which the user is maintained in the desired reclined and/or seated position during the massage operation.

**[0008]** Another common issue with existing hydro-therapy massage apparatus is the egress of water vapor from the interior as a user gets on the apparatus, and the subsequent ingress of ambient air into the interior of the apparatus when the user gets off of the apparatus. For example, typical hydro-therapy massage apparatus include a tank of water holding between 20 and 80 gallons of water, a small amount of which exits the apparatus as water vapor when the user gets on the unit and the interior volume of the apparatus is slightly reduced. For example, existing apparatus may have approximately a cubic foot of air and entrained water vapor that is pushed out of the apparatus with each use. This small loss of water from the apparatus with each use ultimately requires that additional water be added to the interior of the apparatus, such as up to three gallons a day. Moreover, the ingress of ambient air along with the corresponding potential contaminants such as, but not limited to, dust, dirt, dander, etc., may increase the need for periodic maintenance as the interior components of the apparatus may become fouled more frequently. As such, there exists a need for hydro-therapy massage apparatus with improved retention of water vapor as users lie/sit on the support surface of the apparatus.

**[0009]** As noted above, typical prior art hydro-therapy massage apparatus utilize from between 20 to 80 gallons of water, which is retained within their interior volumes. Such high volumes of water may be impractical for known apparatus to provide a secondary containment volume

for retaining such amounts of water should a catastrophic and/or extended minor leak from the apparatus occur. As such, there exists a need for hydro-therapy massage apparatus that utilize smaller volumes of water to help prevent damage from potential leaks.

**[0010]** US2009312679A1, entitled "Apparatus for Dry Hydro-Therapy Body Massage of a User in a Seated Position," discloses an apparatus for dry hydro-therapy body massage of a user in a seated position including a housing structure having a user support surface wherein an upper body portion and a lower body portion of a user are supported in relative angular relation, and a fluid spray arrangement interiorly within the housing structure for directing a fluid stream at the user support surface for imparting a massaging effect through the support surface to the upper body portion and lower body portion of the user. The fluid spray arrangement is movable for travel along the user support surface in a first path of travel generally along the upper body portion of the user and a second path of travel angularly relative to the first path of travel generally along the lower body portion of the user.

**[0011]** JP2003260103A, entitled "Massage Method for Water Bed Massager," discloses a water bed-type massaging machine in which water or hot water is filled into a box-shaped water container having an opening at its top and a flexible sheet is provided over the opening in a watertight manner to constitute a water bed enabling a person being massaged to lie on the top surface of the flexible sheet. Right and left nozzles capable of jetting water or hot water against the back surface of the flexible sheet are provided in the water container.

**[0012]** US8088087B1, entitled "Dry Hydro-Therapy Body Massage Apparatus with Low Profile Enclosure Panels," discloses an apparatus for hydro-therapy massage characterized by a low profile enclosure structure surrounding a user support surface at a nominal elevation thereabove. The apparatus comprises a housing structure having an outwardly facing opening, a user support surface covering the opening, and a fluid spray arrangement within the housing structure for imparting a massaging effect through the support surface to a user thereon.

**[0013]** US6139512A, entitled "Method and Apparatus for Water Therapy," discloses an apparatus and method of improved water therapy in which a person is buoyantly supported in a reclining or prone position on a top membrane of a enclosure which contains heated water, and air. A water pump recirculates the water which is drawn out of the enclosure through outlets and associated piping and which is then reintroduced into the interior of the enclosure through venturi air intake as waterjets that are mixed with air. The air enriched waterjets drive through a layer of water and impinge on the underside of the top membrane to produce massage effects on the person. The air is captured inside the enclosure in a chamber or pocket which rises above the water level within the sealed enclosure and is drawn out of the interior enclosure to the air inlet waterjet venturi for recirculation of air throughout and within the sealed enclosure.

## SUMMARY

**[0014]** One embodiment in accordance with the present disclosure is provided according to claim 1.

**[0015]** The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate one or more embodiments of the disclosure and, together with the description, serve to explain the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** A full and enabling disclosure of the present disclosure, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended drawings, in which:

Figures 1A and 1B are perspective and side views of a dry hydro-therapy massage apparatus in accordance with an embodiment of the present disclosure;

Figures 2 and 3 are partial cut-away views of the massage apparatus shown in Figures 1 and 2;

Figures 4A and 4B are perspective and cross-sectional views, respectively, of a head/neck spray deflector of the massage apparatus as shown in Figures 1A and 1B;

Figure 5 is a perspective of a water vapor circulating system of the massage apparatus shown in Figures 1A and 1B;

Figure 6 is a perspective view of an elongated massage spray head of the massage apparatus shown in Figures 1A and 1B;

Figures 7A and 7B are top and bottom perspective views, respectively, of a housing shell of the massage apparatus shown in Figures 1A and 1B;

Figure 8 is a top plan view of the housing shell shown in Figures 7A and 7B;

Figure 9 is a cross-sectional side plan view of the massage apparatus shown in Figures 1A and 1B, taken along line 9-9 of Figure 1A;

Figure 10 is a cross-sectional view of the user support retention system of the massage apparatus shown in Figures 1A and 1B, taken along line 10-10 of Figure 1B;

Figures 11A and 11B are inner and outer plan views of the elongated massage spray head shown in Figure 6;

Figures 12A and 12B are outer and inner plan views of the elongated massage spray head shown in Figure 6;

Figures 13A, 13B, and 13C are top, rear, and front views of the elongated massage spray head shown in Figure 6;

Figure 14 is a vertical cross-sectional view of the

massage apparatus shown in Figures 1A and 1B, showing the leg spray deflector; and

Figure 15 is a perspective view of a housing shell of an alternate embodiment of a dry hydro-therapy massage apparatus in accordance with an alternate embodiment of the present disclosure.

**[0017]** Repeat use of reference characters in the present specification and drawings is intended to represent same or analogous features or elements of the invention according to the disclosure.

## DETAILED DESCRIPTION

**[0018]** As will be readily understood by persons skilled in the relevant art, the dry hydro-therapy apparatus of the present disclosure is readily adapted to be embodied in many and various forms to accommodate massage of a user in differing seated positions. The present disclosure is described herein in one contemplated embodiment of such apparatus, but only for purposes of providing an exemplary enabling disclosure of the invention and, in particular, the invention is not intended to be limited, and should not be construed as limited, to application or embodiment in such apparatus nor any other particular structure except as defined in the claims appended hereto.

**[0019]** Referring now to the accompanying drawings and initially to Figures 1A, 1B, 2 and 3, a dry hydro-therapy body massage apparatus 10 according to one embodiment of the present disclosure is generally indicated at 10. The body massage apparatus 10 includes a housing structure, generally indicated at 12, generally in the form of a lounge chair style structure, presenting an upwardly facing side 14 forming a user support surface configured for a user 100 to rest thereon for massage treatment in a seated reclining position, as more fully explained hereinafter. A fluid spray assembly, generally indicated at 16 (Figure 2), is disposed within the housing 12 in association with a pressurized fluid supply arrangement, generally indicated at 18 (Figure 3) which pulls from the pump 28 (Figure 7B), for directing a pressurized fluid emission at the underside of the user support surface 14 to transmit a massaging effect there-through to the body of the user 100 seated thereon.

**[0020]** The lounge chair structure 12 includes a chair body formed as a substantially hollow housing shell 20 (Figures 7A, 7B and 8) generally in the form of a tank or tub of an elongated configuration closed at its bottom 30 and side walls 21 and substantially open at its top to define an upwardly-facing elongated opening. The housing shell 20 may be fabricated of any suitable watertight, rigid material of appropriate strength which may be formed to the desired configuration herein described, e.g., fiberglass, plastic, or a like material. The housing shell 20 is supported on a floor-standing frame 25 (Figure 3), e.g., fabricated of any suitable structural material (metal bar stock, tubing, fiberglass or the like), to elevate and orient the user support surface 14 at a desired height and inclination above the floor while also providing an open volume 19 (Figures 2 and 9) within the frame 25 and beneath the housing 20 for enclosure of various operating components of the body massage apparatus 10.

**[0021]** As best seen in Figure 3, standing frame 25 of the body massage apparatus 10 includes a continuous upwardly-extending bottom lip 25' that forms a leak-proof volume with a bottom wall 17 of the frame 25. As such, in the unlikely event that a leak develops in the housing shell 20, or any of the components and piping supported by the frame 25, the water will be retained within the frame 25, thereby preventing damage to carpets, flooring, etc., that are disposed under the body massage apparatus 10. As discussed in greater detail below, the ability of the disclosed body massage apparatus 10 to continuously function with as little as 8 to 12 gallons of water retained therein is what makes inclusion of the described leak retention volume possible.

**[0022]** As best seen in Figure 1B, the lateral side walls 21 of the housing shell 20 are contoured to form a substantially-planar seat back portion 22 and a seat portion 24 having a substantially-planar leg seat section 24', an ottoman section 24", and a main seat section 29, the ottoman section 24" being angularly oriented with respect to the leg seat section 24', forming the user support surface 14. Preferably, the seat back portion 22 and the leg seat section 24' are angularly oriented with respect to each other, with the main seat section 29 being disposed therebetween. The user support surface 14 is configured so that the upper and lower body portions 101 and 103, respectively, of the user 100 are supported in a generally reclining seated disposition comparable to that of a lounge style chair wherein the user's body rests bent at the waist and knees with the upper body portion 101 partially reclined on the seat back portion 22, the upper leg extent 103' of the lower body portion 103 slightly inclined on the leg seat section 24', and the lower leg extent 103" slightly declined on the ottoman section 24". The slight bend of the knees of the user's legs help to push the legs down into the user support surface 14, resulting in a more effective massage than with traditional units having planar support section for the lower body of the user.

**[0023]** As shown, main seat section 29 is semi-cylindrical in shape and extends below the area that would be the intersection of seat back portion 22 and leg seat section 24'. As such, a slight ridge 31 is formed at the intersection of main seat section 29 and leg seat section 24'. As such, when a user is disposed on the user support surface 14, the ridge 31 prevents the force exerted by the pressurized fluid jets that impact the user from causing the user to slide along the leg seat section 24'. As well, the main seat section 29 helps to position the user's lower back and buttocks for a stronger massage as the majority of the user's weight is supported by these areas. As such, proper positioning of the user on the user support surface 14 is maintained and, subsequently, the

pressurized water jets will impact the user in the proper areas of the user's body to achieve the desired massaging effect.

**[0024]** Referring now to Figures 8 and 9, a hollow interior chamber 27 is defined by the housing shell 20. The bottom wall 30 of the housing shell 20 forms a drainage surface inclining into a reservoir basin 28 centrally along the lengthwise extent of the housing shell 20. Preferably, to ensure the water returning to the reservoir basin 28 flows down the drainage surfaces at the desired rate, a plurality of water features in the form of dams 33 extend upwardly from the bottom wall 30 of housing 20. If water returning to the reservoir basin 28 flows down the drainage surfaces too quickly, it is possible that the water will pass over the reservoir basin 28 rather than entering it. Such rapid water return rates require that a larger volume of water be maintained in the reservoir basin 28 to ensure continuous operation of the massage apparatus 10. By utilizing dams 33 to control the rate of return of water to the reservoir basin 28, the present embodiment of massage apparatus 10 is capable of operating with as little as 8 to 12 gallons of water retained within the apparatus. The present embodiment of massage apparatus 10 is capable of flowing water through the fluid spray assembly 16 at the rate of approximately 105 gallons per minute, with only the 8 to 12 gallons retained within the apparatus, although alternate embodiments function at varying flow rates. As previously noted, existing apparatus require a minimum of 20 gallons of water to be retained therein for continuous operation. Additionally, as shown in Figure 9, a baffle plate 45 is disposed in the opening to the reservoir basin 28. The baffle plate 45 includes a plurality of baffles 47 extending upwardly therefrom, and a plurality of openings 49 disposed therebetween. The baffles 47 assist in redirecting the flow of water downwardly into the reservoir basin 28 in a uniform manner so that the water in the reservoir basin is less turbulent than in prior art massage apparatus. As such, the potential for cavitation within the liquid pump 88 of the pressurized fluid supply arrangement 18 is decreased.

**[0025]** A liquid material is preferred as the fluid medium utilized by the body massage apparatus 10 for supply to and emission from the fluid spray assembly 16 to produce a massage effect as hereinafter described, water being an optimal liquid in view of its ready availability and generally non-corrosive and non-caustic character. As noted, a suitable supply of water (8 to 12 gallons), or another appropriate liquid, is stored in the reservoir basin 28 for continuous circulation through the fluid supply arrangement 18 and the fluid spray assembly 16, the bottom drainage wall 30 as well as the other interior surfaces of the housing shell 20 being configured to drain the liquid emitted from the fluid spray assembly 16 into the basin 28. Of course, as those persons skilled in the art will readily recognize, pressurized air, other gases, and other fluidic materials could also be utilized as the fluid massaging medium and, accordingly, the present disclosure is not limited to the use of water or another liquid massage medium.

**[0026]** It is also preferred that the water or other massage liquid be heated to enhance the massaging effect produced by the liquid, e.g., to a temperature approximating normal body temperature, preferably in the range of 35°C to 38°C (95 to 100 degrees Fahrenheit), although the apparatus has the capability of a broad range of liquid temperatures. For this purpose, a heater element (not shown) may be provided, e.g., mounted within the liquid reservoir basin 28 below the normal level of massage liquid therein to be substantially continuously submerged in the stored massage liquid. A thermostat (not shown) is preferably provided in the electrical circuit to the heating element to provide selective control of the temperature of the massage liquid. As shown in Figure 3, the apparatus is also preferably provided with a liquid cooling system 70 to offset heat gain to the massage liquid that may occur from frictional contact of the liquid while being circulated through the apparatus. As shown, the liquid cooling system 70 includes a heat exchanger 72 in the form of a radiator and one or more fans 74 to draw air across the radiator 72.

