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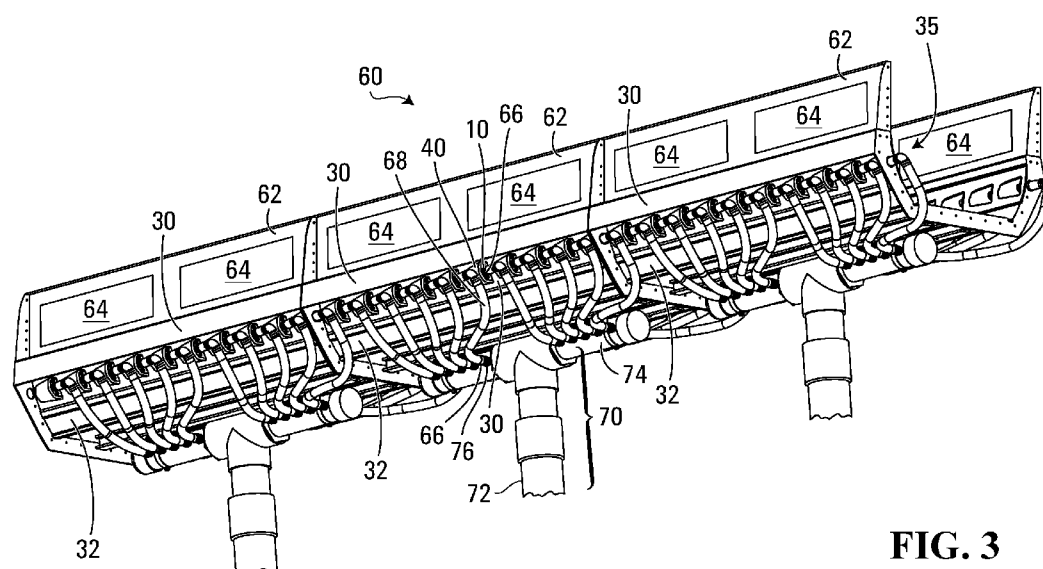


FIG. 3

(57) Abstract: A waterslide feature comprises a channel having a sliding surface and walls. The walls define a plurality of recesses. A nozzle extends through each of the recesses angled to spray water over the sliding surface. The nozzles are positioned to provide a flow of water to impact a vehicle sliding on the sliding surface. The nozzles are sized to provide a flow of water sufficient to affect motion of the vehicle. The vehicle may include an attachment to enhance the effectiveness of the flow of water.



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Waterslide Feature, Ride Vehicle and Method

Field of the Invention

The invention relates generally to amusement rides, and in particular to rides in which participants ride in or on
5 vehicles.

Background of the Invention

In the past few decades, water-based amusement rides have become increasingly popular. A common type of water-based amusement ride is a flume-style waterslide in which one or more
10 participants ride in a vehicle which slides along a channel or "flume" over a water lubricated surface from the start of the waterslide to the end of the waterslide.

Water is provided in the flume to provide lubrication between the vehicle and the flume surface, and to provide
15 cooling and splashing effects. Typically, the motion of the participant in the flume is controlled predominantly by the contours of the flume (hills, valleys, turns, drops, etc.) in combination with gravity. However, various techniques have been applied to accelerate or decelerate participants by means other
20 than gravity.

Once the participants and vehicle arrive at the end of the waterslide, the vehicle must be transported back to the start of the waterslide. The waterslide continues to operate while vehicles are transported back to the start of the
25 waterslide. As such, each waterslide requires a significant number of vehicles to ensure that there is no delay in the operation of the waterslide while vehicles are being transported back to the start of the waterslide.

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Summary of the Invention

In some embodiments, there is provided a waterslide feature comprising: a channel comprising a sliding surface and walls; the walls defining a plurality of recesses; a plurality
5 of nozzles comprising a nozzle extending through each of the recesses angled to spray water over the sliding surface; wherein the nozzles are positioned to provide a flow of water to impact a vehicle sliding on the sliding surface; and wherein the nozzles are sized to provide a flow of water sufficient to
10 affect motion of the vehicle.

In some embodiments each of the recesses defines an opening through the walls and each of the nozzles are connected to a source of water through the respective openings in the walls.

15 In some embodiments each of the recesses define a rear wall angled towards the channel for mounting one of the nozzles and the cross section of each recess tapers from the rear wall to a surface of the channel.

In some embodiments the recesses taper inward to
20 define top and bottom walls substantially perpendicular to the rear wall and the channel.

In some embodiments each of the nozzles define an outlet end which is within the respective recess and an inlet end which is outside the channel.

25 In some embodiments the nozzles are formed of polyvinyl chloride.

In some embodiments each of the nozzles comprise a collar within the respective recess and a cylinder extending outside the channel.

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In some embodiments the inlet end comprises a press fit feature which is fitted into a flexible conduit connected by a clamp.

In some embodiments the plurality of nozzles are
5 connected to a water source in groups wherein the flow of water to each group is separately controlled.

In some embodiments a water flow rate is variable between 15GPM and 40GPM per nozzle.

In some embodiments water pressure in the nozzle is
10 variable between 5psi and 30psi.

In some embodiments the nozzle spray pattern is variable from cylindrical to conical.

In some embodiments the nozzles are positioned spray no more than 6.25 inches above the sliding surface.

15 In some embodiments the nozzles are positioned spray less than approximately 8.75 inches above the sliding surface.

In some embodiments there is provided troughs along the sides of the uphill and downhill sections of the sliding surface.

20 In some embodiments there is provided a trough below the sliding surface and grates along uphill and downhill sections of the sliding surface opening into the trough to allow water to flow from the sliding surface to the trough, wherein the grates comprise laterally extending cylindrical
25 bars.

In some embodiments the waterslide comprises upper walls including removable windows.

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In some embodiments the upper walls enclose the waterslide feature.

In some embodiments there is provided an inflatable waterslide vehicle with outwardly curving sides wherein the
5 water jets are angled to impact the vehicle no higher than a cross-sectional equator of the sides of the vehicle.

In some embodiments the water jets are angled to impact the vehicle below the cross-sectional equator of the sides of the vehicle.

10 In some embodiments there is provided an inflatable waterslide vehicle wherein the vehicle comprises a body having a perimeter, the attachment comprising a support structure fixable to the perimeter of the vehicle and at least one
projection extending outward from the support structure, the
15 projection being sized to affect motion of the vehicle when fixed to the vehicle and impacted by a water.

In some embodiments the support structure is elongated and is fixable to the vehicle at longitudinal ends of the support structure.

20 In some embodiments the support structure is fixable to the vehicle at an intermediate location.

In some embodiments the support is fixable by use of adhesive strips.

In some embodiments the support is flexible to be
25 fixable to a non-planer vehicle perimeter.

In some embodiments the projection comprises at least two projections.

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In some embodiments the projection comprises at least one pocket defined by an opening at a first end tapering to a closed second end.

In some embodiments the projection tapers both
5 inwardly toward the support and laterally toward the center of the support.

In some embodiments an inner wall of the pocket adjacent the support structure is longer than an outer wall of the pocket opposite the support structure wherein the opening
10 is angled away from the support structure.

In some embodiments the support structure and the projections are formed of the same material.

In some embodiments the support structure is tubular and sized to encircle a portion of the vehicle.

15 In some embodiments there is provided an inflatable waterslide vehicle wherein the vehicle comprises a body having a perimeter, the method comprising fixing the projection to a support structure using an adhesive; positioning the support structure on the perimeter of the vehicle at a location where
20 water impacting the projection will affect motion of the vehicle, and fixing longitudinal ends of the support structure to the perimeter of the vehicle using adhesive strips.

In some embodiments there is provided method of adapting an inflatable raft for use with waterslide utilizing
25 water jets to affect the motion of the inflatable raft, wherein the inflatable comprises a body having a perimeter, the method comprising: fixing at least one projection to a support structure using an adhesive; positioning the support structure on the perimeter of the vehicle such that water impacting the
30 projection will affect motion of the vehicle, and fixing

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longitudinal ends of the support structure to the perimeter of the vehicle using adhesive strips.

In some embodiments there is provided a method of affixing a projection to an inflatable waterslide vehicle
5 wherein the vehicle comprises a body having a perimeter, the method comprising fixing the projection to a support structure using an adhesive; fixing the support structure to a tubular member, under inflating the vehicle, positioning the tubular member around the body of the vehicle such that water impacting
10 the projection will affect motion of the vehicle, and fully inflating the vehicle to retain the tubular member in position.

Brief Description of the Drawings

Embodiments of the invention will now be described with reference to the attached drawings in which:

15 Figure 1 is a perspective view of a nozzle of an embodiment of the invention;

Figure 2 is a perspective view of a component of the waterslide structure of the invention;

20 Figure 3 is a schematic bottom perspective view of a section of a waterslide according to an embodiment of the invention including three of the components of Figure 2;

Figure 4 is outer perspective view of the nozzle of Figure 1 installed in a recess according to an embodiment of the invention;

25 Figure 5 is an inner perspective view of a section of a waterslide in operation with a vehicle according to an embodiment of the invention;

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Figure 6 is a perspective side view of portion of a waterslide vehicle with an attachment according to an embodiment of the invention;

Figure 7 is a perspective end view of a waterslide vehicle with the attachment of Figure 6;

Figure 8 is a perspective view of a support structure for the attachment of Figure 6;

Figure 9 is a plan view of an unassembled body of a projection for the attachment of Figure 6;

Figure 10 is a perspective view of the assembled body of Figure 9;

Figure 11 is a perspective view of the body of Figure 9 and an unassembled end cap;

Figure 12 is a perspective view of an assembled projection for the attachment of Figure 6;

Figure 13 is an angled side view of the waterslide vehicle of Figure 7 with adhesive strips attached;

Figure 14 is a perspective side view of a waterslide vehicle with an attachment according to another embodiment of the invention; and

Figure 15 is a plan view of the waterslide vehicle of Figure 7 in a water slide.

Detailed Description of the Embodiments of the Invention

Figure 1 shows a nozzle 10 according to an embodiment of the invention. In this embodiment the nozzle 10 is formed from machined polyvinyl chloride (PVC). The nozzle 10 comprises a cylindrical body 12 with an inlet end 14 and an

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outlet end 16. A tubular channel 18 is defined through the cylindrical body 12 from the inlet end 14 to the outlet end 16.

