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(54) **WATERSLIDE CAPSULE WITH SLIDING DOOR**

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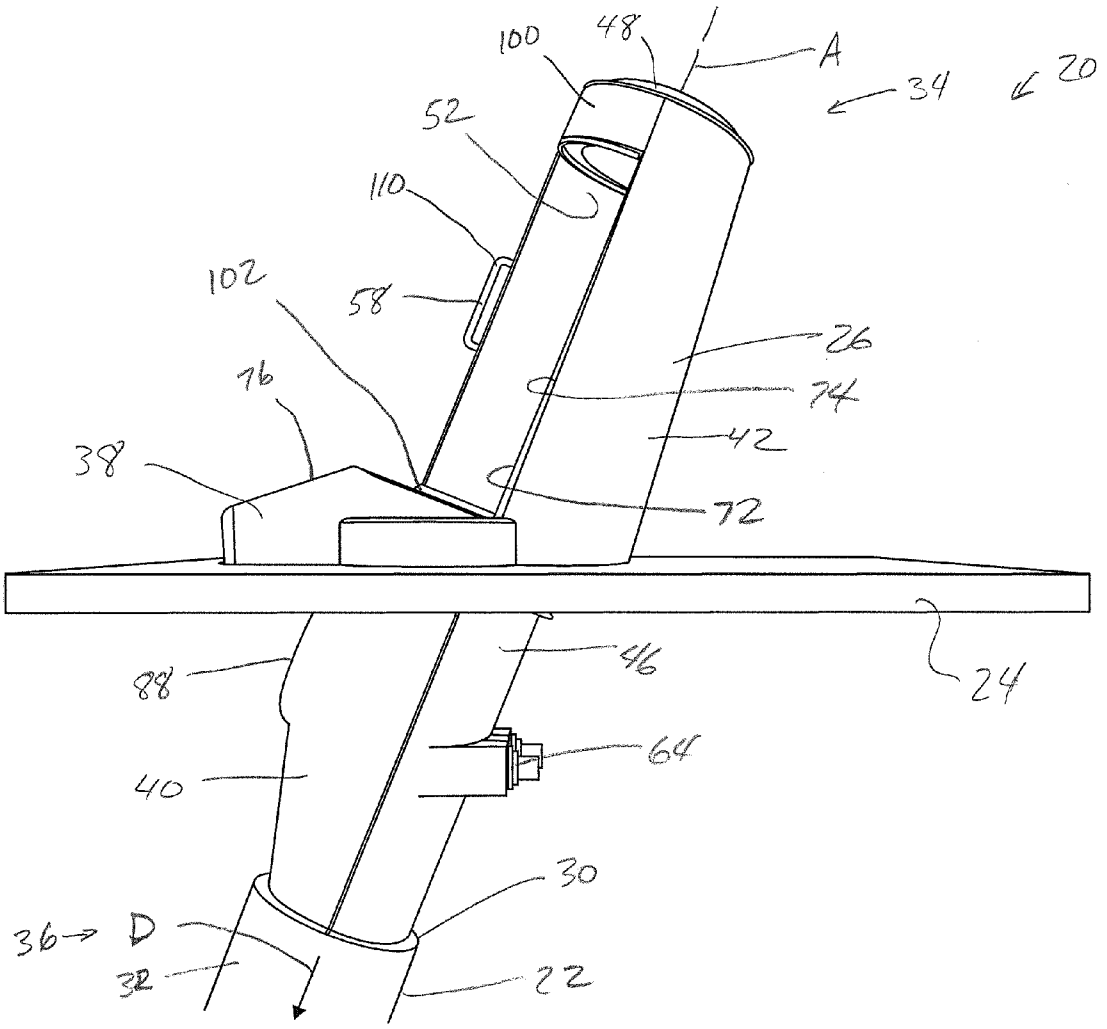
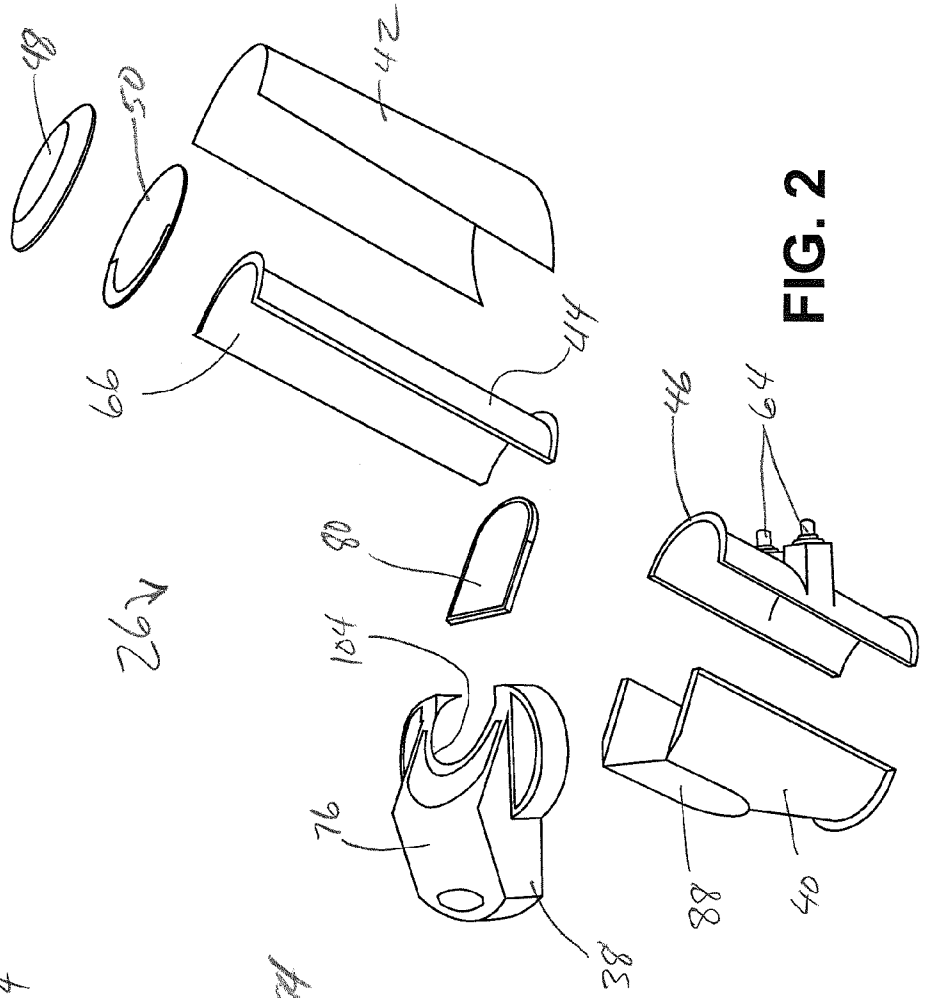
(57) **ABSTRACT**