**[0027]** As shown in Figure 9, the liquid cooling system 70 is disposed at the foot of the massage apparatus 10, where it draws in air, the air travels the length of massage apparatus 10 in the volume 19 that exists between the housing shell 20 and the outer housing of the massage apparatus, and then exits the apparatus at its head end. Note, however, the liquid cooling system 70 may be positioned at any point along the length of the massage apparatus 10. Preferably, the open volumes defined between the hollow shell 20, in particular the bottom wall 30, and the outer housing are greater at the foot 19" and the head 19' of the massage apparatus than along the center portion 19'" of the massage apparatus 10. In this manner, ambient air flow drawn into the massage apparatus by the fans 74 (Figure 3) of the liquid cooling system 70 will undergo a venturi-effect as the air flows from the large foot section, along the smaller center portions, and out the larger head section and exits the massage apparatus 10. The venturi-effect on the air flow assists in more efficiently cooling the interior of the massage apparatus 10 as well as its internal components as the speed of the air increases as it passes over the internal components.

**[0028]** Referring additionally to Figures 7A and 7B, the shell 20 includes a plurality of vertically-extending ribs 76 disposed on the outer surfaces of the lateral side walls 21, as well as a plurality of horizontally-extending ribs 78, extending along the width of the bottom wall 30 of the hollow shell 20. The vertical ribs 76 lend rigidity to the lateral side walls 21, whereas the horizontal ribs 78 lend rigidity to the bottom wall of the hollow shell 20. As such, the amount of material utilized in forming both the lateral side walls 21 and the bottom wall 30 of the hollow shell 20 may be reduced, while still maintaining the rigidity of a thicker walled shell. As such, the vertical ribs 76 and horizontal ribs 78 allow for an overall reduction in the weight of the massage apparatus 10 as compared to ex-

isting units. The uppermost extent of the housing shell 20 forms a flange surface 32 for mounting thereto of the user support surface 14.

**[0029]** The user support surface 14 may be formed of a relatively thin sheet 34 of a waterproof material affixed in watertight relation across the flange 32 bordering the upwardly facing opening. The sheet 34 preferably is sufficiently thin that the impact of fluid emitted from the fluid spray assembly 16 against the underside of the sheet 34 transmits a massaging effect through the sheet 34 to the body of the user. Further, the sheet 34 is preferably of a sufficient flexibility and resiliency to substantially conform to the body of the user for maximum transmission of the massage effect through the sheet 34 to the user. In this manner, the sheet 34 functions in the nature of a waterproof membrane to keep the user dry during operation of the body massage apparatus 10 without noticeably dampening the massaging impact of fluid emitted from the fluid spray assembly 16. For example, a latex rubber in sheet form, in the range of 15 to 55 mil. thickness, is a suitable material to provide these characteristics for the sheet 34, although various other commercially available rubber and plastic sheeting materials should also provide suitable results.

**[0030]** As a primary means of weight bearing support of the user, an open-mesh netting 35, partially shown in phantom lines in Figure 1, may be affixed in tensioned condition to the flange 32 of the housing shell 20 horizontally across its opening immediately beneath the sheet 34. The netting 35 should be of sufficient strength to independently support the weight of a user to provide a safety barrier in the event of a rupture or other failure of the sheet 34. At the same time, the open-mesh construction of the netting 35 permits essentially unrestricted transmission of fluid from the fluid spray assembly 16 through the netting 35 and against the underside of the sheet 34. Preferably, the netting 35 is not as taught in the areas of the user support surface 14 that are beneath the user's head and lowermost leg areas. As such, as compared to the remainder of the user support surface, the head and feet of the user are able to "sink" into the user support surface 14 for better positioning and enhanced massaging effect.

**[0031]** As depicted in Figures 1, 7A, and 10, the flange 32 as well as the side walls 21 of the housing shell 20 are covered by frame panels 36 to provide an aesthetically pleasing exterior enclosure of the overall housing shell 20 and the internal operational components housed beneath the shell 20. Specifically, it is important to maintain a proper seal between the interior chamber 27 of the hollow shell 20 and the sheet 34 in order to prevent the loss of water from the interior of the massage apparatus 10. As such, a continuous groove 41 is provided along the entire length of the upper surface of the flange 32 of the hollow shell 20, with the continuous groove 41 being configured to receive an O-ring 39 therein. As shown in Figure 10, the outer perimeter of sheet 34 extends over the annular groove 41 in which the O-ring 39 is then placed. With the O-ring 39 in place, a series of interlocking frame panels 36 are fastened into place by threaded knobs 23 that engage the underside of the flange 32, thereby securing the sheet 34 to the flange 32. In alternate embodiments, frame panels 36 may be secured to flange 32 by snapping them into place via interlocking features with the flange 32. A downwardly-extending protrusion 36' extends from the bottom surface of each frame panel 36 into the continuous groove 41, thereby compressing the O-ring 39 and enhancing the water tight seal of the massage apparatus 10. Note, the interlocking features of the frame panels 36 allow the frame panels 36 to be removed and re-installed without the use of tools, as necessary for servicing the unit. Additionally, the upper surface of the frame panels 36 covering and bordering the flange 32 may preferably be cushioned for the comfort of the user during ingress and egress of the user support surface 14.

**[0032]** Other than the portion of the interior chamber 27 occupied by the water stored in the basin 28 and the area occupied by the fluid spray assembly 16 and the fluid supply arrangement 18, the interior chamber 27 of the housing shell 20 is substantially filled with air. As such, as one would expect, when a user lies down on the user support surface 14, thereby reducing the interior volume of the interior chamber 27 as the user support surface 14 moves slightly downwardly into the interior chamber 27, some air and potentially entrained water vapor would be expected to egress from the hollow shell 20. In order to prevent a subsequent ingress of surrounding air and dust, dirt, etc., into the interior of the hollow shell 20, the present massage apparatus 10 includes a water vapor circulating system 130, as best seen in Figures 3 and 5. As shown, the water vapor circulating system 130 includes an inflatable chamber 131 that is secured to the outer surface of the head portion of the hollow shell 20, and is connected to the interior of the hollow shell 20 via piping 134 that is connected to an inlet 132 of the chamber 131. As such, when air and entrained water vapor is forced out of the hollow shell 20, it is collected in the chamber 131 rather than egressing to the surrounding environment. When a user dismounts the user support surface 14, rather than drawing in air from the surrounding environment, air is simply drawn back into the hollow shell 20 from the chamber 131. An outlet 136 is provided in the bottom of the chamber 131 to allow the return of condensed water vapor to the hollow shell 20 therethrough. As such, the interior of the hollow shell 20 and the chamber 131 form a closed system, thereby helping to maintain the desired water volume within the massage unit 10, as well as preventing the ingress of dust, debris, etc., from the surrounding environment.

**[0033]** Referring now to Figure 6, the fluid spray assembly 16 includes an elongate massage spray head, generally indicated at 44, oriented transversely across substantially the widthwise extent of the user's body. The massage head 44 may be of any of various possible configurations and componentry adapted to emit the mas-

sage fluid under pressure against the underside of the membrane sheet 34. For example, in one possible configuration, the massage head 44 may have a substantially hollow outer body 52 with a plurality of emission openings 56, each in the form of a nozzle, over substantially the full extent of the upward surface of the body 52 which faces the sheet 34. The emission openings 56 deliver pressurized fluid from the body 52 in a jet-like spray upwardly therefrom against the underside of the membrane sheet 34. Preferably, the elongate massage head 44 and emission openings 56 are configured to provide a jet-like spray that is a combination of both laminar and turbulent flows. Often, existing massage apparatus have jet-like sprays that are strictly laminar flow or strictly turbulent flow. A strictly laminar massaging spray concentrates the force of the spray in a small of an area on the user which can lead to pain and discomfort. On the other hand, strictly turbulent flow can cause the pressure of the massaging spray to be spread out over a large of an area so that the desired massaging effect is not achieved. The present massage apparatus 10 obtains the desired combination of a combined laminar and turbulent flow massaging spray by way of the design of the massage spray head 44 and corresponding emission opening 56, as discussed below.

**[0034]** Referring additionally to Figures 11A through 12B, the hollow outer body 52 of the massage spray head 44 is preferably formed of an injection molded upper body portion 82 and an injection molded lower body portion 86. As shown in Figures 11A and 11B, lower body portion 86 includes a smoothly radiused inlet 84 and a plurality of brackets 46 on each end for receiving corresponding rollers or wheels 48 (Figure 13). The radiused inlet is configured to provide a smooth inlet flow of water into the interior of the outer body 52 so that the flow within the outer body 52 is less turbulent. As best seen in Figures 12A and 12B, the upper body portion 82 of the outer body 52 also includes the radiused inlet 84 as well as the plurality of emission openings 56. As shown, the emission openings 56 are disposed along a line that is offset from the longitudinal center axis 89 of the upper body portion 82. The combination of the radiused inlet 84, subsequent laminar flow within outer body 52, and the offset emission openings 56 allow the massage spray head 44 of the present massage apparatus 10 to attain an optimal massage spray that includes both laminar and turbulent flows, resulting in the desired massaging effect. Preferably, the modular design of the massage spray head 44 allows the desired massaging spray pattern to be changed by simply replacing the upper body portion 82 of the outer body 52 with an alternate upper body portion having a different arrangement of emission openings 56.

**[0035]** As best seen in Figures 2 and 13A through 13C, the elongate massage head 44 is supported at each opposite end by brackets 46 with rollers or wheels 48 (Figure 13) for rolling travel along tracks 26 traversingly back-and-forth through substantially the full lengthwise extent of the chamber 27 along angularly changing paths of travel following the angular configuration of the tracks 26. The pair of angular tracks 26 are affixed interiorly to the bottom wall 30 of the housing shell 20, each extending in angular sections in parallel spaced relation to each other through substantially the full lengthwise extent of the chamber 27. The rollers 48 travel along the tracks 26 during lengthwise traversing travel within the chamber 27. Preferably, each track 26 is a one-piece construction, while alternate embodiments may include multi-piece tracks.

**[0036]** The traversing travel of the massage head 44 is driven reciprocally back-and-forth through the lengthwise extent of the massage chamber 27 via any suitable drive mechanism. For, example, in the illustrated embodiment, a toothed timing belt 66 (Figure 2) is attached at opposite belt ends to each respective bracket 46 at the ends of the massage head 44, forming two endless drive belt loops which are trained about a series of toothed guide pulleys 68 rotatably mounted to the interior surfaces of the side walls 21 adjacent the tracks 26 at each opposite end of the chamber 27 and also at the location of each change of angular direction in the tracks 26. The pulleys 68 at one end of the chamber 27 are secured to a common drive shaft journaled through one side wall 21 and connected exteriorly thereof to a reversible drive motor 70 for imparting synchronous drive motion to the belts 66 and, in turn, to the massage head 44 to travel along the tracks 26. Any suitable form of sensors, such as electric eyes (not shown), may be provided at the limits of the massage head travel to control reversal of the drive motor 70.

**[0037]** Referring again to Figure 3, the pressurized fluid is delivered from the fluid supply arrangement 18 to the massage head 44 in any suitable way. For example, the pressurized fluid supply arrangement 18 may have an electric motor 90 driving a liquid pump 88 to draw fluid from the liquid reservoir basin 28 of the housing shell 20, e.g., via a submerged tubular fitting. The outlet side of the pump 88 delivers the fluid under pressure to the massage head 44 through a conduit 92 with a flow control valve (not shown) disposed therein and a length of flexible tubing (not shown) connected between the conduit 92 and a fitting on the outer body 52 of the massage head 44.

**[0038]** As will be understood, the widthwise reach of the massage head 44 laterally across the interior chamber 27 effectively applies a massaging action to the full lateral extent of the body of a user supported on the user support surface 14, and in particular across the full width of the user's shoulders, back or chest, mid-section and hips. In the distal head region 110 (Figure 1B) and leg region 112 of the user support surface 14, by contrast, the fluid spray is not needed across the full widthwise reach of the massage head 44 to accomplish an effective massaging action of the more narrow neck and legs of the user. Therefore, to insure an optimum application of the massaging spray to these selected areas of the user's body, the present disclosure provides a control arrange-

ment, preferably in the form of two deflectors 114, 116, arranged in the interior chamber 27 intermediate the fluid spray assembly 16 and the underside of the user support surface 14 to selectively alter and redirect the directional flow of the fluid spray to be concentrated in a more narrow widthwise portion of the user support surface 14 at predominantly only the user's neck and legs.

**[0039]** More specifically, as shown in Figures 4A and 4B, the head/neck deflector 114 comprises two pairs of deflector plates 118a and 118b affixed within the interior chamber 27 to the end wall of the housing shell 20, the deflector plates within each pair being at a lateral spacing from one another and extending from the end wall longitudinally of the housing along the underside of laterally outer margins of head region 110 of the user support surface 14 and above the fluid spray assembly 16. The deflector plates 118a and 118b are thereby respectively disposed outwardly alongside the area of the user support surface 14 on which a user's neck and head will rest and the plates 118a and 118b within each pair are inclined toward one another in converging relationship for deflecting inwardly toward the underside of the user support surface 14 in the spacing between the plates the portions of the fluid stream from the emission openings 56 of the massage head 44 which would otherwise impact unoccupied areas of the user support surface 14, to thereby redirect the deflected portions of the fluid spray to impact against the neck of the user. In the preferred embodiment shown, there is a deflector plate for each emission opening 56 of the massage spray head 44 so that no massage spray stream impacts directly on the head/neck of the user without first contacting the corresponding deflector plate. The head/neck deflector 114 helps to maximize the massaging effect of the massage head 44 in the soft tissue of the neck area of the user by preventing the direct impingement of any of the water jets on the spinal cord area without first being re-directed by a deflector plate. As well, the deflector plates prevent the water jets from impinging on areas of the user support surface that are outside the areas that are directly supporting the user, thereby reducing extraneous noise from the jets.