Adjacent to the outlet end 16 is a collar 20. The collar 20 protrudes outward perpendicular from the cylindrical body 12 and perpendicular to the longitudinal length of the cylindrical body 12. The collar 20 has two holes 22 defined there through parallel to and on opposite sides of the tubular channel 18.

Adjacent the inlet end 14 are four spaced apart ring shaped projections 24 which encircle the cylindrical body 12. These ring shaped projections 24 can help to retain a hose on the cylindrical body 12 in use as further discussed below.

Although a particular shape and type of a nozzle 10 is described, it will be appreciated that various other nozzle shapes and types may be employed. For example, other shapes of projections and/or depressions may be provided to assist in retaining hose or other flexible conduit to the nozzle 10, and at other locations on the nozzle 10, or may be eliminated, or replaced with threading for use with an inflexible conduit. The collar 20 may be at another location, have another shape or may be eliminated. For example, the holes 22 may be omitted and an adhesive or sealant may be used to fix the nozzle 10 in place. With the use of an adhesive or sealant around the cylindrical body 12, the collar 20 could be omitted. In some embodiments, the nozzle is formed in two parts, which may facilitate their installation and removal.

In some embodiments, the nozzle 10 may incorporate one or more valves to assist in controlling the flow of water through the nozzle 10.

Figure 2 shows a component 30 for a waterslide. The component 30 includes two walls 32 and a bottom 34 connecting

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the walls 32. The walls 32 extend upward and are angled and curved slightly outwardly and together with the bottom form a channel 35 there between. The ends of the walls 32 and the bottom 34 comprise flanges 36 projecting continuously outwardly around and perpendicular to the ends of the walls 32 and the bottom 34. The flanges 36 incorporate holes 38 spaced around and extending through the flanges 36. The holes 38 allow the component 30 to be connected end to end with other such components of a waterslide.

10 A series of recesses 40 are defined along the interior of the walls 32, projecting inwardly from the interior surface 33 of the walls 31 and projecting outward on the exterior of the walls 32. In this embodiment, there are 10 closely spaced recesses 40 extending lengthwise along each wall at the same height from the bottom 34. A rearward wall 42 of each of the recesses 40 includes a large opening or hole 44 and two small openings or holes 46 extending there through. The large holes 44 is sized to accommodate the cylindrical body 12 of the nozzles 10 and the small holes 46 are positioned and sized to mirror the holes 22 in the collar 20 of the nozzle 10. This enables a nozzle 10 to be fastened in each recesses 40 inset from the interior surface of the wall 32.

It will be appreciated that there are numerous possible shapes, numbers and positions of recesses 40 including more or fewer, located at lower, higher or variable heights, and having numerous different shapes. The recesses may also be omitted. Similarly, there are numerous ways in which nozzles 10 can be connect to spray water into the channel and the nozzles 10 may be omitted or replaced by other spraying equipment.

In this embodiment, the bottom 34 in substantially flat but has troughs 48 extending along adjacent each of the

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walls 32. In some embodiments, the troughs 48 allow water to drain away from the sliding surface defined by the bottom 34. In other embodiments, a separate sliding surface (see Figure 5) may be provided with holes or other openings through the
5 sliding surface provided to allow water to drain through the sliding surface and be drained away in a space defined between the sliding surface and the bottom.

Each of the walls 32 of this embodiment has a flat upper surface 50. This flat upper surface 50 allows for an
10 upper wall to be attached above the walls 32 to, for example, provide for water retention within the channel 35 of the waterslide, and as a safety feature to retain riders within the waterslide.

Figure 3 depicts the exterior of a feature or section
15 of a waterslide 60. The waterslide feature 60 incorporates three of waterslide components 30. On top of each of the walls 32 of the components 30 are mounted upper walls 62. The upper walls 62 incorporate windows 64. The windows 64 may, for example, be removable from the upper walls 62 and attached by
20 Velcro. In some embodiments, the upper walls 62 may be high enough to retain substantially all of the water within the waterslide feature 60 feature and may curve inward and may meet at the top such that the waterslide feature 60 is completely enclosed.

25 As detailed in Figure 4, a nozzle 10 is mounted in each of the recesses 40 with the flange 20 inset from the component wall 32 and mounted against the rearward wall 42 of the respective recess 40. The cylindrical body 12 extends out through the large hole 44 (see Figure 3). Each nozzle is
30 mounted by a fastener 45 through each of the two holes 22 of the nozzle 10 aligned with the two small holes 46 of each recess 40. The recesses 40 have the rearward wall 42 which is

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angled, in this embodiment, at an approximately 75 degree angle to the component wall 32. The recesses 40 also defined by a top wall 47 and a bottom wall 49 which are substantially perpendicular to the component wall 32. An side or inner wall 5 43 angles from the inner most end of the rear wall 42 out to meet with the surface of the component wall 32 such that the nozzle 10 does not protrude out beyond the surface 33 of the wall 32 but water exiting the nozzle 10 is direct out of the recess 40 at an angle of 10 to 15 degrees from the surface 33 10 of the wall and across the channel 35 of the component 30. As a result, the cross section of each recess decreases or tapers from the rear wall 42 a surface 33 of the walls 32 of the channel 35. In this embodiment, the cross section of the recess tapers inward without a decrease in height.

15

In this embodiment, the walls 42, 47 and 49 are substantially planer, with the rearward wall 42 being substantially rectangular and the top and bottom walls 47 and 49 being substantially triangular. The inner wall 43 is formed 20 of two substantially planer sections creating an inwardly angled v-shaped cross-section.

Referring to Figure 3, in this embodiment, each nozzle 10 is connected at its outlet end 14 (see Figure 1) to a hose 68 by a clamp 66, such as a gear clamp. The hose 68 may 25 be a flexible PVC (polyvinyl chloride) hose or may be another flexible or inflexible conduit. The other end of each hose 68 is connected to a water supply 70 or other source of water by another gear clamp 66. Each water supply 70 incorporates a supply pipe 72 connected to a distribution pipe 74 which is in 30 turn connected to 10 connector pipes 76 on each side of the section 30. In operation, water is pumped through the supply pipe 72, to the distribution pipe 74, to the connector pipes 76, through the hose 68, through tubular channel 18 of the

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nozzles 10 and is sprayed out into the channel 35 of the waterslide to impact a vehicle sliding in the channel 35. It will be appreciated that since the three components 30 have different water supplies 70, the flow of water to the three
5 components 30 can be separately controlled, such that, for example, water can be sprayed through the groups of twenty nozzles 10 in each component 30 only when a vehicle approaches and/or is travelling through the component 30.

In some embodiments, there may be a single water
10 supply 70 rather than separate water supplies for different sections 30. In other embodiments, there may be multiple water supplies for each section 30.

Figure 5 provides an interior view of a portion or section of a waterslide 79 in operation. The waterslide 79
15 incorporates the waterslide feature 60 with the three upwardly angled components 30, a lower section 80 and an exit section 81. In this embodiment, the angled components 30 have a separate sliding surface 82 installed above the bottom 34 of the sections 30 (see Figure 2). A space is defined between the
20 separate sliding surface 82 and the bottom 34 through which water draining from the separate sliding surface 82 may flow. The separate sliding surface 82 of this embodiment incorporates grates 86 with laterally extending cylindrical slats which extend perpendicular to the flow of water to facilitate
25 drainage of water from the separate sliding surface 82 by a Coanda effect to the space below the separate sliding surface 82.

The lower section 80 defines a local lower section of the waterslide 79. In this embodiment, the lower section 80 has
30 a lower sliding surface 84 with grill openings 88 defined there through. The grill openings extend in the direction of flow of water and allow water to drain from the lower sliding surface

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84 to flow in the space between the sliding surface and the bottom of the lower section 80. The water may then be recycled to be reused on the waterslide 79.

In this embodiment, a conventional inflatable figure eight raft or vehicle 90 is depicted as sliding along the sliding surface 82. The vehicle 90 is a typical mass produced raft having sides with a circular cross-section resulting in outwardly curving sides. Riders are not shown but would travel in the vehicle 90. As the vehicle slides from the lower sliding surface 84 onto the upwardly angled sliding surface 82, a flow of water or water jets 92 are sprayed from the nozzles 10 of this section to impact the vehicle 90. The water jets 92 impacting the vehicle 90 and affect the motion of the vehicle 90 by applying a force to propel the vehicle 90 along the upward incline of the sliding surface 82. Before or when the vehicle 90 enters the next section 30, the water jets 92 in that section may be turned on while the water jets 92 in the previous section 30 may be turned off as the vehicle 90 moves beyond those water jets 92.

In some embodiments, the height of the water jets 92 above the sliding surface 82 is no higher than the cross-sectional equator 91 of the rounded sides 93 of the vehicle 90 such that water impacting the vehicle 90 will be substantially deflected downward away from riders (not shown) in the vehicle 90. In some embodiments, the height of the inflatable tubes or sides 93 of the vehicle is 14 inches and the diameter of the tubular channel 18 of the nozzles 10 is 0.5 inches. The diameter of the water jets 92 increase as they spray outward such that the diameter of the spray at the vehicle is approximately 2 to 3 inches. In this embodiment, the nozzles 10 would need to be located and direct water no higher than 6.25 inches from the sliding surface.

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In some embodiments, the nozzle flow rate can be varied between 15 and 40 GPM (Gallons Per Minute) and the nozzle pressure can be varied between 5 and 30 psi. In some embodiments, the spray pattern of the water may vary from
5 cylindrical and lower pressure, to conical, at higher pressure.

The embodiment of Figure 5 depicts a conventional Figure eight inflatable waterslide vehicle 90. In some embodiments, the waterslide vehicle 90 may be modified to provide enhanced momentum when impacted by water jets 92.

10 Figures 6 and 7 show an embodiment of a waterslide vehicle 110 with an attachment 112 mounted to lateral sides 113 of the vehicle 110. In this embodiment, the attachment includes a support structure 114 and two projections 116. The two projections 116 are fastened to the support structure 114
15 by, for example, an adhesive. The support structure 114 is in turn fastened to the vehicle 110 by adhesive strips 118 at opposite ends and by an adhesive at an intermediate location or area 117.

The support structure 114 is depicted in Figure 8.
20 The support structure 114 of this embodiment has an elongated flat shape with parallel longitudinal sides 120 and rounded ends 122. The rounded ends 122 in this embodiment are semicircular and may aid in the retention of the support structure 114 on the vehicle 110 but other shapes may be used.
25 Similarly, the elongated flat shape of the support structure 114 may be replaced with other shapes or multiple elements, such as two square support structures, or completely eliminated and the projections 116 affixed directly to the sides 113 of the vehicle 110.