A waterslide capsule assembly is operable to fluidly communicate with a waterslide flume to contain a rider and release the rider into the flume. The waterslide capsule assembly broadly includes a capsule and a sliding access door. The capsule at least partly defines a capsule chamber to receive the rider, with the capsule presenting opposite capsule ends, a longitudinal entry opening, and an exit opening. The access door is slidably mounted relative to the capsule and slidable between a closed position and an open position.




48
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42
66
44
80
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40
38

FIG. 2

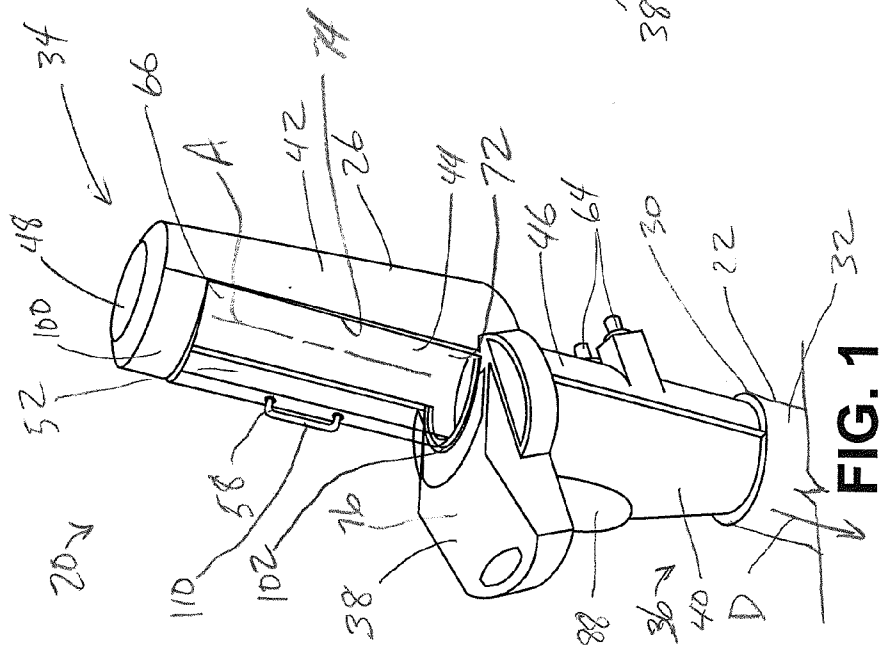
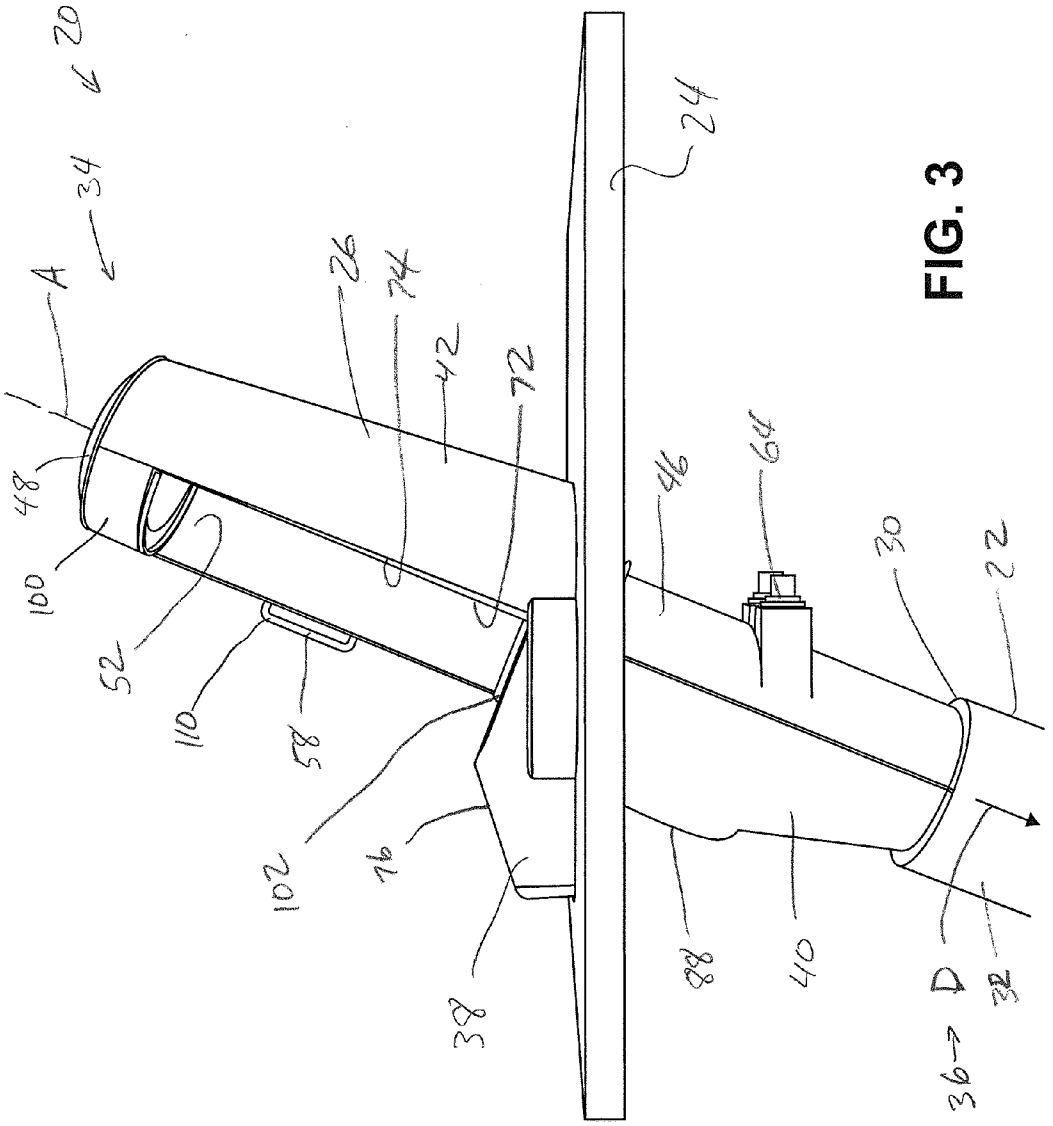