**[0040]** Similarly, as shown in Figure 14, the leg deflector 116 (Figure 2) comprises a pair of deflector plates 120 affixed within the interior chamber 27 to the opposite end wall of the housing shell 20 immediately adjacent one another and extending from the end wall longitudinally of the housing centrally along the underside of the leg region 112 of the user support surface 14 and above the fluid spray assembly 16. The deflector plates 120 are thereby respectively disposed alongside the central longitudinal area of the user support surface 14 between the outward areas on which a user's legs will rest. The plates 120 abut one another along common lower plate edges and are inclined upwardly away one another in diverging relationship for deflecting outwardly toward the underside of the user support surface 14 outwardly of the plates 120 the portions of the fluid stream from the central extent of the massage head 44 which would otherwise impact the unoccupied area of the user support surface 14 between the user's legs, to thereby redirect the deflected portions of the fluid spray to impact against the legs of the user.

**[0041]** The operation of the body massage apparatus of the present disclosure may thus be understood. As the massage head 44 travels back-and-forth lengthwise within the chamber 27, the pressurized liquid is delivered from the pump 88 through the intervening conduits into the interior of the outer body 52 of the massage head 44 and in jet-like spray therefrom through the emission openings 56. The relative thinness of the sheet 34 together with its resilient flexibility causes the sheet 34 to conform relatively closely to the shape and contours of the user's body and, in turn, the impact of the jetted liquid against the underside of the sheet 34 is readily transmitted therethrough to the body of the user to produce a massaging effect on the user's body. As the massage head 44 reaches each opposite end of the interior chamber 25 in its traveling movement, the electric eyes or other sensors recognize the presence of the massage head 44 and, in turn, actuate reversal of the electric motor 70 to initiate driving of the massage head 44 in the opposite direction.

**[0042]** Referring now to Figure 15, a housing shell 120 in accordance with an alternate embodiment of the present disclosure is shown. The housing shell 120 differs primarily from the previously discussed embodiment, in that rather than a travelling fluid spray assembly 16 (Figure 2), the present housing shell 120 includes a plurality of fluid nozzles 156 directed upwardly from the bottom wall 130. This design allows for the omission of various components required in the embodiment having a travelling fluid spray assembly 16. As shown, the fluid nozzles 156 are arranged in horizontal and vertical rows along the bottom wall 130. Note, however, the fluid nozzles 156 may be positioned in any desired pattern, such as, but not limited to, circular, staggered, varying spacing based on location, etc. Note also, during use the spray nozzles 156 may be operated simultaneously, in selected zones based on position of the user, independently, etc.

## Claims

1. An apparatus (10) for dry hydro-therapy body massage of a user (100) in a reclined position, comprising:

   a housing structure (12) having a user support surface (14) for supporting the user (100) in the reclined position, the user support surface (14) including a substantially-planar seat back portion (22), a seat portion (24) with a semi-cylindrical main seat section (29) and a substantially-planar leg seat section (24'), wherein the seat back portion (22) and the leg seat section (24')

are in relative angular relation to each other and the main seat section (29) is disposed therebetween, and the seat back portion (22) is adapted to support an upper body portion (101) of the user (100), the leg seat section (24) is adapted to support an upper leg extent (103') of a lower body portion (103) of the user (100), and the main seat section (29) is adapted to support a buttocks of the user (100), wherein the housing structure (12) comprises a housing shell (20) including a bottom wall (30) and a plurality of side walls (21) extending upwardly therefrom, wherein the user support surface (14) is secured to an upper perimeter of the side walls (21), thereby defining an interior chamber (27);
a fluid spray assembly (16) interiorly within the housing structure (12) for directing a fluid stream at the user support surface (14) for imparting a massaging effect through the user support surface (14) to the upper body portion (101) and lower body portion (103) of the user (100); wherein the interior chamber (27) of the housing structure (12) is partially filled with a volume of a fluid;
**characterised in that** the apparatus (10) comprises
a vapor circulating system (130) including a body defining a further interior chamber (131), wherein the interior chambers (131, 27) of the housing structure (12) and the vapor circulating system (130) are in fluid communication with each other via a first passage (132), and the interior chambers (131, 27) of the housing structure (12) and the vapor circulating system (130) form a closed system, wherein
the first passage (132) extends from a portion of the sidewall (21) of the housing shell (20) disposed above the volume of the fluid to the body of the vapor circulating system (130).

**2.** The apparatus (10) of claim 1, further comprising a first ridge (31) formed in the user support surface (14) at an intersection of the main seat section (29) and the leg seat section (24').

**3.** The apparatus (10) of claim 2, the user support surface (14) further comprising a substantially planar ottoman section (24") that is configured to support a lower leg extent (103") of the lower body portion (103) of the user (100), wherein the ottoman section (24") and the leg seat section (24") intersect at a second ridge.

**4.** The apparatus (10) of claim 3, wherein the user support surface (14) comprises a waterproof membrane (34) and an open net mesh (35) disposed both adjacent to and below the waterproof membrane (34).

**5.** The apparatus (10) of claim 1, wherein the fluid spray assembly (16) is movable for travel along the user support surface (14) in a first path of travel generally along the seat back portion (22) and a second path of travel along an acute angle relative to the first path of travel generally along the seat portion (24).

**6.** The apparatus (10) of claim 5, the fluid spray assembly (16) comprising a hollow elongated spray head (44) including a plurality of emission openings (56) disposed along an upper surface thereof so that flow through the emission openings (56) is directed toward the user support surface (14), the spray head (44) extending transversely to a longitudinal axis of the apparatus (10).

**7.** The apparatus (10) of claim 6, wherein the elongated spray head (44) further comprises a radiused fluid inlet (84), and the emission openings (56) are disposed laterally from a longitudinal center axis of the spray head (44) that is transverse to the longitudinal center axis of the apparatus.

**8.** The apparatus (10) of claim 1, wherein the fluid spray assembly (16) comprises a plurality of fixed emission openings (156) arranged so that a fluid flow therethrough is directed upwardly toward the user support surface (14).

**9.** The apparatus (10) of claim 1, further comprising a tub-shaped housing shell (20) with a bottom wall (30), a plurality of side walls (21) extending upwardly therefrom, and a continuous flange (32) extending along an upper perimeter of the side walls (21), wherein the user support surface (14) is secured to the flange (32) of the housing shell (20) so that a water-tight seal is formed therebetween.

**10.** The apparatus (10) of claim 9, further comprising a plurality of interlocking frame panels (36), each frame panel (36) including a downwardly-extending elongated protrusion (36') that is received in a corresponding elongated groove (41) defined in an upper surface of the flange (32) of the housing shell (20), wherein the user support surface (14) is affixed to the housing shell (20) when the elongated protrusions (36') are disposed in the elongated groove (41).

**11.** The apparatus (10) of claim 10, wherein an O-ring (39) is disposed between a bottom surface of the elongated groove (41) and the elongated projections (36') of the frame panels (36).

**12.** The apparatus (10) of claim 1, further comprising two deflectors (114, 116), arranged in the interior chamber (27) intermediate the fluid spray assembly (16) and the underside of the user support surface (14)

to selectively alter and redirect the directional flow of the fluid spray to be concentrated in a more narrow widthwise portion of the user support surface (14).

**13.** The apparatus (10) of claim 1, further comprising a second passage (136) that extends from a lower most portion of the body of the vapor circulating system (130) to the housing shell (120).

**14.** The apparatus (10) of claim 1, further comprising a liquid cooling system (70) that blows air through an inner volume of the housing structure (12) that is disposed between the housing shell (20) and an outer shell in which the housing shell (20) is disposed, wherein a cross-section of the inner volume of a center of the housing structure (12) is less than both a cross-section of the volume at both a foot and a head of the housing structure (12) such that the air passing through the volume undergoes a venturi effect.

**Patentansprüche**

**1.** Vorrichtung (10) zur trockenen hydrotherapeutischen Körpermassage eines Benutzers (100) in einer zurückgelehnten Position, umfassend:

eine Gehäusestruktur (12) mit einer Benutzerauflagefläche (14) zum Tragen des Benutzers (100) in der zurückgelehnten Position, wobei die Benutzerauflagefläche (14) einen im Wesentlichen ebenen Rückenlehnenabschnitt (22), einen Sitzabschnitt (24) mit einem halbzylindrischen Hauptsitzabschnitt (29) und einen im Wesentlichen ebenen Beinsitzabschnitt (24') umfasst, wobei der Rückenlehnenabschnitt (22) und der Beinsitzabschnitt (24') in einer relativen Winkelbeziehung zueinander stehen und der Hauptsitzabschnitt (29) dazwischen angeordnet ist, und der Rückenlehnenabschnitt (22) eingerichtet ist, einen oberen Körperabschnitt (101) des Benutzers (100) zu tragen, der Beinsitzabschnitt (24) eingerichtet ist, um einen oberen Beinbereich (103') eines unteren Körperabschnitts (103) des Benutzers (100) zu tragen, und der Hauptsitzabschnitt (29) eingerichtet ist, um ein Gesäß des Benutzers (100) zu tragen, wobei die Gehäusestruktur (12) eine Gehäuseschale (20) mit einer Bodenwand (30) und einer Mehrzahl von Seitenwänden (21) umfasst, die sich von dieser nach oben erstrecken, wobei die Benutzerauflagefläche (14) an einem oberen Umfang der Seitenwände (21) befestigt ist und dadurch eine Innenkammer (27) definiert,
eine Fluidsprühanordnung (16) im Inneren der Gehäusestruktur (12) zum Richten eines Fluidstroms auf die Benutzerauflagefläche (14), um über die Benutzerauflagefläche (14) einen Massageeffekt auf den oberen Körperabschnitt (101) und den unteren Körperabschnitt (103) des Benutzers (100) auszuüben; wobei die Innenkammer (27) der Gehäusestruktur (12) teilweise mit einem Volumen eines Fluids gefüllt ist; **dadurch gekennzeichnet, dass** die Vorrichtung (10) ein Dampfzirkulationssystem (130) mit einem Körper umfasst, der eine weitere Innenkammer (131) definiert, wobei die Innenkammern (131, 27) der Gehäusestruktur (12) und des Dampfzirkulationssystems (130) über einen ersten Durchgang (132) in Fluidverbindung miteinander stehen, und die Innenkammern (131, 27) der Gehäusestruktur (12) und des Dampfzirkulationssystems (130) ein geschlossenes System bilden, wobei sich der erste Durchgang (132) von einem Abschnitt der Seitenwand (21) der Gehäuseschale (20), der oberhalb des Volumens des Fluids angeordnet ist, zum Körper des Dampfzirkulationssystems (130) erstreckt.

**2.** Vorrichtung (10) nach Anspruch 1, die ferner eine erste Rippe (31) umfasst, die in der Benutzerauflagefläche (14) an einem Übergang zwischen dem Hauptsitzabschnitt (29) und dem Beinsitzabschnitt (24') ausgebildet ist.

**3.** Vorrichtung (10) nach Anspruch 2, bei der die Benutzerauflagefläche (14) ferner einen im Wesentlichen ebenen Ottomanenabschnitt (24") umfasst, der konfiguriert ist, um einen unteren Beinbereich (103") des unteren Körperabschnitts (103) des Benutzers (100) zu tragen, wobei der Ottomanenabschnitt (24") und der Beinsitzabschnitt (24") an einer zweiten Rippe zusammentreffen.

**4.** Vorrichtung (10) nach Anspruch 3, bei der die Benutzerauflagefläche (14) eine wasserdichte Membran (34) und ein offenes Netzgewebe (35) umfasst, das sowohl angrenzend an als auch unterhalb der wasserdichten Membran (34) angeordnet ist.

**5.** Vorrichtung (10) nach Anspruch 1, bei der die Fluidsprühanordnung (16) zur Bewegung entlang der Benutzerauflagefläche (14) auf einem ersten Bewegungsweg im Allgemeinen entlang des Rückenlehnenabschnitts (22) und auf einem zweiten Bewegungsweg entlang eines spitzen Winkels relativ zum ersten Bewegungsweg im Allgemeinen entlang des Sitzabschnitts (24) bewegbar ist.

**6.** Vorrichtung (10) nach Anspruch 5, bei der die Fluidsprühanordnung (16) einen hohlen, langgestreckten Sprühkopf (44) mit einer Mehrzahl von Austrittsöffnungen (56) umfasst, die entlang einer Oberseite desselben angeordnet sind, so dass ein Fluss durch die Austrittsöffnungen (56) auf die Benutzerauflagefläche (14) gerichtet ist, wobei sich der Sprühkopf

(44) quer zu einer Längsachse der Vorrichtung (10) erstreckt.

**7.** Vorrichtung (10) nach Anspruch 6, bei der der langgestreckte Sprühkopf (44) ferner einen abgerundeten Fluideinlass (84) umfasst und die Austrittsöffnungen (56) seitlich von einer Längsmittelachse des Sprühkopfs (44) angeordnet sind, die quer zu der Längsmittelachse der Vorrichtung verläuft.

**8.** Vorrichtung (10) nach Anspruch 1, bei der die Fluidsprühanordnung (16) eine Mehrzahl von feststehenden Austrittsöffnungen (156) umfasst, die so angeordnet sind, dass ein Fluidstrom durch sie hindurch nach oben in Richtung der Benutzerauflagefläche (14) gerichtet ist.