30 In this embodiment, the support structure 114 is cut from a relatively thin flexible material, such as supported PVC (4000 Denier PVC, for example). The use of a flexible material

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which bends may enable the support structure 114 to be more easily affixed to different shapes of vehicles having different side profiles since the support structure may be bent to fit against the sides. In the embodiment of Figures 6 and 7, the support structure 114 is bent inward at an intermediate location 117 to be affixed to the recessed area or "waist" of the sides 113 of the figure eight shape of the vehicle 110. It will be appreciated that the flexibility of the support structure 114 could equally allow it be bent to follow and be affixed to the convex side of a round vehicle.

Figure 9 depicts the "wing shaped" pattern 121 used to form the body 130 (Figure 10) of the protrusion 116 of this embodiment. The pattern 121 is symmetrical about a centerline with a "wave shaped" top edge 124 with rounded convex edge portions and a concave center portion. A bottom edge 126 formed of three straight segments, the center segment being parallel to the center portion of the top and the side segments angling downward. The side edges 128 angle outwardly from the bottom edge 126 to the top edge 124. It will be appreciated that numerous different shapes of patterns may be used to form numerous shapes of protrusions.

The pattern 121 of Figure 9 is also cut from a thin flexible material such that it may be folded or rolled to form the body 130 of the protrusion 116 as shown in Figure 10. The side edges 128 are overlapped and fastened to each other, for example, by an adhesive (such as a 2-part PVC glue), adhesive strip or other fastener. This results in a body 130 having a flattened cone shape which tapers inward laterally and in decreases depth from the open mouth to the closed end.

As shown in Figures 10 and 11, the narrow open end of the cone shaped body 130 is then closed, for example, by cutting an end cap 132 of flexible material and fastening it to

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the narrow end of the body 130. The assembled protrusion 116 of this embodiment, as best seen in Figures 6 and 12, has open mouth 136 with a lower front 138 which curves upward and outward to higher sides 140 and back or inner wall 142.

5 Although the protrusion 116 of this embodiment have been shown as formed by cutting, bending and fastening a flexible material into a desired shape, it will be appreciated that there are numerous other ways of producing such a protrusion 116, such as injection molding a protrusion to form
10 either a flexible or rigid part from plastic or rubber, or by bending and welding a weldable material such as metal.

Figure 13 depicts a side perspective view of the vehicle 110 with the adhesive strips 118 tacked to side 113 of the vehicle 110. In this embodiment, the adhesive strips 118
15 are complimentary in shape to the ends 122 of the support structure 114. In particular, the adhesive strips 118 have rounded outer ends but are wider than the ends of the support structure 114.

One of the adhesive strips 118 is situated towards
20 the front of the vehicle 110 and the other is situated toward the rear of the vehicle 110 at the widest portions of the vehicle 110 and equidistant from the front and rear of the vehicle 110. The adhesive strips are tacked to the side 113 at the top edges 144 and the bottom edges 146 of the adhesive
25 strips such that there is an opening 148 between the adhesive strips 118 and the side 113. The elongated support structure is thus fixable by its longitudinal ends to each side of the vehicle.

In operation, the protrusions are formed, for
30 example, as described with reference to figures 10 to 12. The protrusions are then affixed to the support structure 114. In this embodiment, two protrusions are used and they are placed

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end to end along the support structure. In other embodiments, a single or a plurality of protrusions may be used. The mouths 136 of the protrusions 116 of this embodiment are vertically aligned and both facing rearward along the longitudinal length of the vehicle 110. In other embodiments the mouths 136 may be angled upwardly or downwardly and may face in different directions. For example, for a round vehicle the protrusions may be oppositely facing such that the vehicle may be spun in either direction, depending on the direction of a water jet impacting against the protrusions, as discussed further below.

In some embodiments a spoiler, such as a secondary flap or tube, or an enlargement of the tubing in that area, can be fastened to the rear of the vehicle 110 by various means (e.g. adhesive, Velcro, straps) to deflect water downward to contain it within the ride.

Once the protrusions 116 are fastened to the support structure 114, the ends 122 of the support structure 114 may be slid into the openings 148 between the adhesive strips 118 and the side 113 of the vehicle 110. The adhesive strips 118 can then be fastened to the side 113 and the support structure 114 such that the support structure 114 is fastened to the vehicle 110. In some embodiments, an adhesive may also be used to fasten a back surface of the support structure 114 to the side 113, for example, at a midpoint of the support structure 114 to the waist or narrow portion of the vehicle 110, or at other locations or all along the length of the support structure 114.

In the present embodiment, the assembly of the support structure 114 and protrusion 116 is symmetrical along its longitudinal axis such that the same form of assembly can be positioned along both sides of the vehicle 110.

Although adhesive strips 118 are shown, these strips may be eliminated or combined with other adhesives for

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fastening the support structure 114 and protrusions 116 to the vehicle 110. In some embodiments, the support structure 114 may be eliminated and the protrusions fastened directly to the side 113 of the vehicle 110.

5 Figure 14 depicts another embodiment in which a vehicle 60 has a sleeve 164 which provides both support for protrusions 166 and for seats 168. In particular, the sleeve 164 is formed of a flexible tubular material which is slipped over the vehicle 160 when the vehicle 160 is not inflated or is
10 under inflated. The protrusions 166 may be formed as the protrusions 116, described above, or may be integrally formed with the sleeve 164 by weaving or molding. Straps 170 may interconnect both handles 172 of the vehicle and the sleeve 164 to the seats 168 to support and retain the seats 168 in
15 position. It will be appreciated that either the protrusions 166 or the seats 168 may be eliminated from this structure or may be otherwise supported, for example, by an adhesive, or by the contours of the vehicle when inflated.

 It will be appreciated that the assembly of the
20 protrusions and support structure may be provided as a kit for adapting conventional mass produced water ride vehicles, such as vehicle 110, to be used with water rides which employ water spray or jets to affect the motion of a waterslide vehicle.

 In particular, with reference to Figure 15, the
25 vehicle 110 may be positioned in a channel 190 of a flume style waterslide having a central sliding surface 192 between two walls 194. Spaced along the sides of the sliding surface 192 are spray or water jet sources (see Figures 1-5). The water jets 196 impact spray into the mouths 136 of the protrusions
30 116 as the vehicle 110 slides along the sliding surface 192 past the water jets 196 to impose a force to push the vehicle 110 along the sliding surface 192.

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In some embodiments, the assembly of support structure 114 and protrusion assemblies may be removed from the vehicle 110 at the end of the vehicle life, by cutting or removing or otherwise dissolving the adhesive. The assembly
5 may then be reused on another vehicle.

The vehicle may be used with the waterslides of PCT application numbers PCT/CA2013/050794 and PCT/CA2015/050339 both of which are incorporated herein in their entirety.

10 Numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practised otherwise than as specifically described herein.

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CLAIMS:

1. A waterslide feature comprising:
a channel comprising a sliding surface and walls;
5 the walls defining a plurality of recesses;
a plurality of nozzles comprising a nozzle extending
through each of the recesses angled to spray water over the
sliding surface;
wherein the nozzles are positioned to provide a flow
10 of water to impact a vehicle sliding on the sliding surface;
and
wherein the nozzles are sized to provide a flow of
water sufficient to affect motion of the vehicle.
- 15 2. The waterslide feature according to claim 1 wherein
each of the recesses defines an opening through the walls and
each of the nozzles are connected to a source of water through
the respective openings in the walls.
- 20 3. The waterslide feature of claim 2 wherein each of the
recesses define a rear wall angled towards the channel for
mounting one of the nozzles and the cross section of each
recess tapers from the rear wall to a surface of the channel.
- 25 4. The waterslide feature of claim 3 wherein the
recesses taper inward to define top and bottom walls
substantially perpendicular to the rear wall and the channel.
5. The waterslide feature according to any one of claims
30 1 to 4 wherein each of the nozzles define an outlet end which
is within the respective recess and an inlet end which is
outside the channel.

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6. The waterslide feature according to any one of claims 1 to 5 wherein the nozzles are formed of polyvinyl chloride.

7. The waterslide feature according to any one of claims 1 to 6 wherein each of the nozzles comprise a collar within the respective recess and a cylinder extending outside the channel.

8. The waterslide feature according to claim 5 wherein the inlet end comprises a press fit feature which is fitted into a flexible conduit connected by a clamp.

9. The waterslide feature according to claim 8 wherein the plurality of nozzles are connected to a water source in groups wherein the flow of water to each group is separately controlled.

10. The waterslide feature according to any one of claims 1 to 9 wherein a water flow rate is variable between 15GPM and 40GPM per nozzle.

11. The waterslide feature according to any one of claims 1 to 10 wherein water pressure in the nozzle is variable between 5psi and 30psi.

12. The waterslide a feature according to any one of claims 1 to 11 wherein the nozzle spray pattern is variable from cylindrical to conical.

13. The waterslide feature according to any one of claims 1 to 12 wherein the nozzles are positioned spray no more than 6.25 inches above the sliding surface.

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14. The waterslide feature according to any one claims 1 to 12 wherein the nozzles are positioned spray less than approximately 8.75 inches above the sliding surface.

5 15. The waterslide feature according to any one of claims 1 to 14 further comprising troughs along the sides of the uphill and downhill sections of the sliding surface.

16. The waterslide feature according to any one of claims
10 1 to 13 further comprising a trough below the sliding surface and grates along uphill and downhill sections of the sliding surface opening into the trough to allow water to flow from the sliding surface to the trough, wherein the grates comprise laterally extending cylindrical bars.

15

17. The waterslide feature of any one of claims 1 to 16 wherein the waterslide comprises upper walls including removable windows.

20 18. The waterslide feature of claim 17 wherein the upper walls enclose the waterslide feature.

19. The waterslide system comprising a waterslide feature according to any one of claims 1 to 18 and an inflatable
25 waterslide vehicle with outwardly curving sides wherein the water jets are angled to impact the vehicle no higher than a cross-sectional equator of the sides of the vehicle.

20. The waterslide system according to claim 19 wherein
30 the water jets are angled to impact the vehicle below the cross-sectional equator of the sides of the vehicle.

- 23 -

21. An attachment for an inflatable waterslide vehicle wherein the vehicle comprises a body having a perimeter, the attachment comprising a support structure fixable to the perimeter of the vehicle and at least one projection extending
5 outward from the support structure, the projection being sized to affect motion of the vehicle when fixed to the vehicle and impacted by a water.