34
66
A
42
26
44
72
46
64
30
22
32
48
100
52
58
20
110
102
76
38
88
36
40
D

FIG. 1


20
34
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1
48
100
52
110
58
102
76
38
26
24
42
72
24
46
64
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22
88
410
D
32
36

FIG. 3

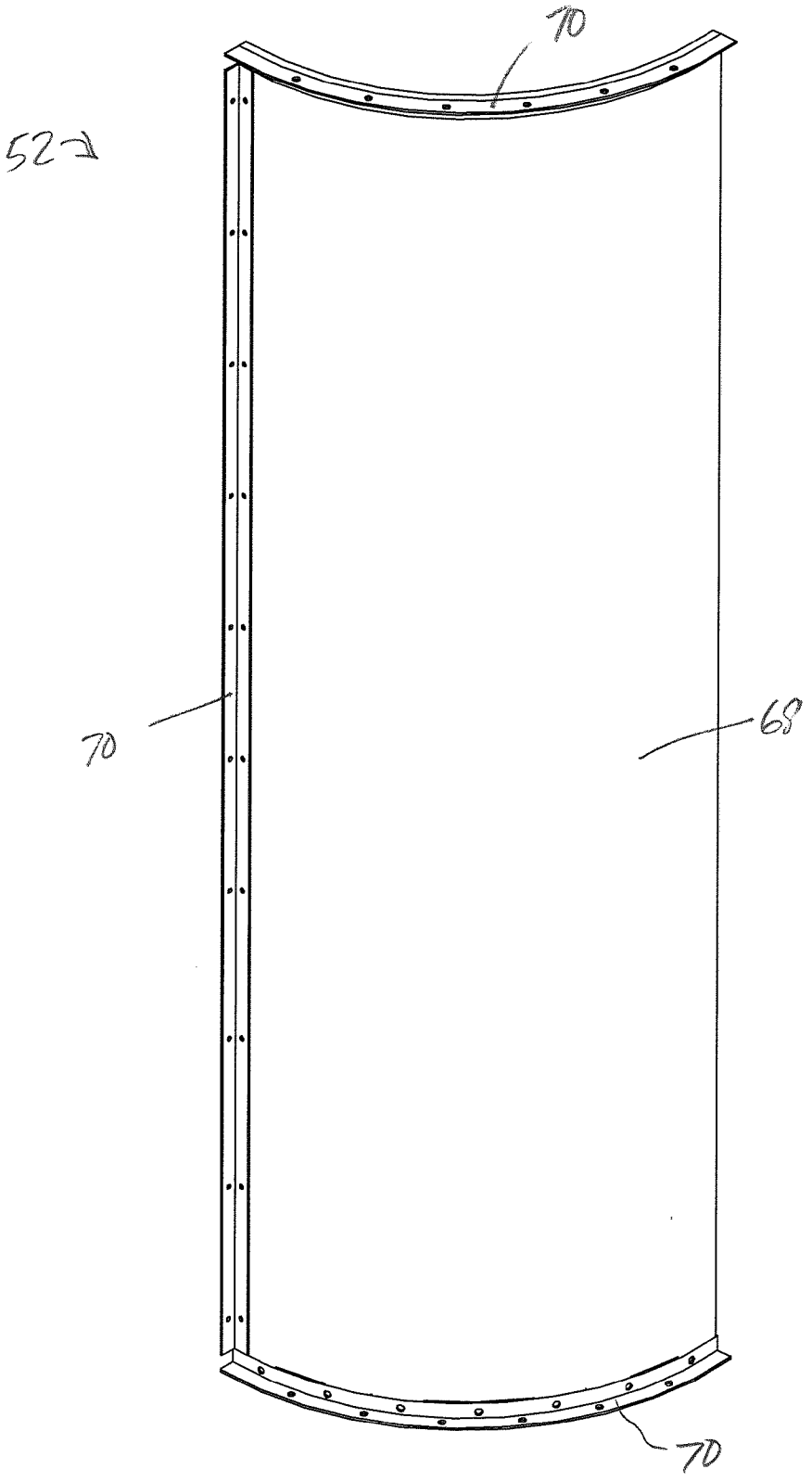


FIG. 4

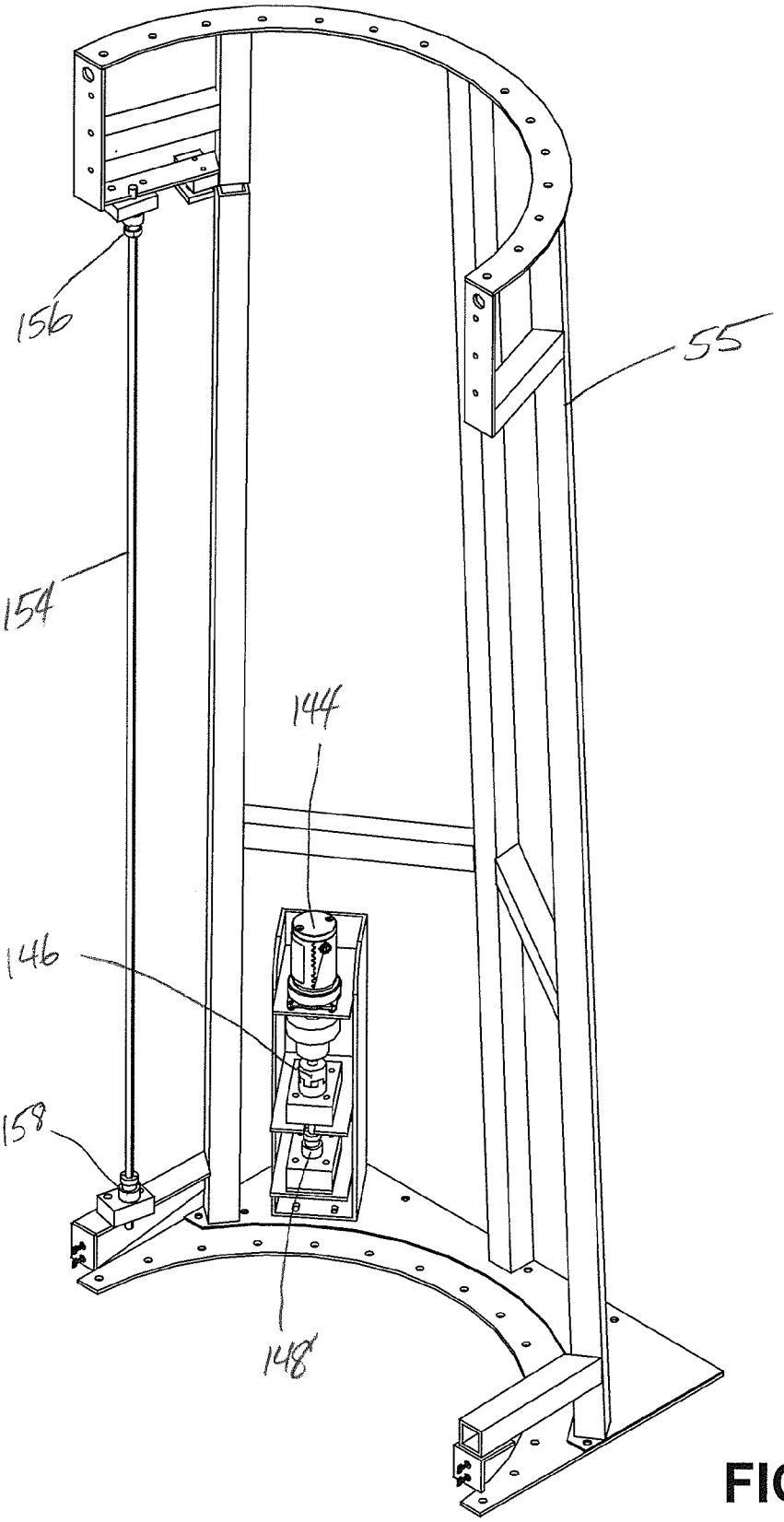