**9.** Vorrichtung (10) nach Anspruch 1, die ferner eine wannenförmige Gehäuseschale (20) mit einer Bodenwand (30), einer Mehrzahl von sich von dieser nach oben erstreckenden Seitenwänden (21) und einem durchgehenden Flansch (32), der sich entlang eines oberen Umfangs der Seitenwände (21) erstreckt, umfasst, wobei die Benutzerauflagefläche (14) an dem Flansch (32) der Gehäuseschale (20) so befestigt ist, dass dazwischen eine wasserdichte Dichtung gebildet ist.

**10.** Vorrichtung (10) nach Anspruch 9, die ferner eine Mehrzahl von ineinandergreifenden Rahmentafeln (36) aufweist, wobei jede Rahmentafel (36) einen sich nach unten erstreckenden langgestreckten Vorsprung (36') aufweist, der in einer entsprechenden langgestreckten Nut (41) aufgenommen ist, die in einer Oberseite des Flansches (32) der Gehäuseschale (20) definiert ist, wobei die Benutzerauflagefläche (14) an der Gehäuseschale (20) befestigt ist, wenn die langgestreckten Vorsprünge (36') in der langgestreckten Nut (41) angeordnet sind.

**11.** Vorrichtung (10) nach Anspruch 10, bei der ein O-Ring (39) zwischen einer Bodenfläche der langgestreckten Nut (41) und den langgestreckten Vorsprüngen (36') der Rahmenplatten (36) angeordnet ist.

**12.** Vorrichtung (10) nach Anspruch 1, die ferner zwei Ablenker (114, 116) umfasst, die in der Innenkammer (27) zwischen der Fluidsprühanordnung (16) und der Unterseite der Benutzerauflagefläche (14) angeordnet sind, um die Strömungsrichtung des Fluidsprühstrahls selektiv zu ändern und so umzulenken, dass er in einem schmaleren Breitenabschnitt der Benutzerauflagefläche (14) konzentriert wird.

**13.** Vorrichtung (10) nach Anspruch 1, ferner mit einem zweiten Durchgang (136), der sich von einem untersten Abschnitt des Körpers des Dampfzirkulationssystems (130) zu der Gehäuseschale (120) erstreckt.

**14.** Vorrichtung (10) nach Anspruch 1, die ferner ein Flüssigkeitskühlsystem (70) umfasst, das Luft durch ein inneres Volumen der Gehäusestruktur (12) bläst, das zwischen der Gehäuseschale (20) und einer äußeren Schale, in der die Gehäuseschale (20) angeordnet ist, angeordnet ist, wobei ein Querschnitt des inneren Volumens einer Mitte der Gehäusestruktur (12) kleiner ist als ein Querschnitt des Volumens sowohl an einem Fuß als auch an einem Kopf der Gehäusestruktur (12), so dass die Luft, die durch das Volumen strömt, einen Venturi-Effekt erfährt.

**Revendications**

**1.** Appareil (10) de massage corporel par hydrothérapie sèche d'un utilisateur (100) dans une position inclinée, comprenant :

une structure de logement (12) présentant une surface de soutien d'utilisateur (14) pour soutenir l'utilisateur (100) dans la position inclinée, la surface de soutien d'utilisateur (14) incluant une partie de dossier d'assise sensiblement plane (22), une partie d'assise (24) avec une section d'assise principale semi-cylindrique (29) et une section d'assise de jambes sensiblement plane (24'), dans lequel la partie de dossier d'assise (22) et la section d'assise de jambes (24') sont en relation angulaire relative l'une par rapport à l'autre et la section d'assise principale (29) est disposée entre celles-ci, et la partie de dossier d'assise (22) est adapté pour soutenir une partie de corps supérieure (101) de l'utilisateur (100), la section d'assise de jambes (24) est adaptée pour soutenir une étendue de jambes supérieure (103') d'une partie de corps inférieure (103) de l'utilisateur (100), et la section d'assise principale (29) est adaptée pour soutenir les fesses de l'utilisateur (100), dans lequel la structure de logement (12) comprend une coque de logement (20) incluant une paroi de fond (30) et une pluralité de parois latérales (21) s'étendant vers le haut à partir de celle-ci, dans lequel la surface de soutien d'utilisateur (14) est fixée à un périmètre supérieur des parois latérales (21), en définissant ainsi une chambre intérieure (27) ;
un ensemble de pulvérisation de fluide (16) intérieurement dans la structure de logement (12) afin d'orienter un flux de fluide au niveau de la surface de soutien d'utilisateur (14) pour conférer un effet de massage à travers la surface de soutien d'utilisateur (14) à la partie de corps supérieure (101) et à la partie de corps inférieure (103) de l'utilisateur (100) ; dans lequel la cham-

bre intérieure (27) de la structure de logement (12) est partiellement remplie d'un volume d'un fluide ;

**caractérisé en ce que** le dispositif (10) comprend :

un système de circulation de vapeur (130) incluant un corps définissant une chambre intérieure supplémentaire (131), dans lequel les chambres intérieures (131, 27) de la structure de logement (12) et le système de circulation de vapeur (130) sont en communication fluidique l'un avec l'autre via un premier passage (132), et les chambres intérieures (131, 27) de la structure de logement (12) et le système de circulation de vapeur (130) forment un système fermé, dans lequel
le premier passage (132) s'étend depuis une partie de la paroi latérale (21) de la coque de logement (20) disposée au-dessus du volume du fluide vers le corps du système de circulation de vapeur (130).

**2.** Appareil (10) selon la revendication 1, comprenant en outre une première arête (31) formée dans la surface de soutien d'utilisateur (14) au niveau d'une intersection de la section d'assise principale (29) et de la section d'assise de jambes (24').

**3.** Appareil (10) selon la revendication 2, la surface de soutien d'utilisateur (14) comprenant en outre une section de repose-pied sensiblement plane (24") qui est configurée pour soutenir une étendue de jambes inférieure (103") de la partie de corps inférieure (103) de l'utilisateur (100), dans lequel la section de repose-pied (24") et la section d'assise de jambes (24") se croisent au niveau d'une seconde arête.

**4.** Appareil (10) selon la revendication 3, dans lequel la surface de soutien d'utilisateur (14) comprend une membrane imperméable à l'eau (34) et un treillis ouvert (35) disposé à la fois à côté et en dessous de la membrane imperméable à l'eau (34).

**5.** Appareil (10) selon la revendication 1, dans lequel l'ensemble de pulvérisation de fluide (16) est mobile pour se déplacer le long de la surface de soutien d'utilisateur (14) dans un premier trajet de déplacement généralement le long de la partie de dossier d'assise (22) et un second trajet de déplacement le long d'un angle aigu par rapport au premier trajet de déplacement généralement le long de la partie d'assise (24).

**6.** Appareil (10) selon la revendication 5, l'ensemble de pulvérisation de fluide (16) comprenant une tête de pulvérisation allongée creuse (44) incluant une pluralité d'ouvertures d'émission (56) disposées le long d'une surface supérieure de celle-ci de sorte que l'écoulement à travers les ouvertures d'émission (56) est dirigé vers la surface de soutien d'utilisateur (14), la tête de pulvérisation (44) s'étendant transversalement par rapport à un axe longitudinal de l'appareil (10).

**7.** Appareil (10) selon la revendication 6, dans lequel la tête de pulvérisation allongée (44) comprend en outre une entrée de fluide arrondie (84), et les ouvertures d'émission (56) sont disposées latéralement à partir d'un axe central longitudinal de la tête de pulvérisation (44) qui est transversal à l'axe central longitudinal de l'appareil.

**8.** Appareil (10) selon la revendication 1, dans lequel l'ensemble de pulvérisation de fluide (16) comprend une pluralité d'ouvertures d'émission fixes (156) agencées de telle sorte qu'un écoulement de fluide à travers celles-ci est dirigé vers le haut en direction de la surface de soutien d'utilisateur (14).

**9.** Appareil (10) selon la revendication 1, comprenant en outre une coque de logement en forme de cuve (20) avec une paroi de fond (30), une pluralité de parois latérales (21) s'étendant vers le haut à partir de celle-ci, et une bride continue (32) s'étendant le long d'un périmètre supérieur des parois latérales (21), dans lequel la surface de soutien d'utilisateur (14) est fixée à la bride (32) de la coque de logement (20) de sorte qu'un joint étanche à l'eau est formé entre celles-ci.

**10.** Appareil (10) selon la revendication 9, comprenant en outre une pluralité de panneaux de cadre de verrouillage mutuel (36), chaque panneau de cadre (36) incluant une saillie allongée s'étendant vers le bas (36') qui est reçue dans une rainure allongée correspondante (41) définie dans une surface supérieure de la bride (32) de la coque de logement (20), dans lequel la surface de soutien d'utilisateur (14) est fixée à la coque de logement (20) lorsque les saillies allongées (36') sont disposées dans la rainure allongée (41).

**11.** Appareil (10) selon la revendication 10, dans lequel un joint torique (39) est disposé entre une surface inférieure de la rainure allongée (41) et les saillies allongées (36') des panneaux de cadre (36).

**12.** Appareil (10) selon la revendication 1, comprenant en outre deux déflecteurs (114, 116), agencés dans la chambre intérieure (27) entre l'ensemble de pulvérisation de fluide (16) et le côté inférieur de la surface de soutien d'utilisateur (14) pour modifier et rediriger sélectivement l'écoulement directionnel de la pulvérisation de fluide à concentrer dans une partie plus étroite dans le sens de la largeur de la surface

de soutien d'utilisateur (14).

**13.** Appareil (10) selon la revendication 1, comprenant en outre un second passage (136) qui s'étend depuis une partie la plus basse du corps du système de circulation de vapeur (130) jusqu'à la coque de logement (120).

**14.** Appareil (10) selon la revendication 1, comprenant en outre un système de refroidissement par fluide (70) qui souffle de l'air à travers un volume interne de la structure de logement (12) qui est disposé entre la coque de logement (20) et une coque externe dans laquelle la coque de logement (20) est disposée, dans lequel une section transversale du volume interne d'un centre de la structure de logement (12) est inférieure à la fois à une section transversale du volume au niveau d'un pied et d'une tête de la structure de logement (12) de telle sorte que l'air traversant le volume subit un effet venturi.