22. The attachment of claim 21 wherein the support
10 structure is elongated and is fixable to the vehicle at longitudinal ends of the support structure.

23. The attachment of claim 22 wherein the support
15 structure is fixable to the vehicle at an intermediate location.

24. The attachment of any one of claims 21 to 23 wherein the support is fixable by use of adhesive strips.

20 25. The attachment of any one of claims 21 to 24 wherein the support is flexible to be fixable to a non-planer vehicle perimeter.

26. The attachment of anyone of claims 21 to 25 wherein
25 the projection comprises at least two projections.

27. The attachment of anyone of claims 21 to 26 wherein the projection comprises at least one pocket defined by an opening at a first end tapering to a closed second end.
30

28. The attachment of claim 27 wherein the projection tapers both inwardly toward the support and laterally toward the center of the support.

- 24 -

29. The attachment of claim 27 or 28 wherein an inner wall of the pocket adjacent the support structure is longer than an outer wall of the pocket opposite the support structure wherein the opening is angled away from the support structure.

5

30. The attachment of any one of claims 21 to 29 wherein the support structure and the projections are formed of the same material.

10 31. The attachment of claim 21 wherein the support structure is tubular and sized to encircle a portion of the vehicle.

32. A method of affixing a projection to an inflatable waterslide vehicle wherein the vehicle comprises a body having a perimeter, the method comprising fixing the projection to a support structure using an adhesive; positioning the support structure on the perimeter of the vehicle at a location where water impacting the projection will affect motion of the vehicle, and fixing longitudinal ends of the support structure to the perimeter of the vehicle using adhesive strips.

33. A method of adapting an inflatable raft for use with waterslide utilizing water jets to affect the motion of the inflatable raft, wherein the inflatable comprises a body having a perimeter, the method comprising:

fixing at least one projection to a support structure using an adhesive;

positioning the support structure on the perimeter of the vehicle such that water impacting the projection will affect motion of the vehicle, and

fixing longitudinal ends of the support structure to the perimeter of the vehicle using adhesive strips.

- 25 -

34. A method of affixing a projection to an inflatable waterslide vehicle wherein the vehicle comprises a body having a perimeter, the method comprising fixing the projection to a support structure using an adhesive; fixing the support
5 structure to a tubular member, under inflating the vehicle, positioning the tubular member around the body of the vehicle such that water impacting the projection will affect motion of the vehicle, and fully inflating the vehicle to retain the tubular member in position.