FIG. 5

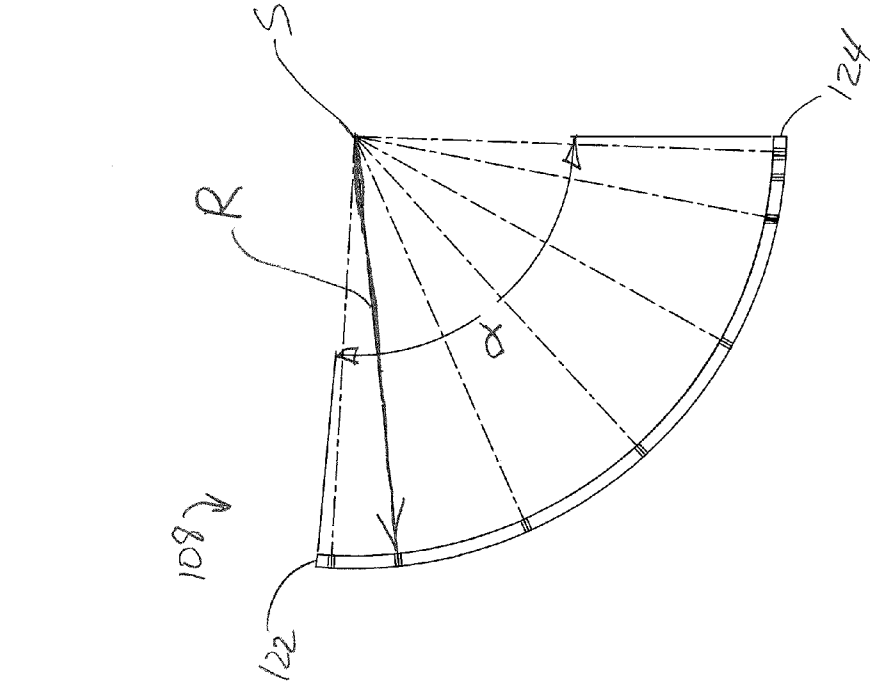


FIG. 6B

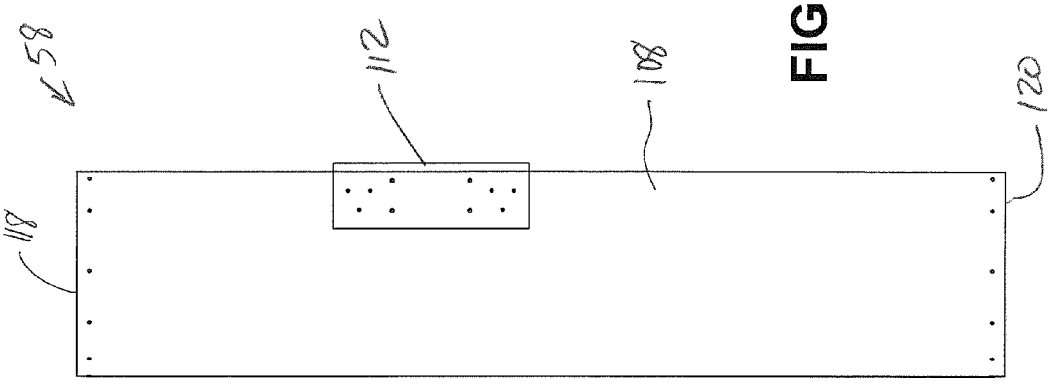


FIG. 6A

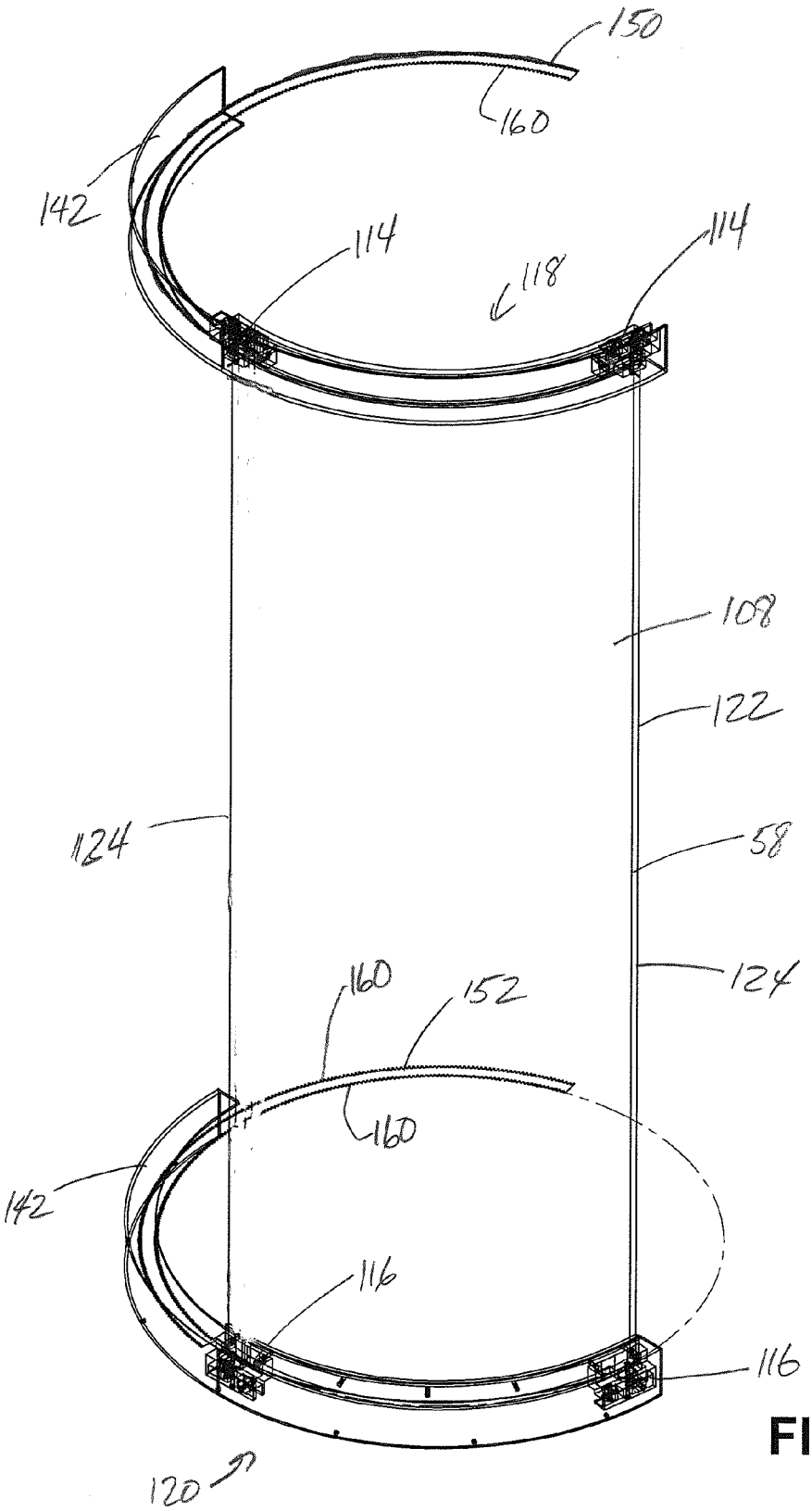

150
160
142