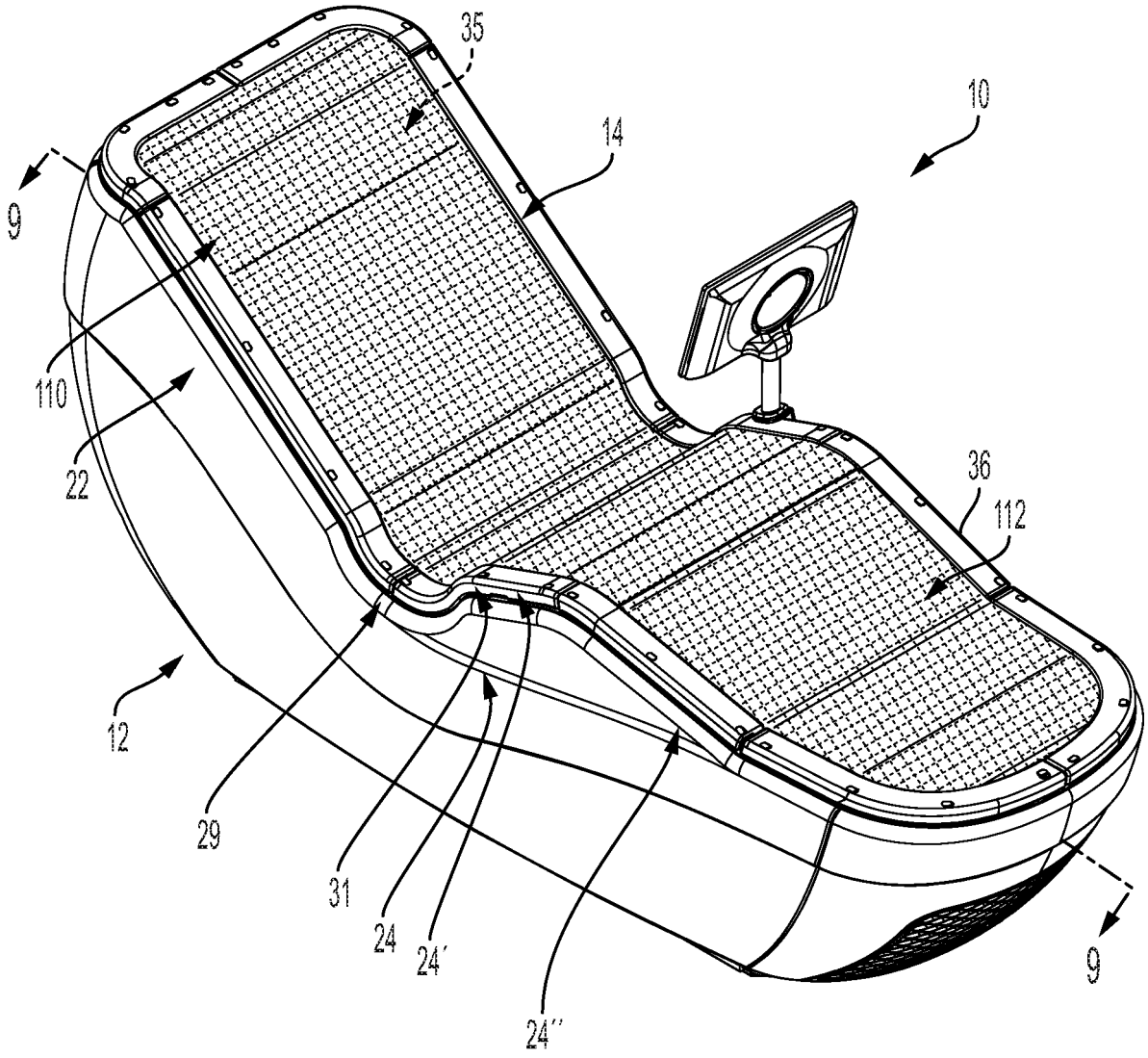


FIG. 1A

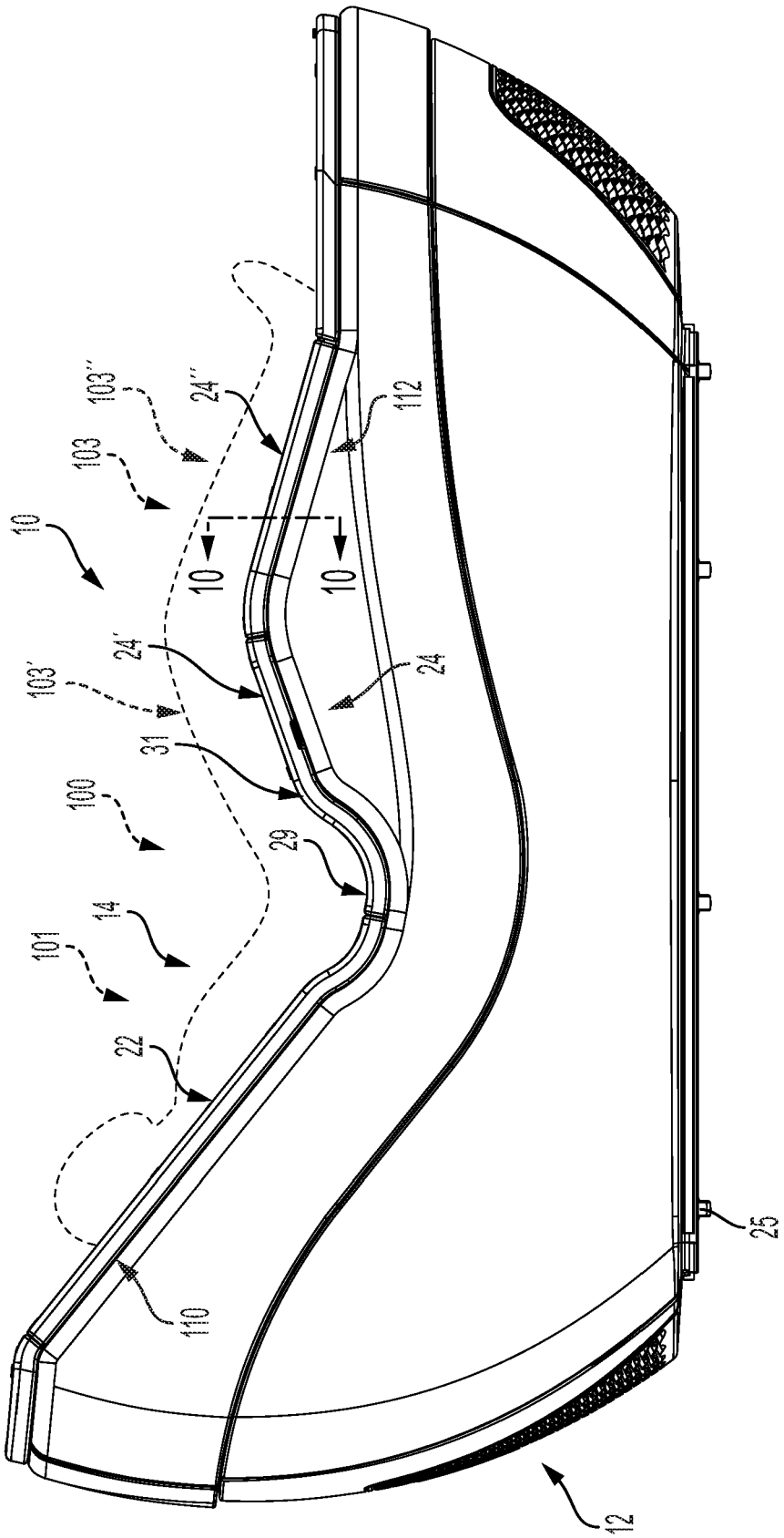


FIG. 1B

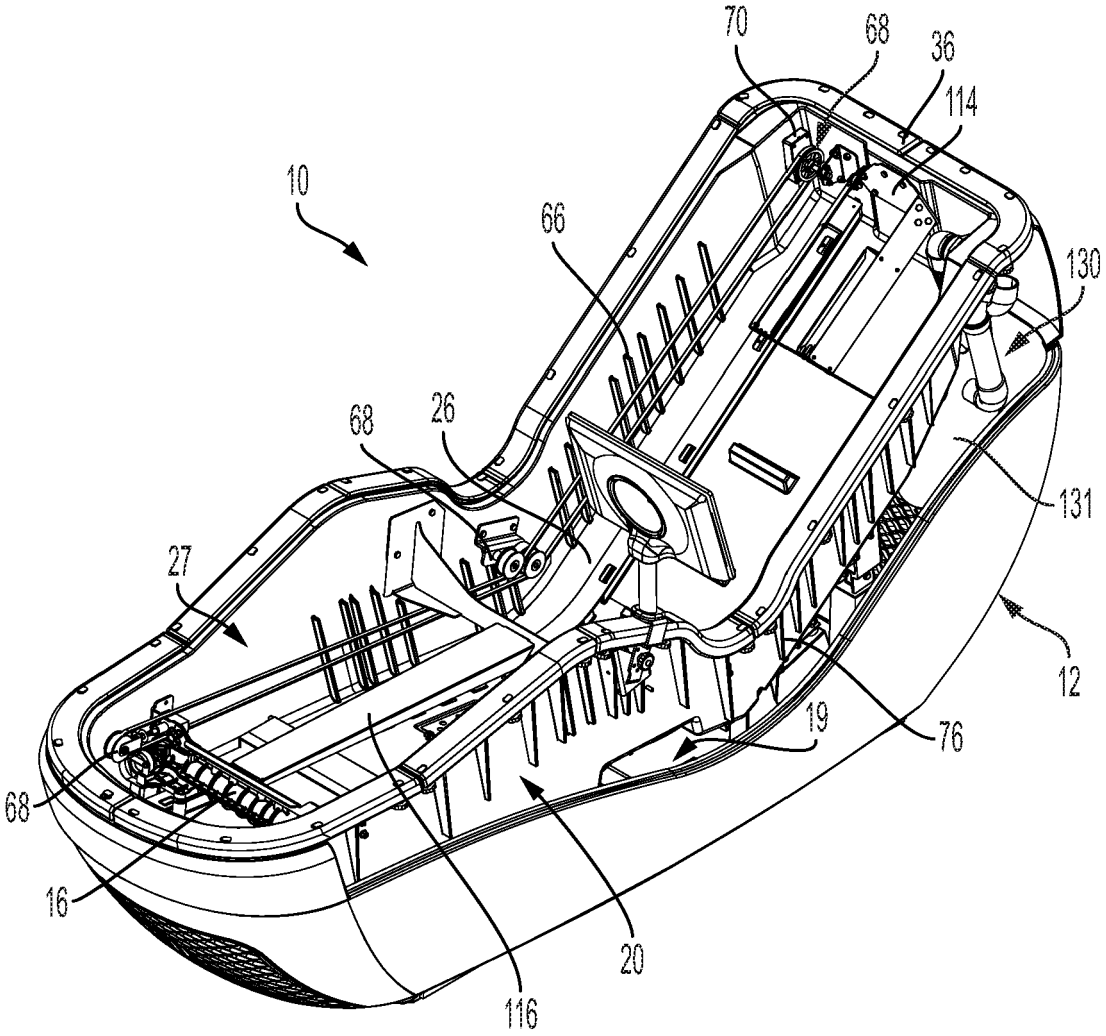


FIG. 2

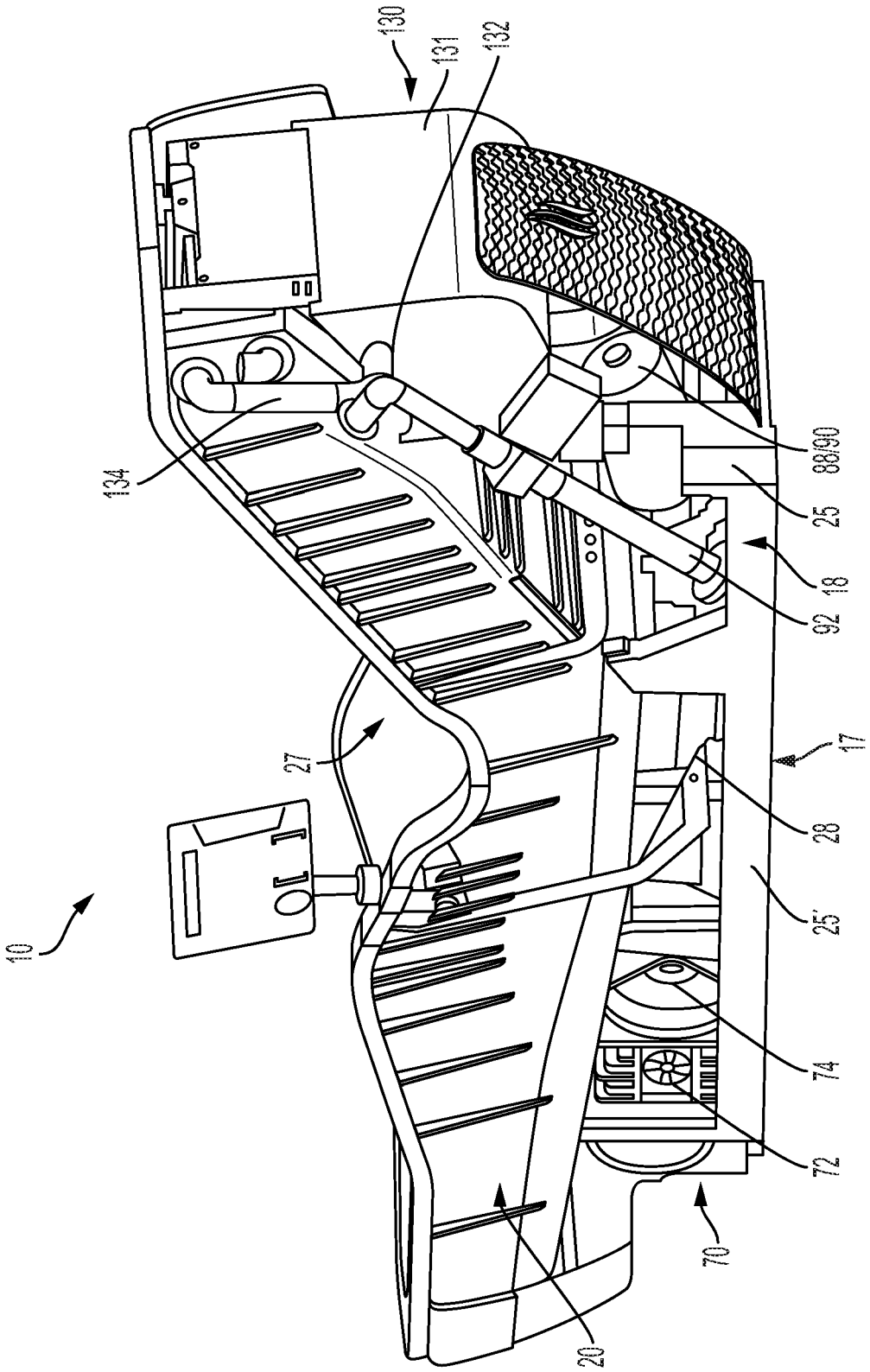


FIG. 3

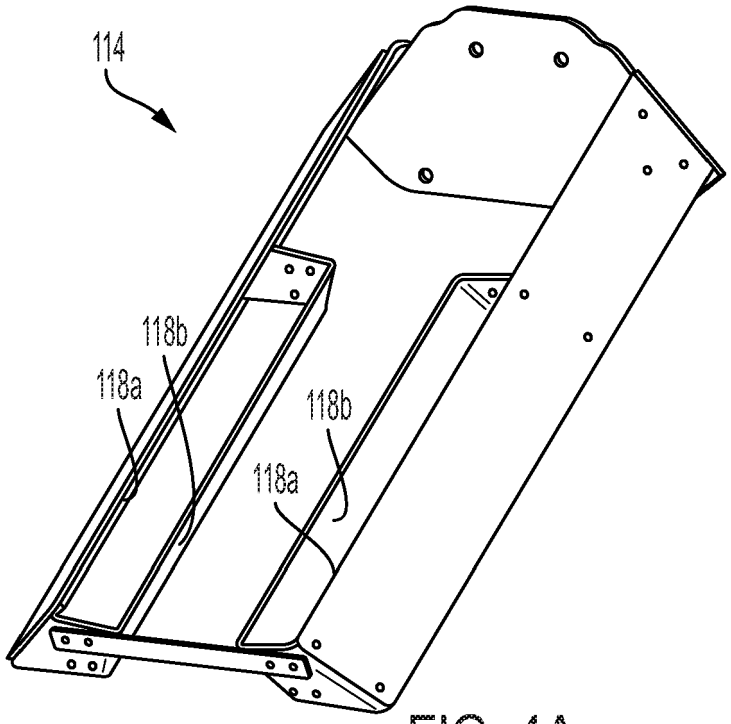


FIG. 4A

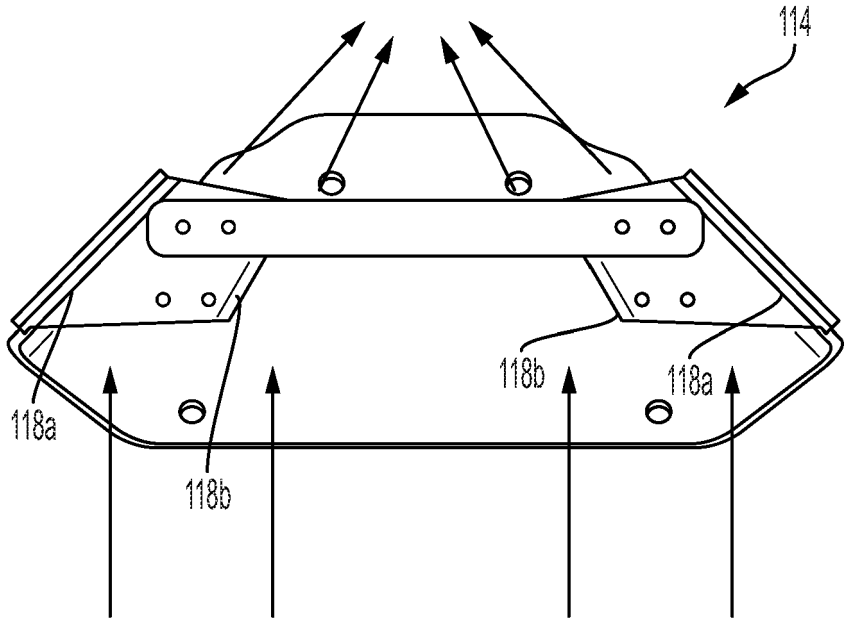


FIG. 4B