10

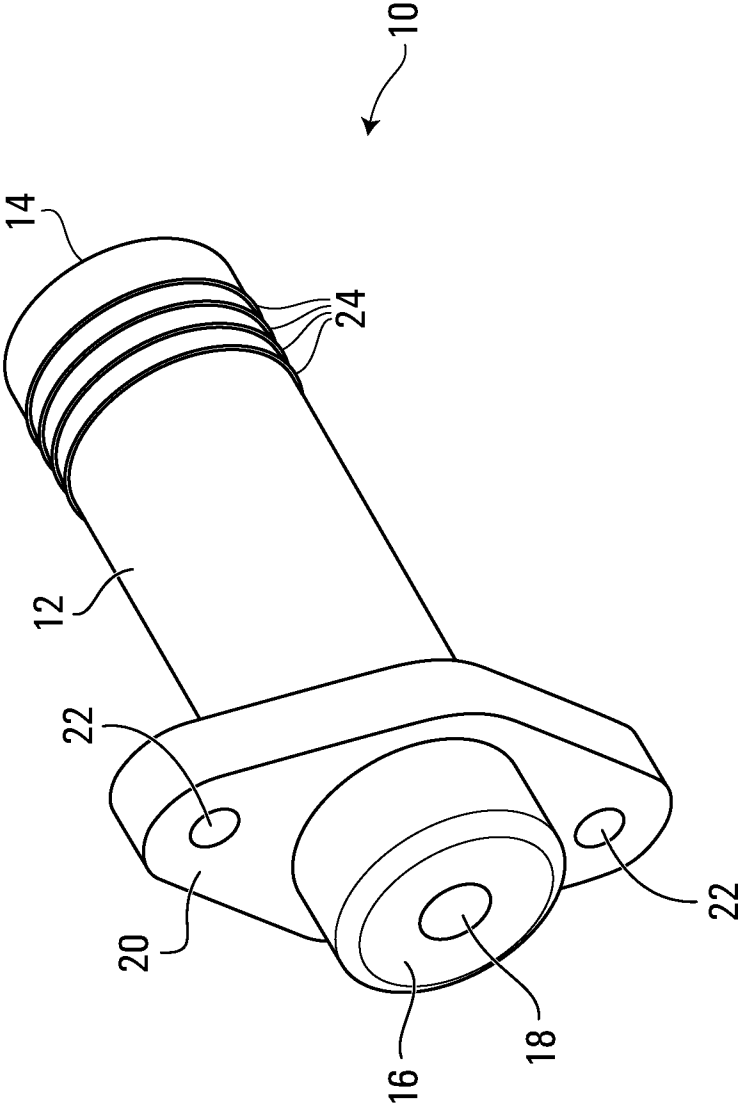


FIG. 1

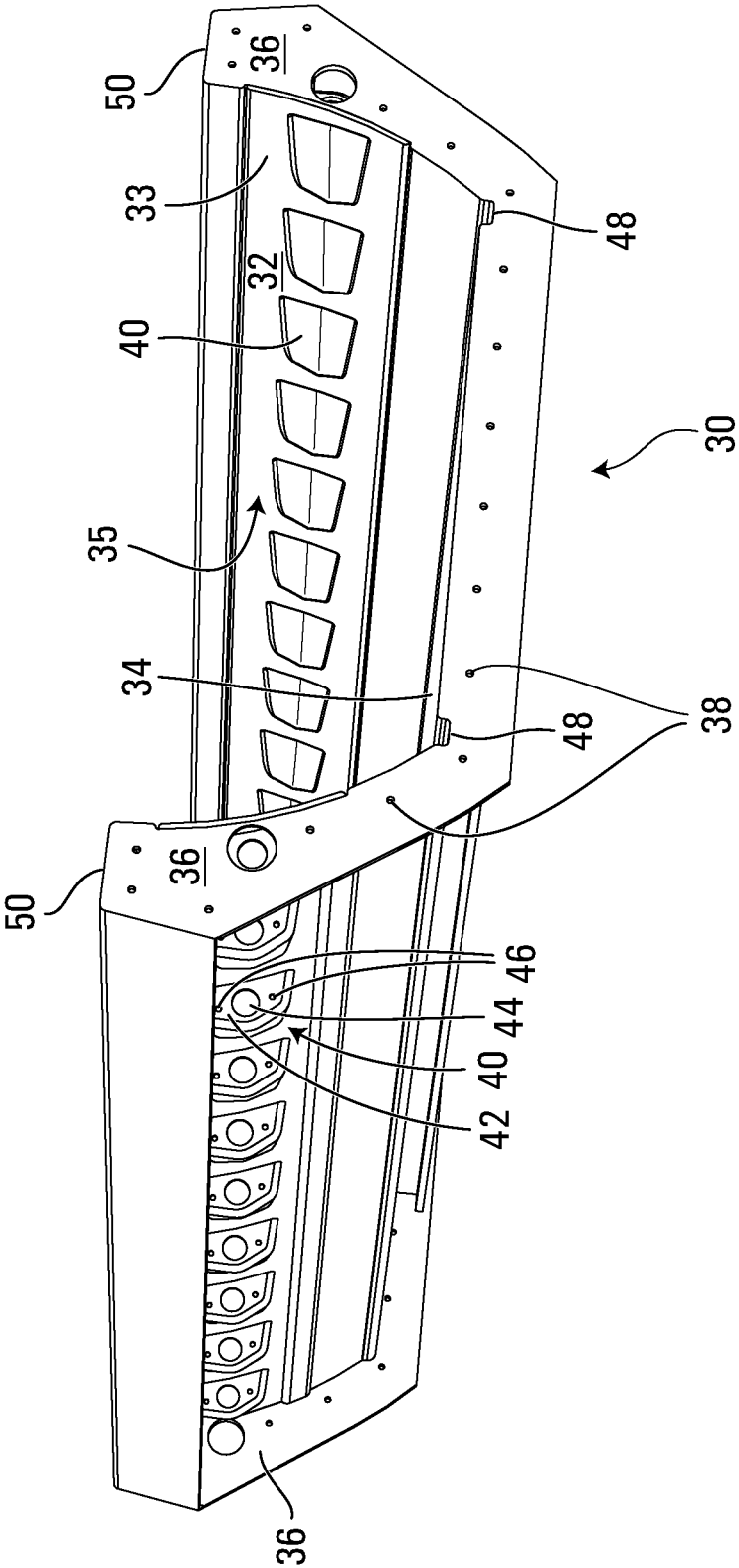


FIG. 2

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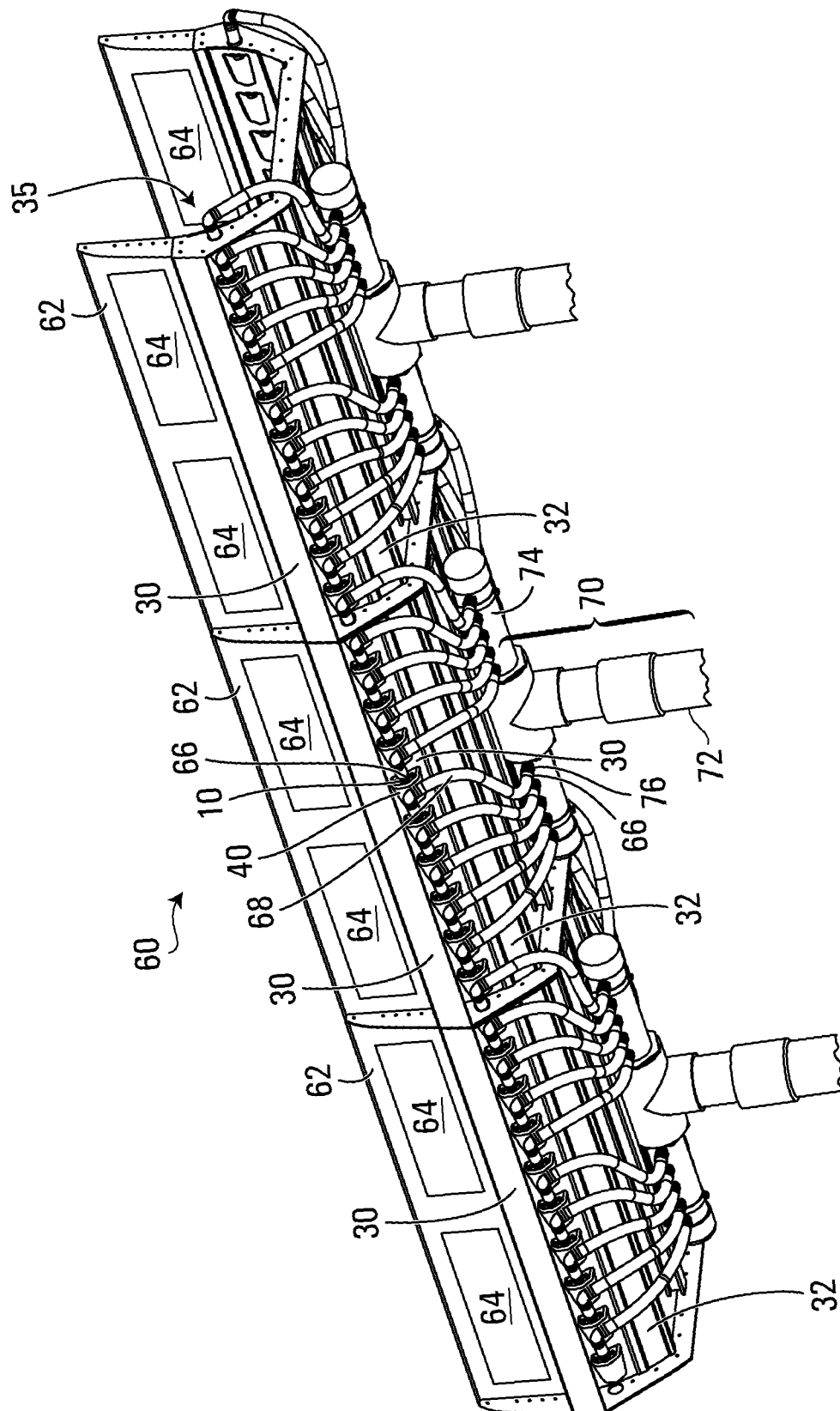