114
118
114
108
122
124
58
124
160
152
160
142
116
116
120

FIG. 7

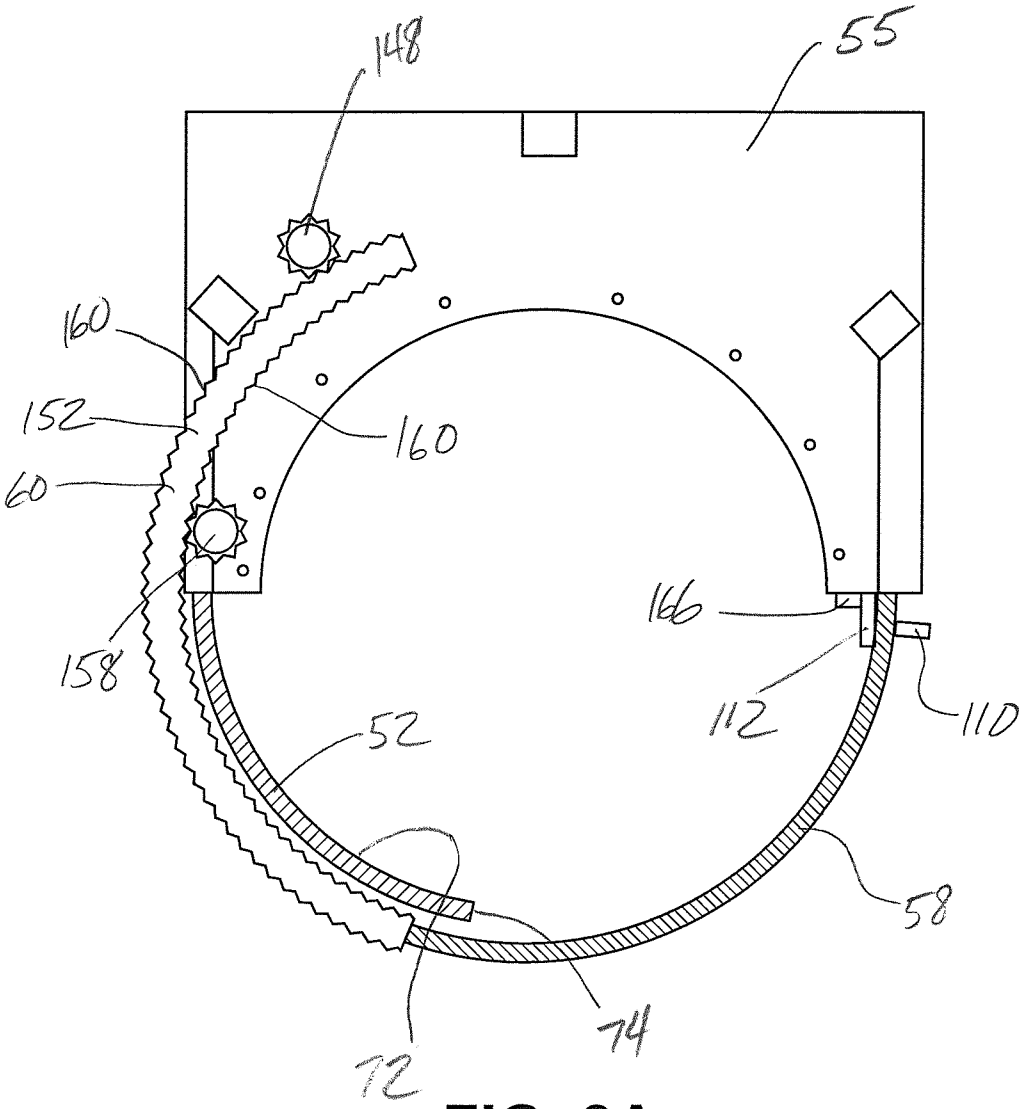


FIG. 8A

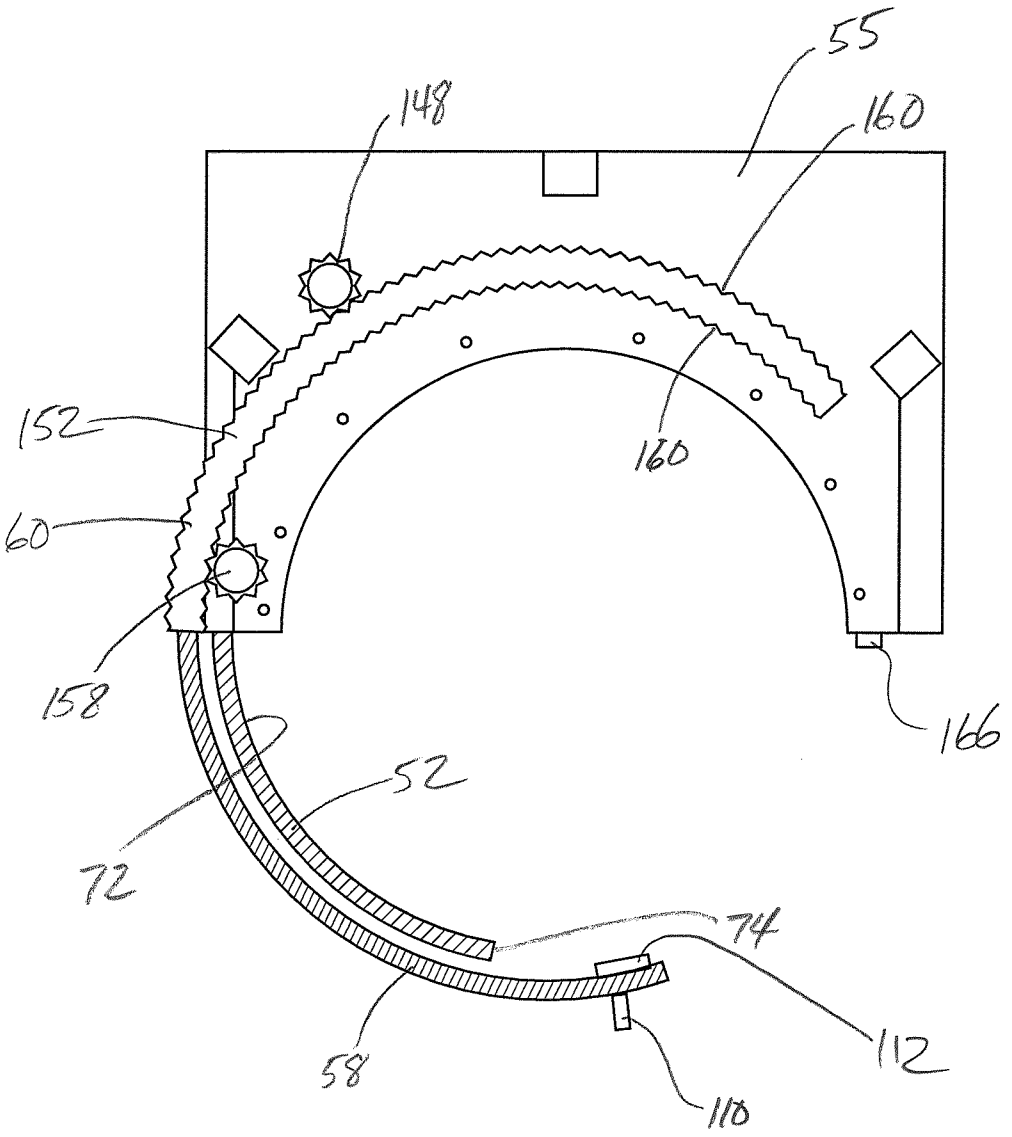


FIG. 8B