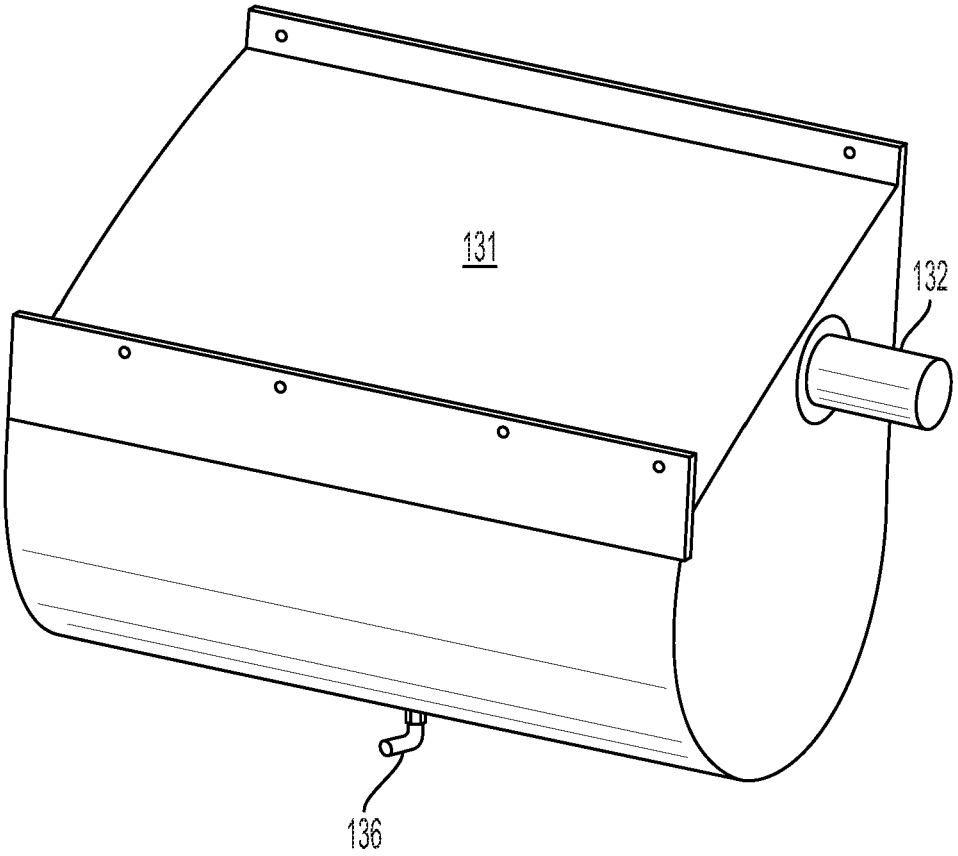


FIG. 5

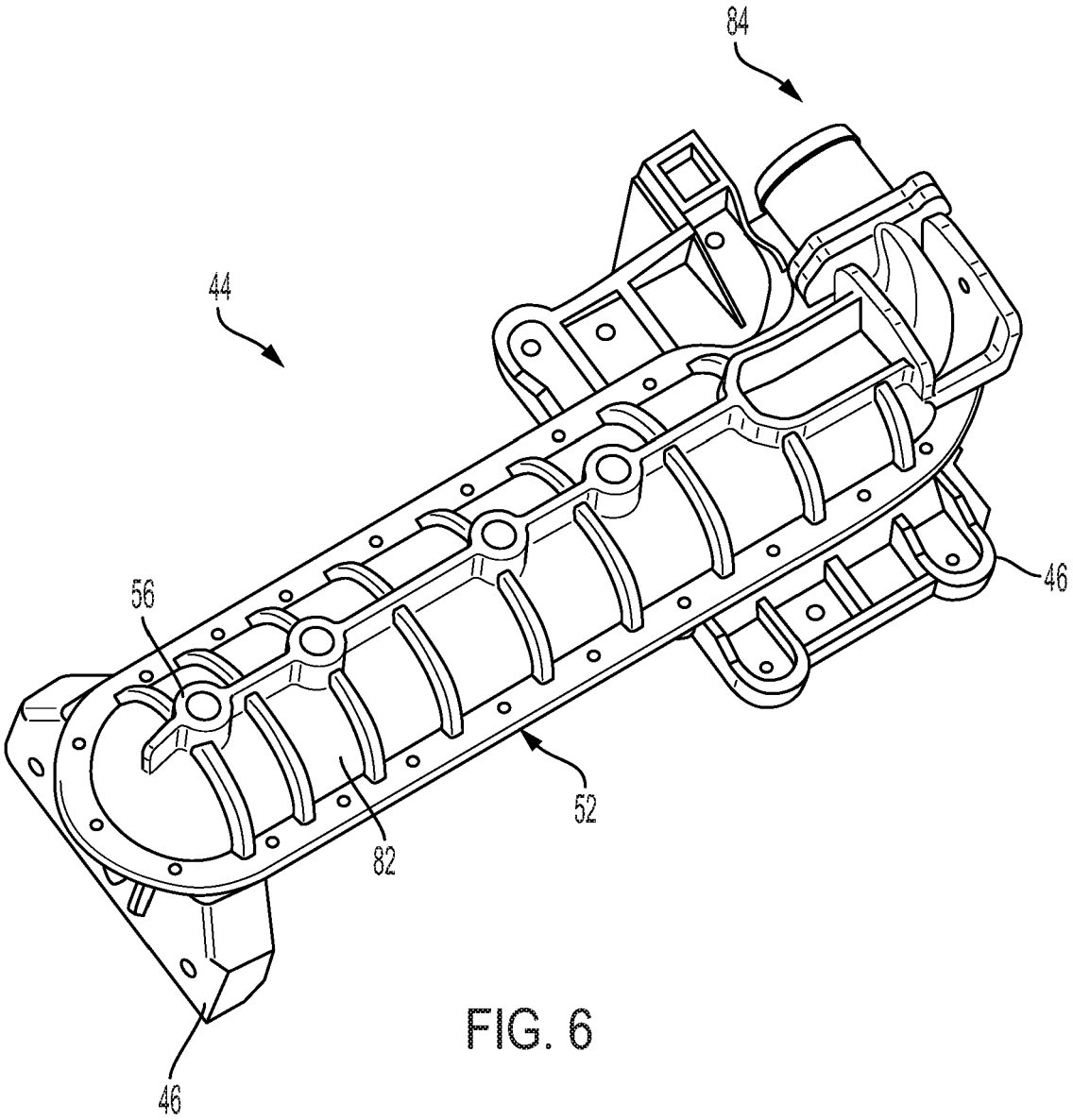


FIG. 6

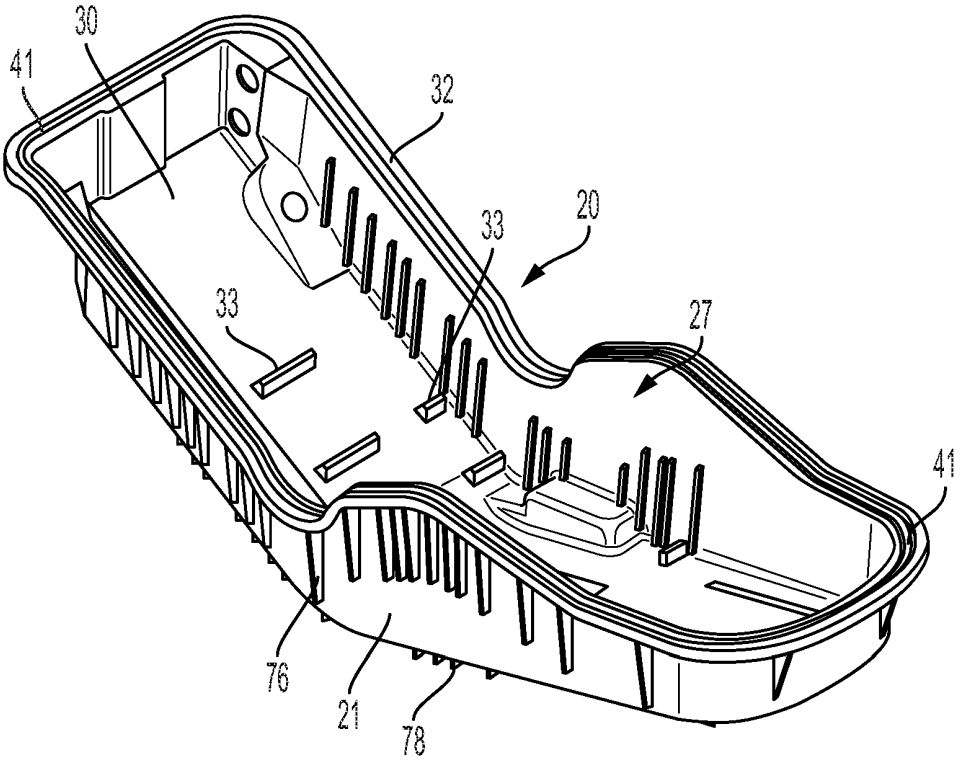


FIG. 7A

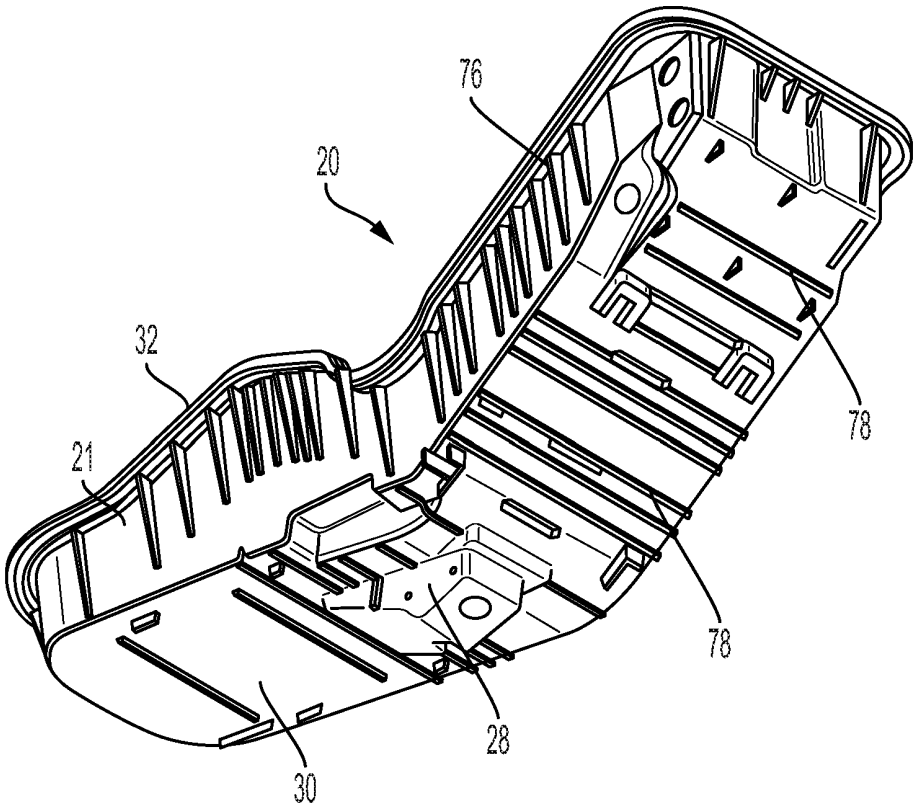


FIG. 7B

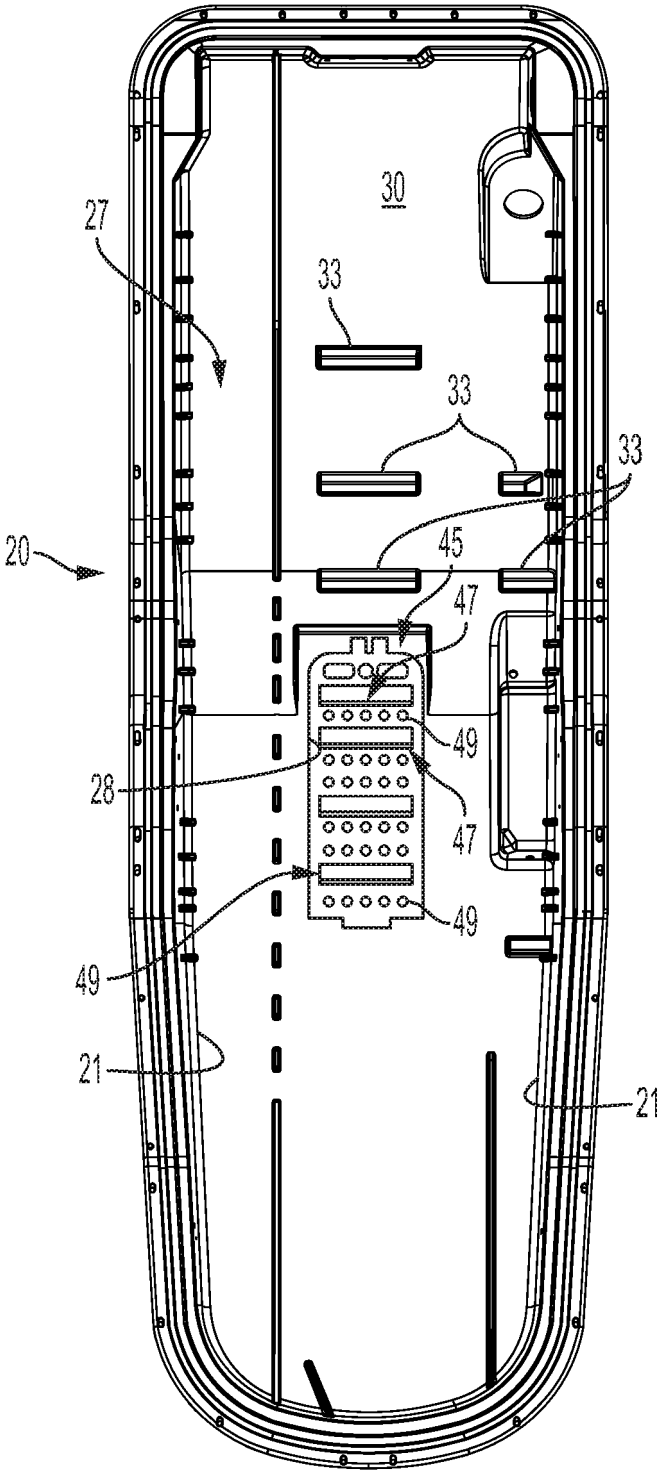


FIG. 8

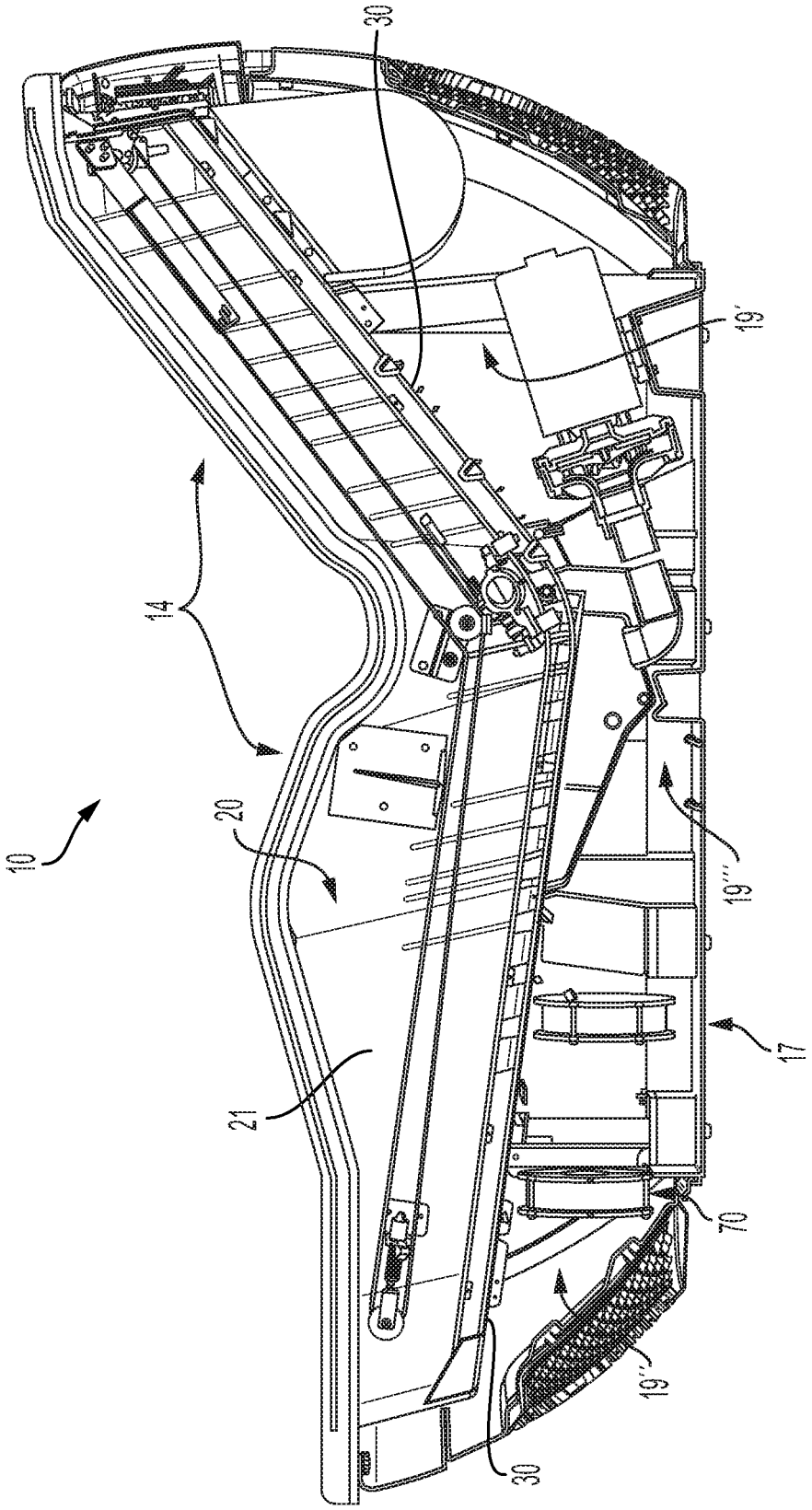


FIG. 9