FIG. 3

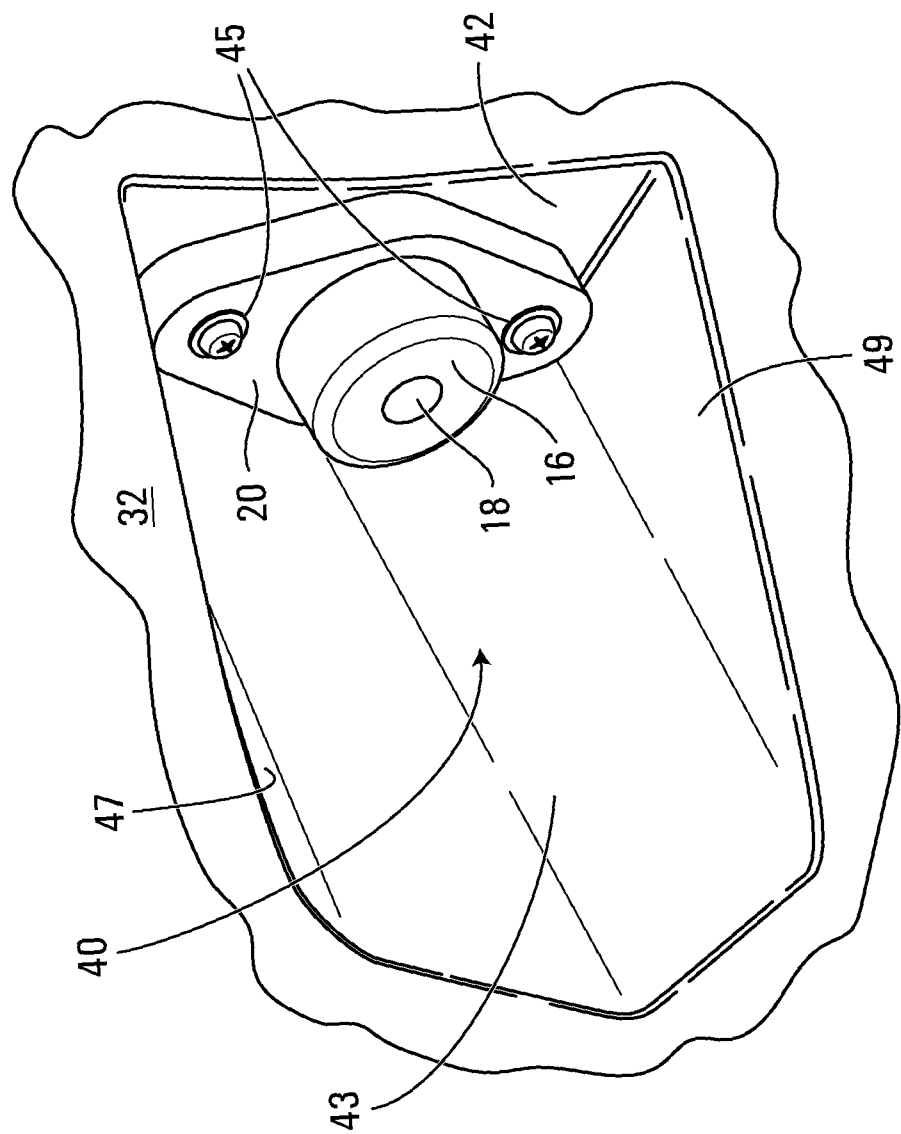


FIG. 4

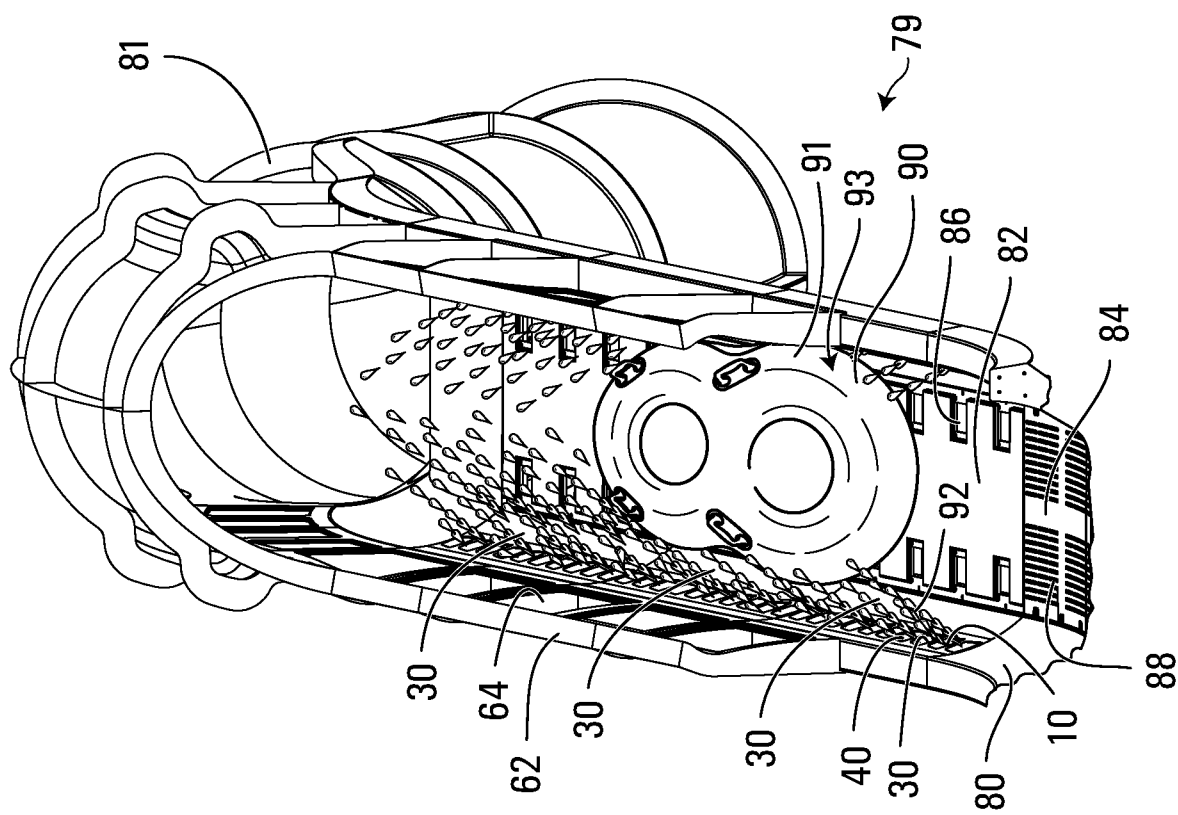


FIG. 5

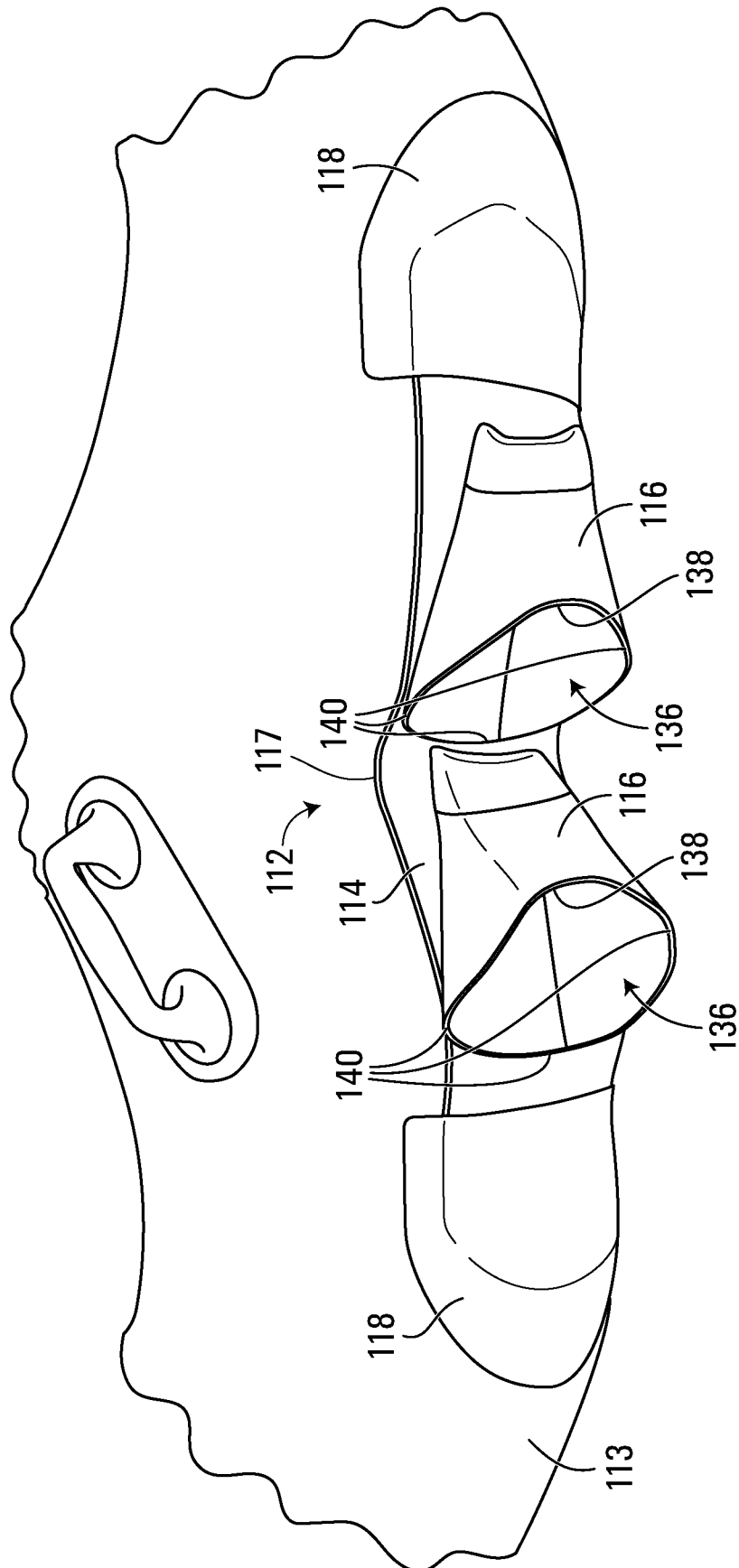


FIG. 6

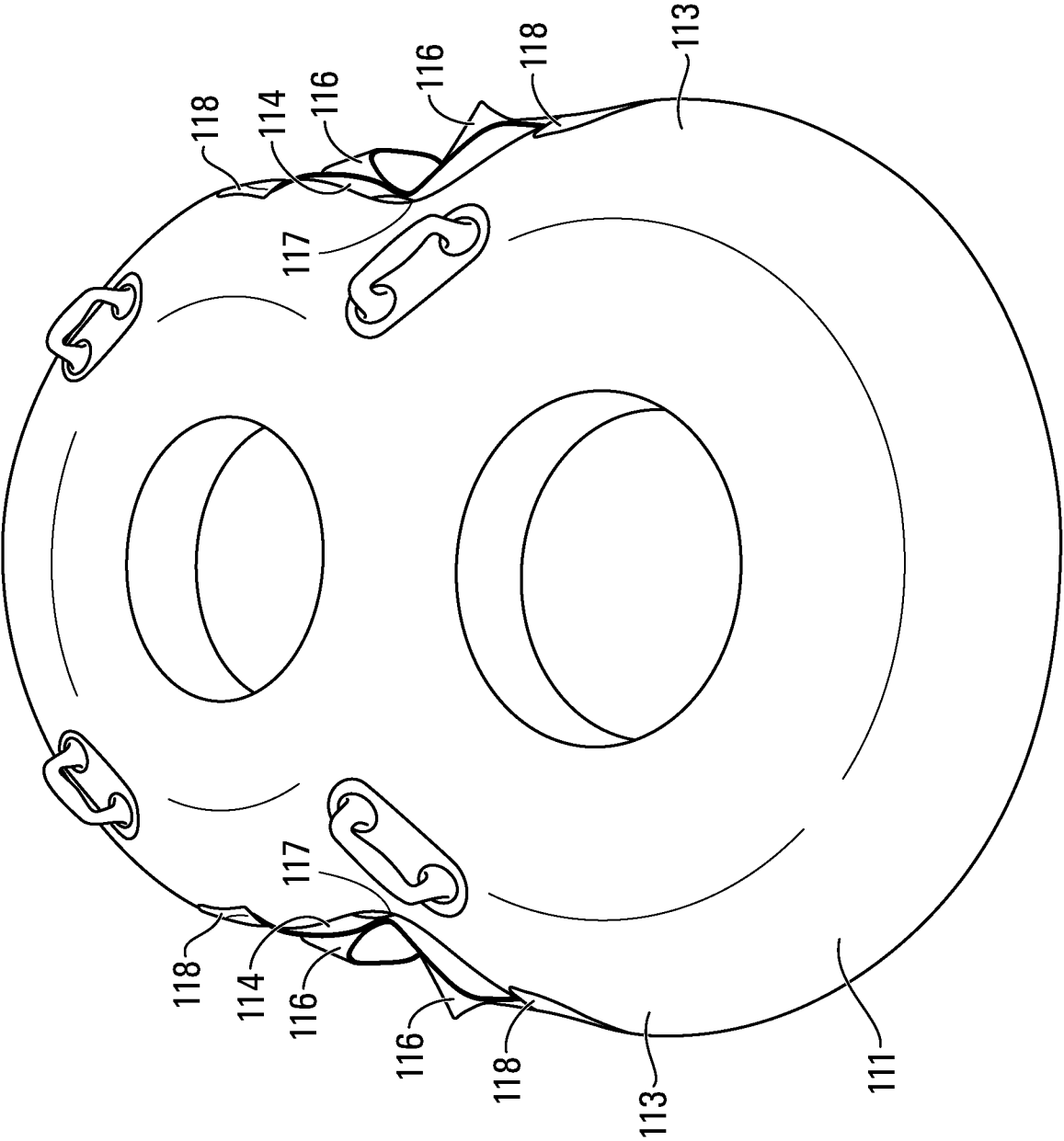


FIG. 7

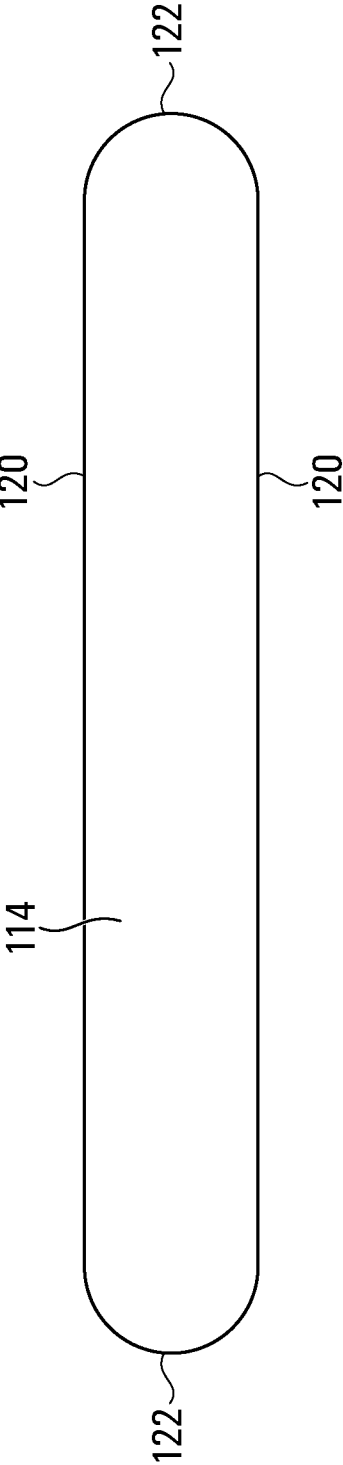


FIG. 8

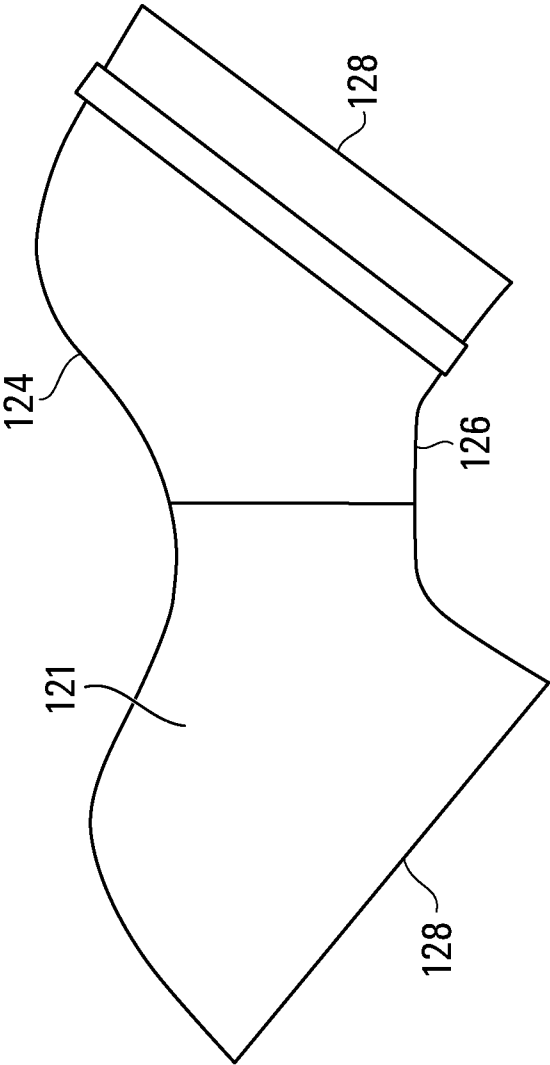


FIG. 9

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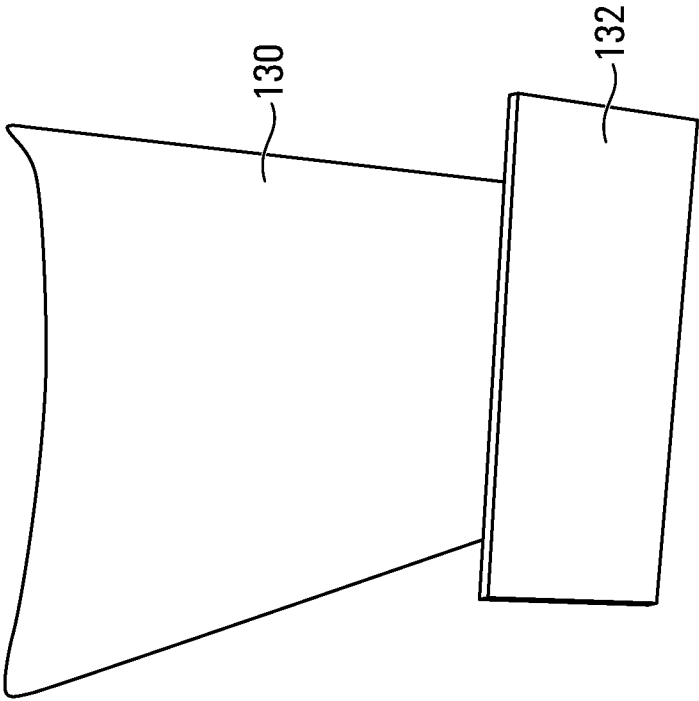