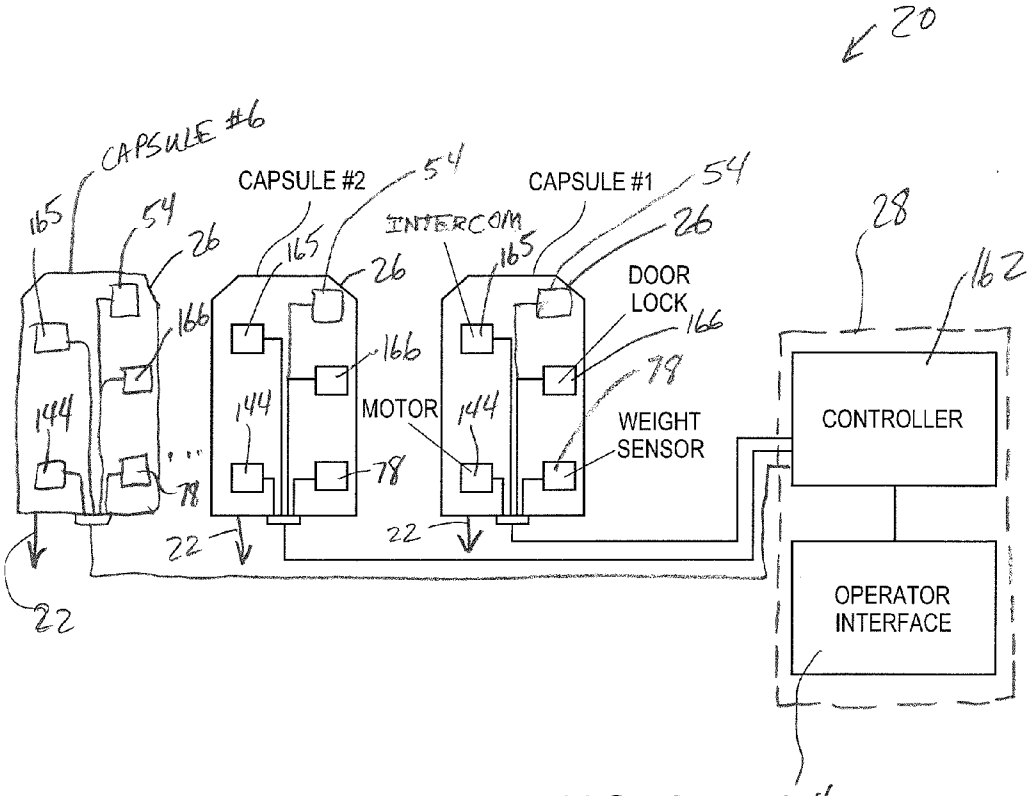

20
CAPSULE #6
CAPSULE #2
CAPSULE #1
INTERCOM
54
165
26
166
144
78
22
MOTOR
DOOR LOCK
WEIGHT SENSOR
28
162
CONTROLLER
OPERATOR INTERFACE
164