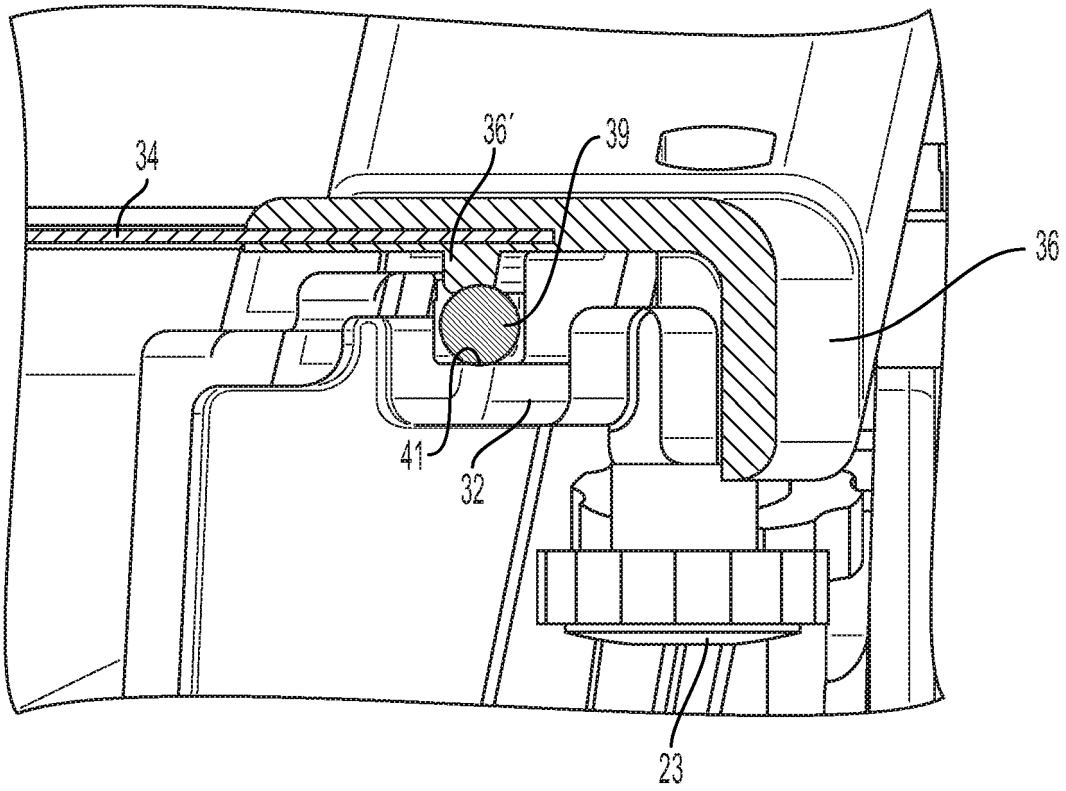


FIG. 10

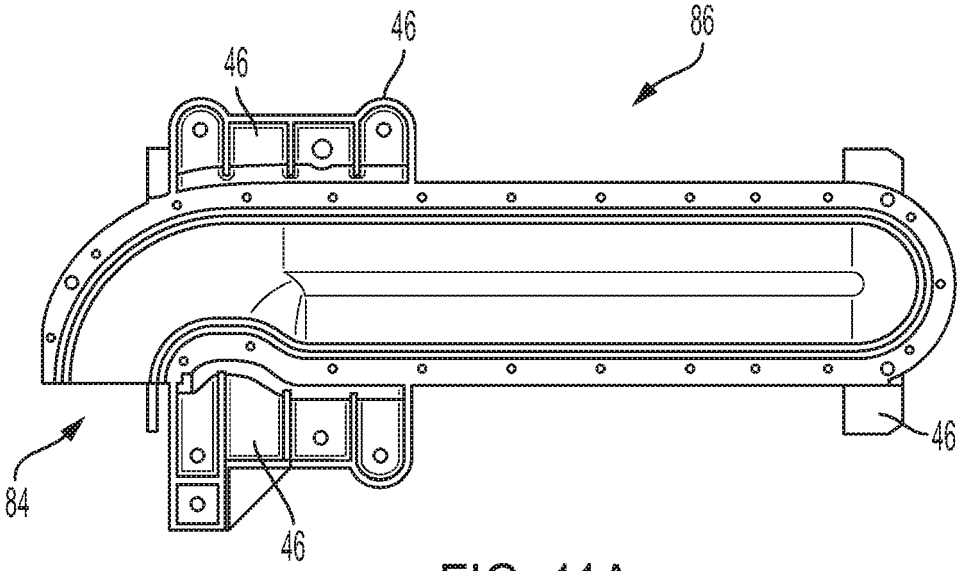


FIG. 11A

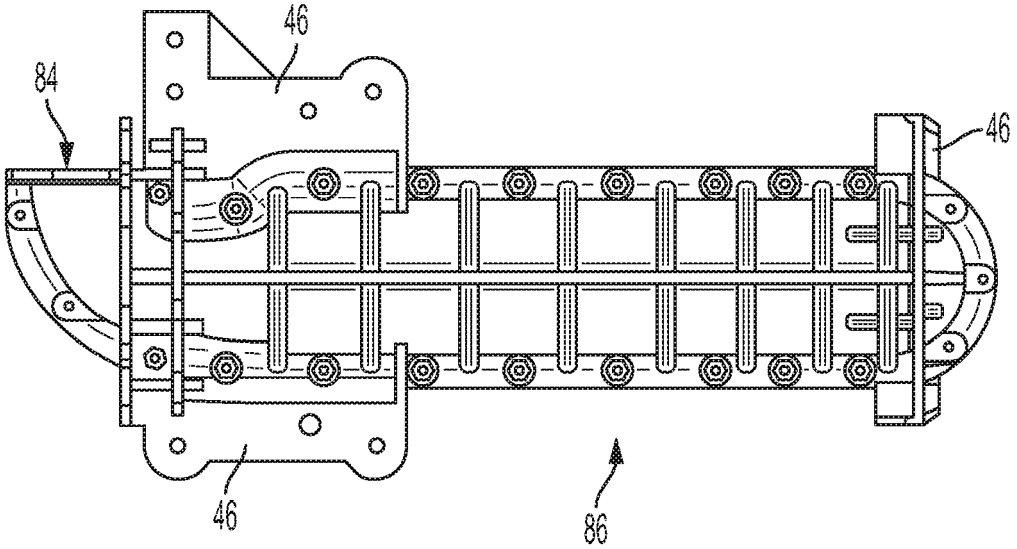


FIG. 11B

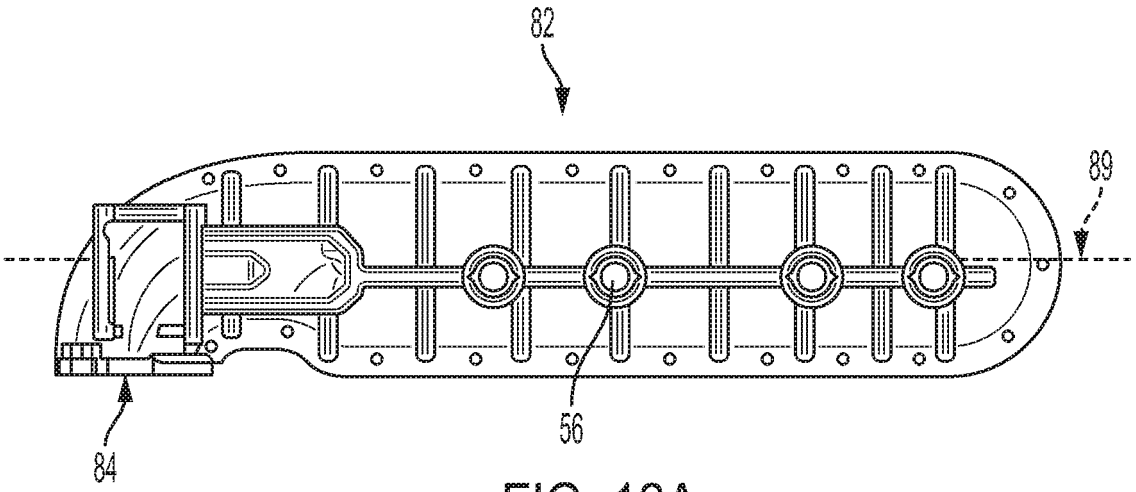


FIG. 12A

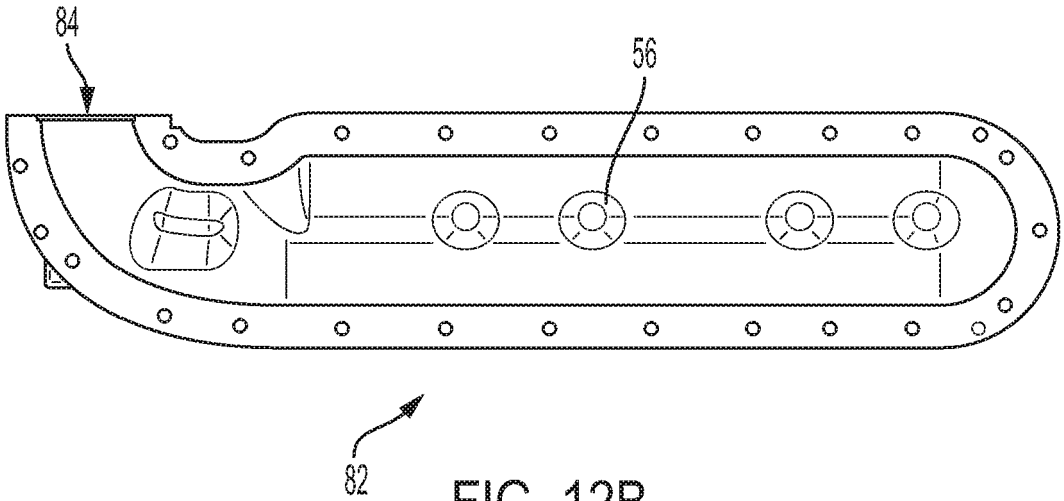


FIG. 12B

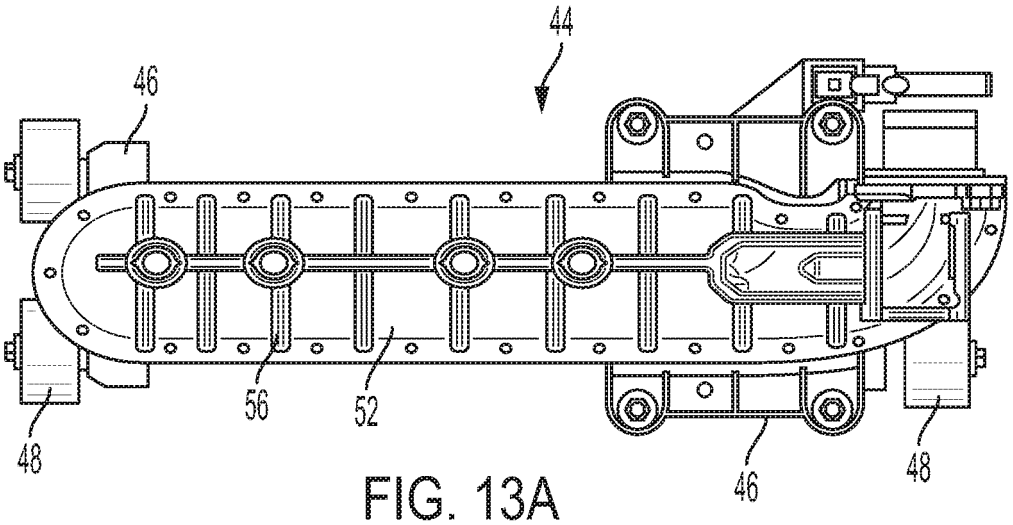