FIG. 11

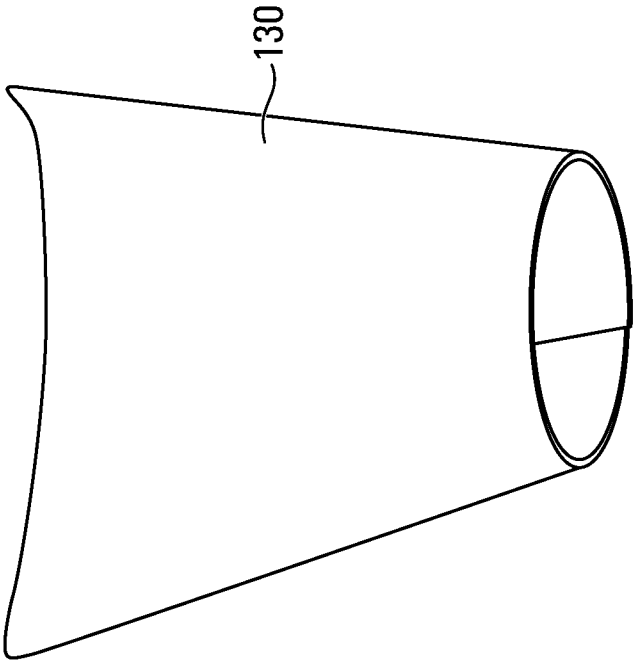


FIG. 10

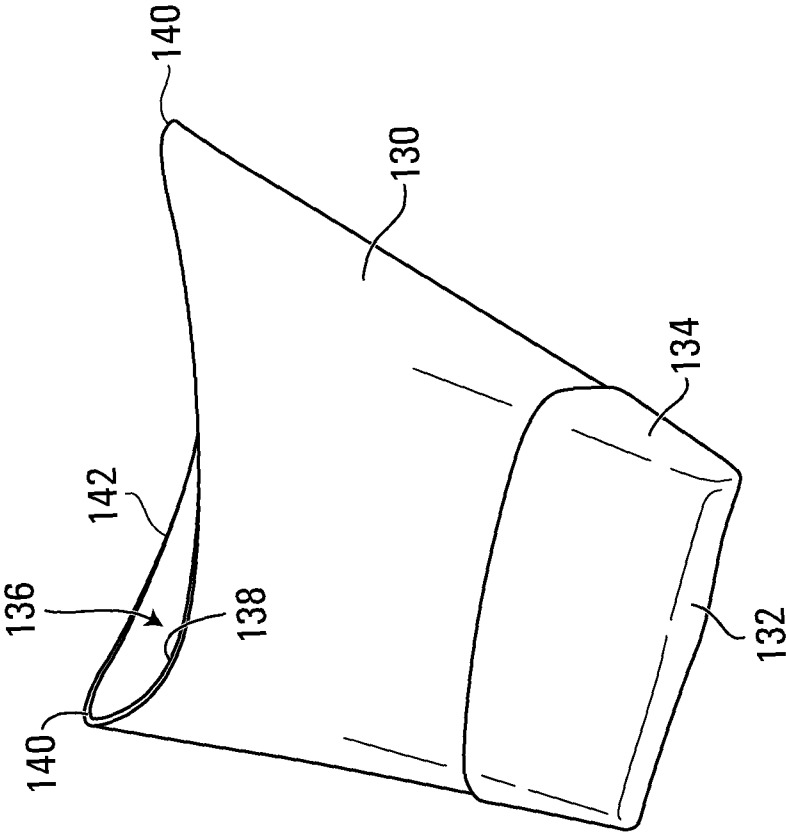


FIG. 12

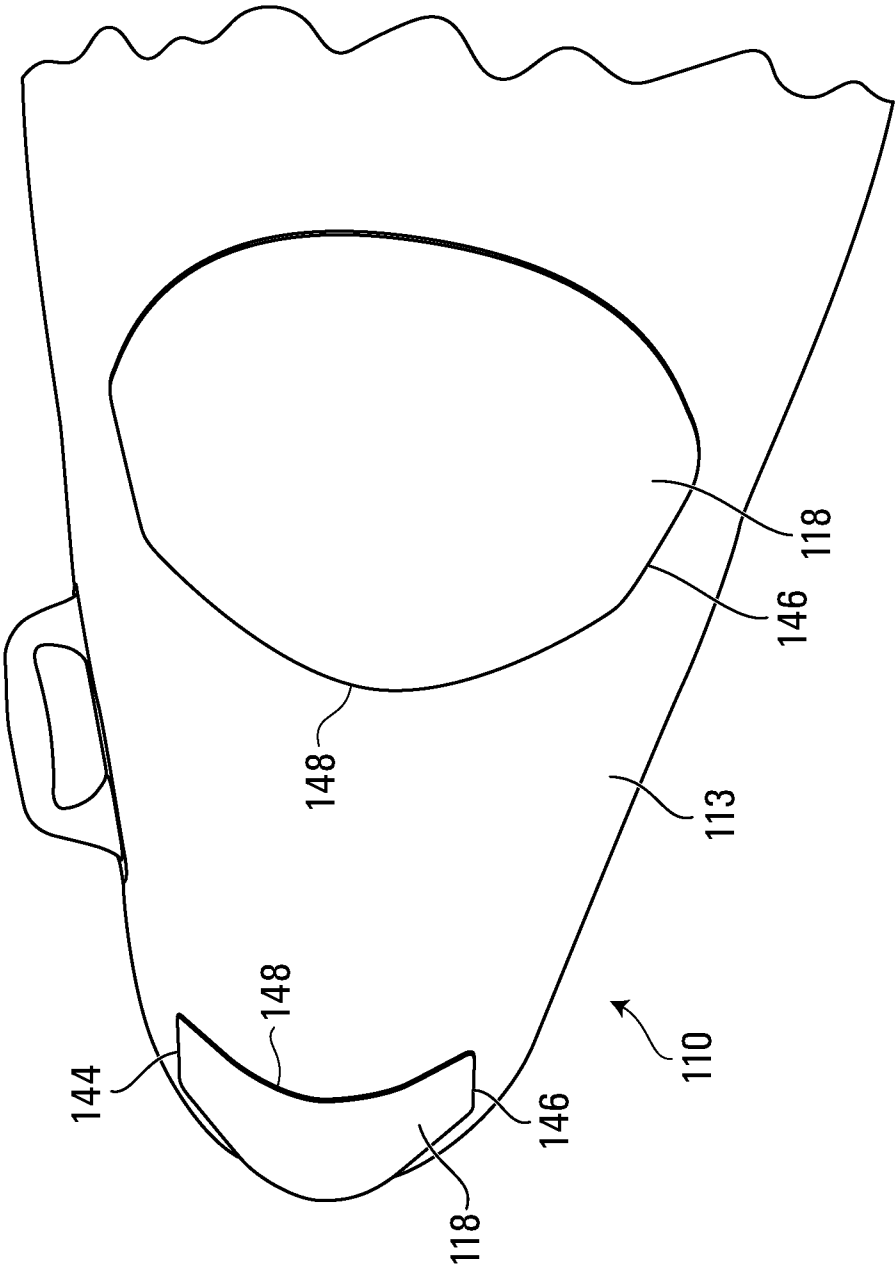


FIG. 13

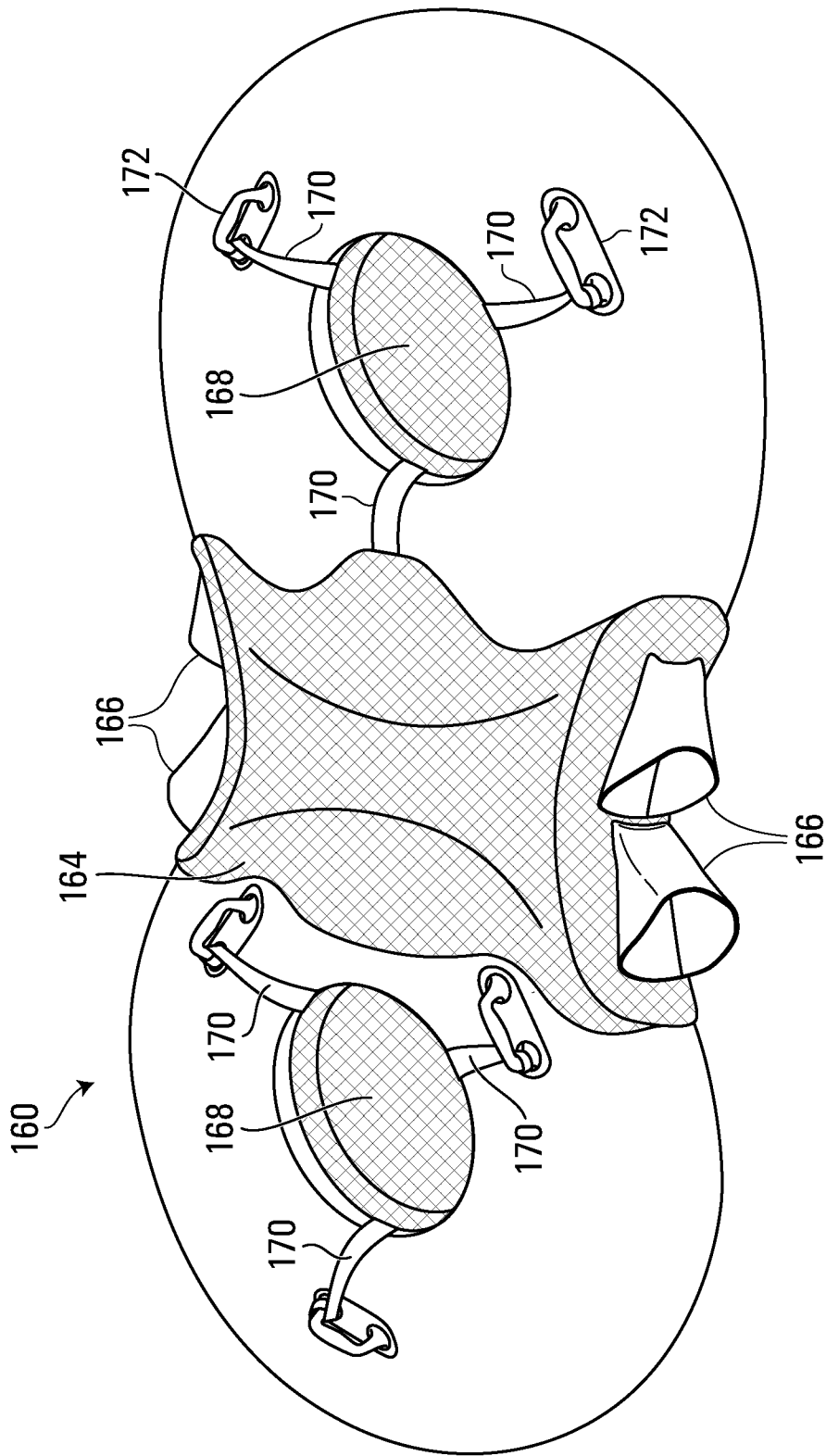


FIG. 14

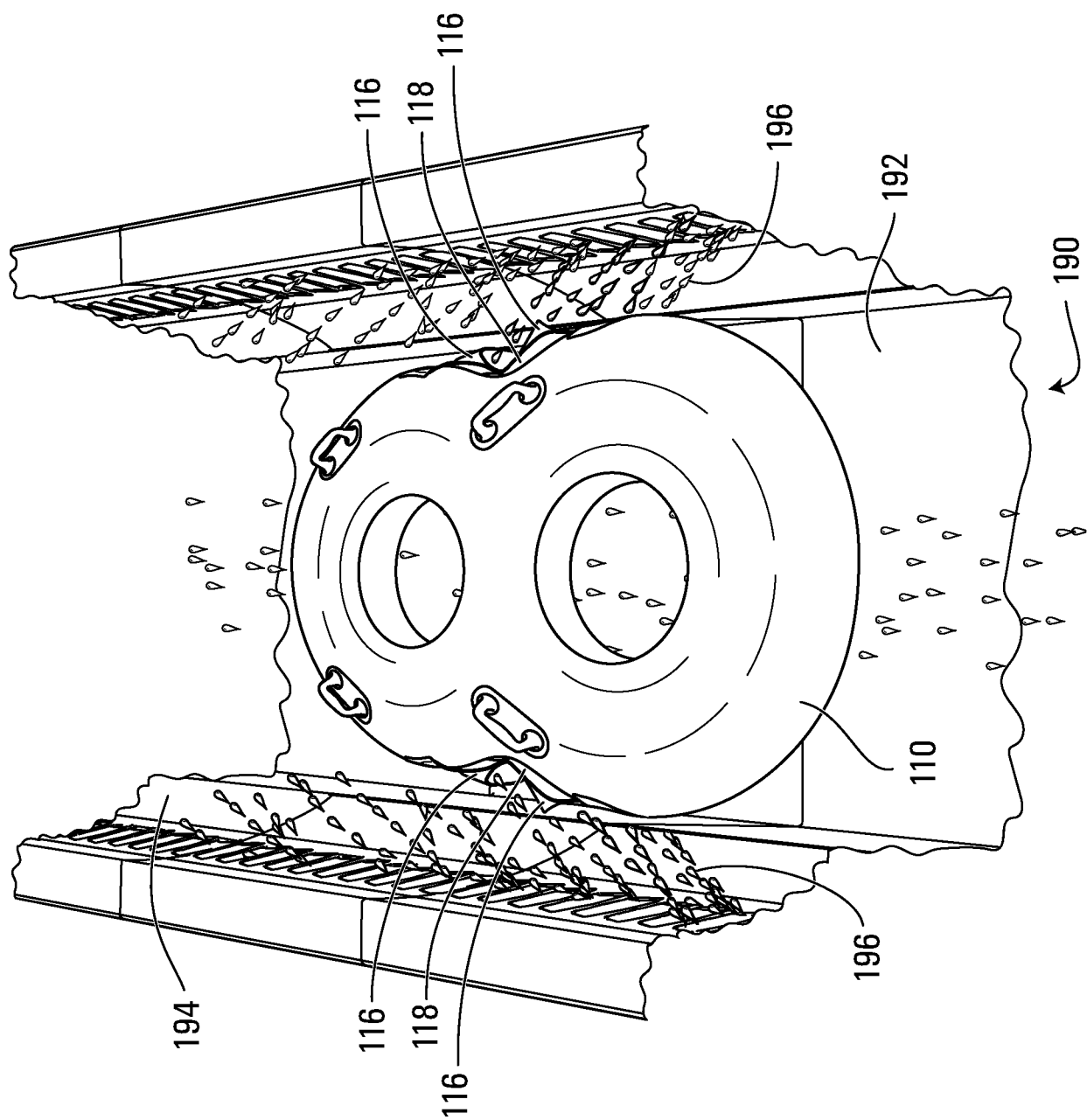


FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2016/050838

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **A63G 21/18** (2006.01), **A63G 21/12** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2006.01): A63G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Questel-Orbit, Canadian Patent Database, Google Patents
Keywords: waterslide, sliding surface, channel, wall, recess, nozzle, flow, impact, motion, collar, trough, window

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	CA2888630 A1 (Smegal R. T. et al.) 24 April 2014 (24-04-2014) *Fig. 1; page 10, line 1; page 17, lines 5-10; page 7, line 12- page 8, line 2*	1, 2, 5, 10, 11, 13, 14, 19, 20 4, 6-9, 12, 15-18
X	CA2654714 A1 (Henry J. W. et al.) 21 March 2002 (21-03-2002) *Fig. 26*	1, 2, 3, 5
Y	US5503597 A (Lochtefeld T. J. et al.) 02 April 1996 (02-04-1996) *Fig. 6B; col. 5, line 42; col. 6, lines 35, 50*	4, 6, 12
Y	US5401214 A (Smollar M. et al.) 28 March 1995 (28-03-1995) *Fig. 5*	7-9
Y	EP0601641 A1 (Loots G. M. G.) 15 June 1994 (15-06-1994) *Fig. 9; col. 9, lines 28-44*	15, 16
Y	WO2007/027841 A2 (Henry J. W. et al.) 08 March 2007 (08-03-2007) *Fig's 1, 2*	17, 18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* "A" "E" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
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Date of the actual completion of the international search
09 March 2017 (09-03-2017)

Date of mailing of the international search report
17 March 2017 (17-03-2017)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
Place du Portage I, C114 - 1st Floor, Box PCT
50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 819-953-2476

Authorized officer

Goran Basic (819) 635-8017

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2016/050838

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
(see extra sheet)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos.:

1-20

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2016/050838

The claims are directed to a plurality of inventive concepts as follows:

Group A - Claims 1-20 are directed to a waterslide feature comprising a channel comprising a sliding surface and walls the walls defining a plurality of recesses and a plurality of nozzles comprising a nozzle extending through each of the recesses angled to spray water over the sliding surface; and

Group B - Claims 21-34 are directed to an attachment for an inflatable waterslide vehicle and methods of attaching it to the vehicle.

The claims must be limited to one inventive concept as set out in PCT Rule 13.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2016/050838

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA2888630A1	24 April 2014 (24-04-2014)	CA2888630A1 CN104797312A EP2908920A1 EP2908920A4 KR20150064220A US2016136527A1 WO2014059551A1	24 April 2014 (24-04-2014) 22 July 2015 (22-07-2015) 26 August 2015 (26-08-2015) 21 December 2016 (21-12-2016) 10 June 2015 (10-06-2015) 19 May 2016 (19-05-2016) 24 April 2014 (24-04-2014)
CA2654714A1	21 March 2002 (21-03-2002)	CA2654714A1 CA2654714C AT311232T AU9082601A AU9083201A AU2001290832B2 CA2422023A1 CA2422023C DE60115477D1 DE60115477T2 EP1318864A2 EP1318864B1 EP1604712A1 US2002082097A1 US7285053B2 US2005090321A1 US7371182B2 US2005085306A1 US2005090320A1 US2006178222A1 US8070615B2 US2006052171A1 US8197352B2 WO0222226A2 WO0222227A2	21 March 2002 (21-03-2002) 30 October 2012 (30-10-2012) 15 December 2005 (15-12-2005) 26 March 2002 (26-03-2002) 26 March 2002 (26-03-2002) 02 August 2007 (02-08-2007) 21 March 2002 (21-03-2002) 12 May 2009 (12-05-2009) 05 January 2006 (05-01-2006) 24 August 2006 (24-08-2006) 18 June 2003 (18-06-2003) 30 November 2005 (30-11-2005) 14 December 2005 (14-12-2005) 27 June 2002 (27-06-2002) 23 October 2007 (23-10-2007) 28 April 2005 (28-04-2005) 13 May 2008 (13-05-2008) 21 April 2005 (21-04-2005) 28 April 2005 (28-04-2005) 10 August 2006 (10-08-2006) 06 December 2011 (06-12-2011) 09 March 2006 (09-03-2006) 12 June 2012 (12-06-2012) 21 March 2002 (21-03-2002) 21 March 2002 (21-03-2002)
US5503597A	02 April 1996 (02-04-1996)	None	
US5401214A	28 March 1995 (28-03-1995)	None	
EP0601641A1	15 June 1994 (15-06-1994)	EP0601641A1 NL9202110A	15 June 1994 (15-06-1994) 01 July 1994 (01-07-1994)
WO2007/027841A2	08 March 2007 (08-03-2007)	WO2007027841A2 WO2007027841A3 US2007060403A1 US7371183B2 US2007066410A1 US7762899B2 US2007049385A1 US7815514B2 US2007060402A1 US8282497B2 US2007049386A1	08 March 2007 (08-03-2007) 30 April 2009 (30-04-2009) 15 March 2007 (15-03-2007) 13 May 2008 (13-05-2008) 22 March 2007 (22-03-2007) 27 July 2010 (27-07-2010) 01 March 2007 (01-03-2007) 19 October 2010 (19-10-2010) 15 March 2007 (15-03-2007) 09 October 2012 (09-10-2012) 01 March 2007 (01-03-2007)