FIG. 13A

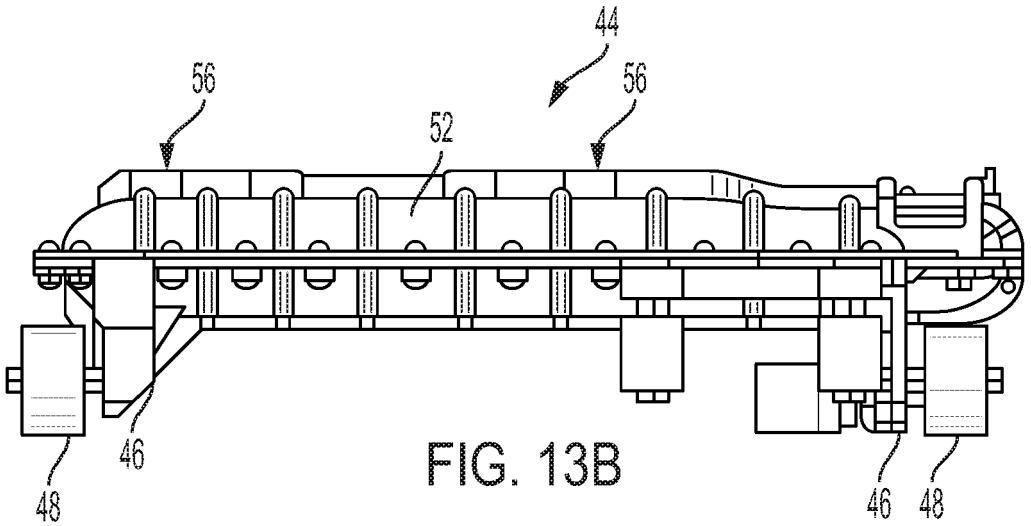


FIG. 13B

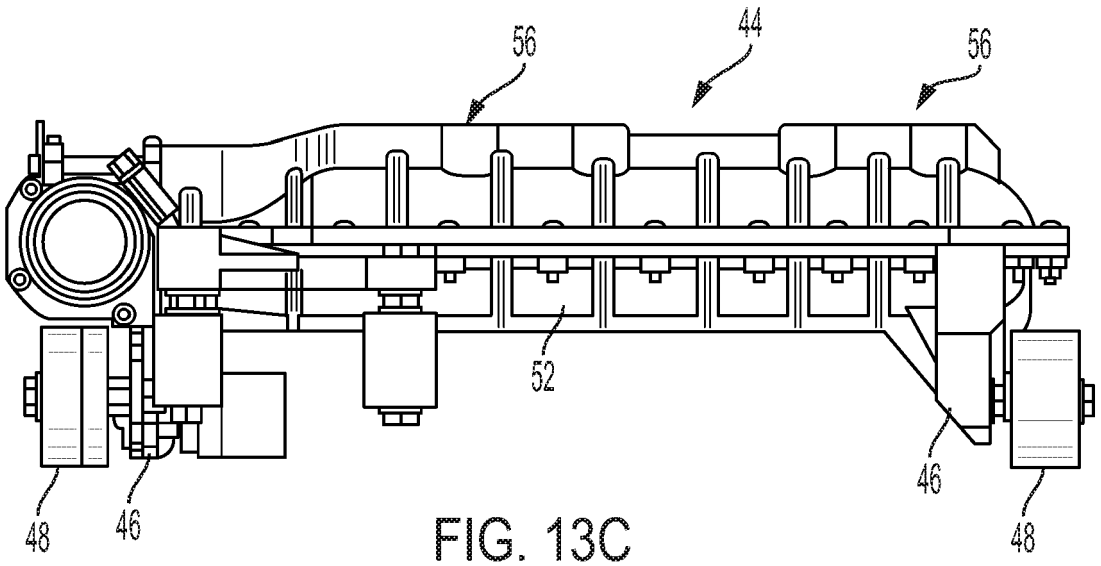


FIG. 13C

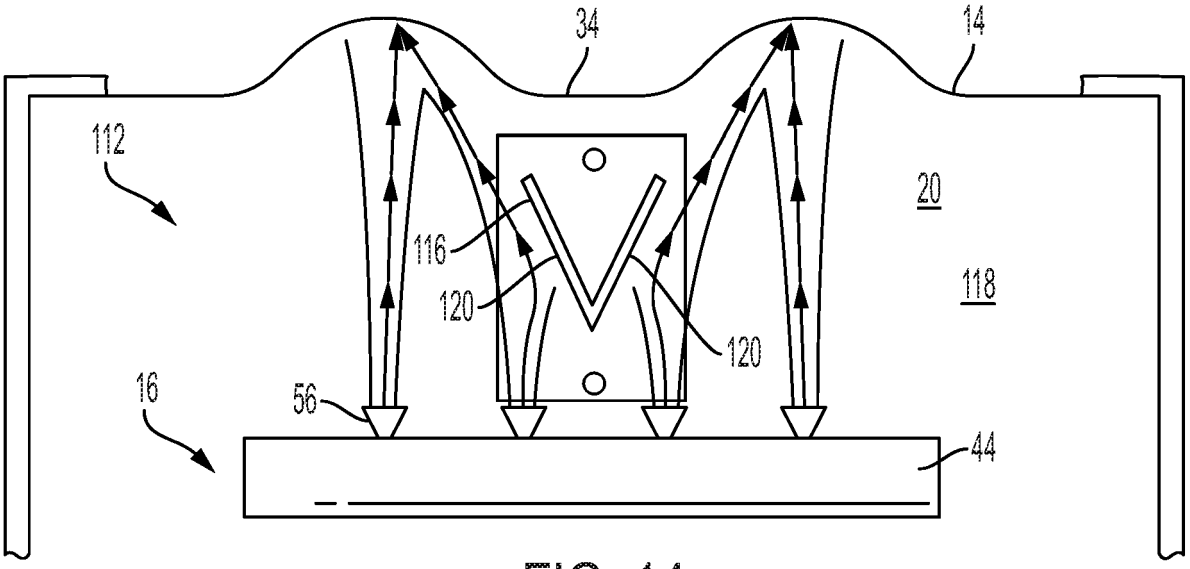


FIG. 14

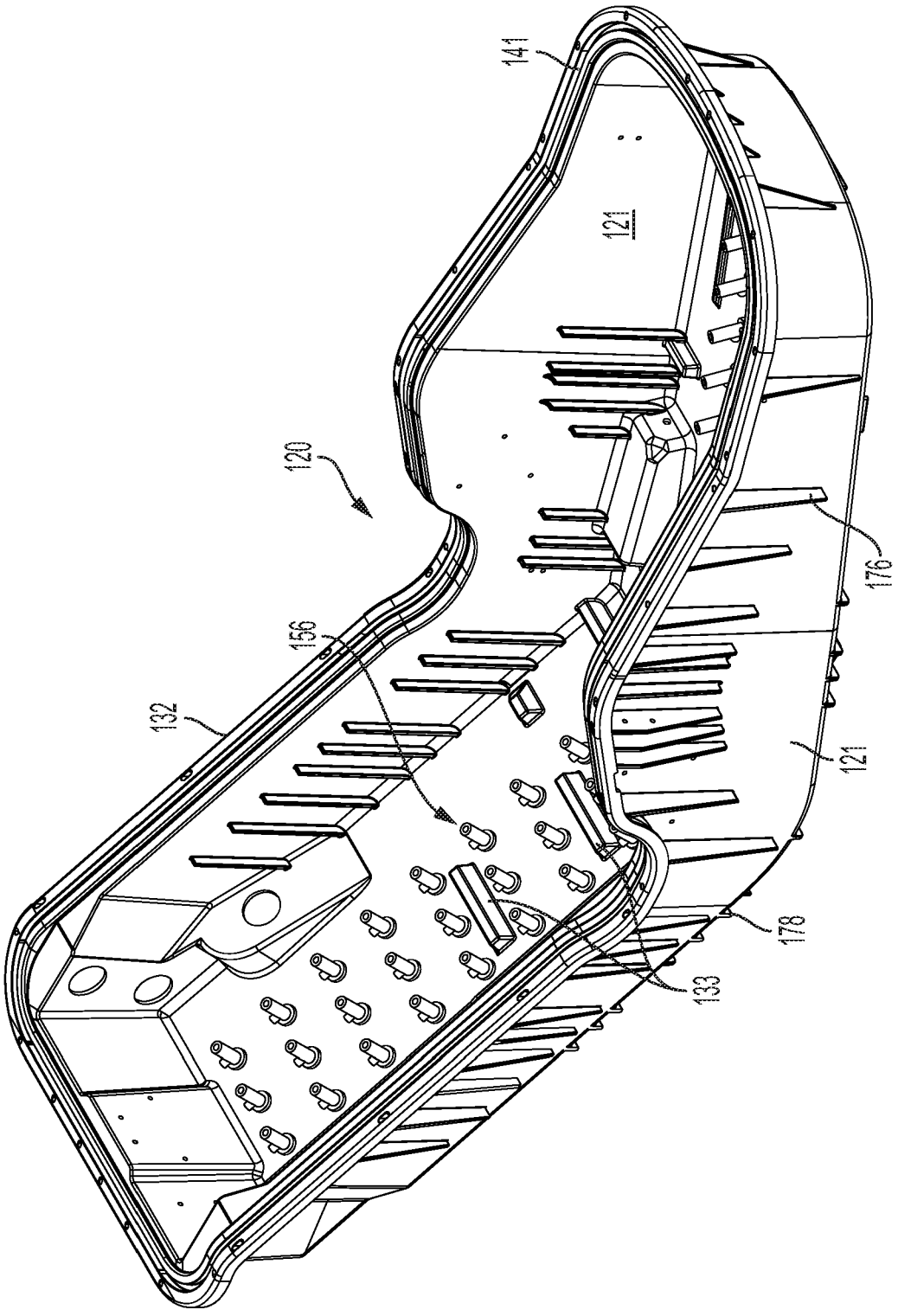


FIG. 15

## REFERENCES CITED IN THE DESCRIPTION

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