FIG. 9

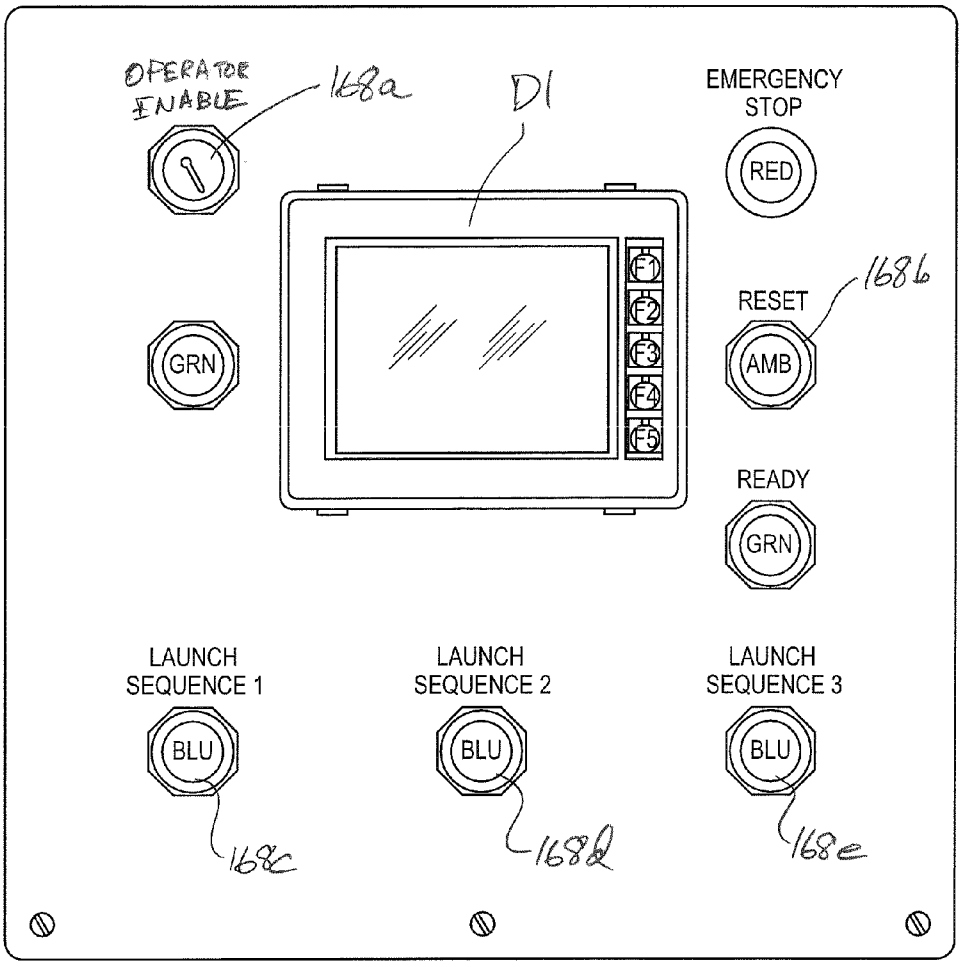
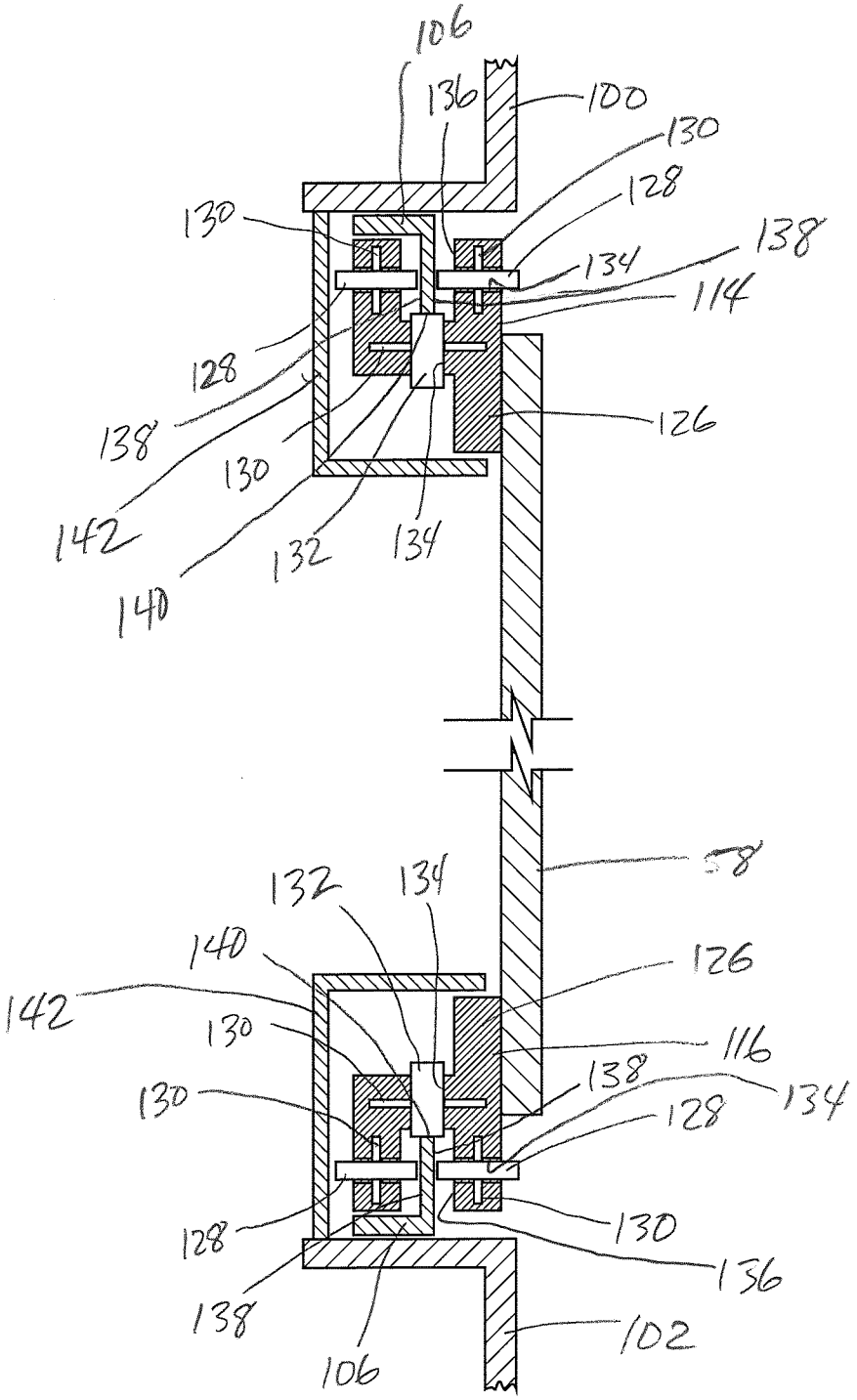

164
OPERATOR ENABLE
168a
D1
EMERGENCY STOP
RED
GRN
F1
F2
F3
F4
F5
RESET
AMB
1686
READY
GRN
LAUNCH SEQUENCE 1
BLU
168c
LAUNCH SEQUENCE 2
BLU
168d
LAUNCH SEQUENCE 3
BLU
168e

FIG. 10


106
136
100
130
128
130
138
134
114
128
138
126
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132
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140
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102
106

FIG. 11

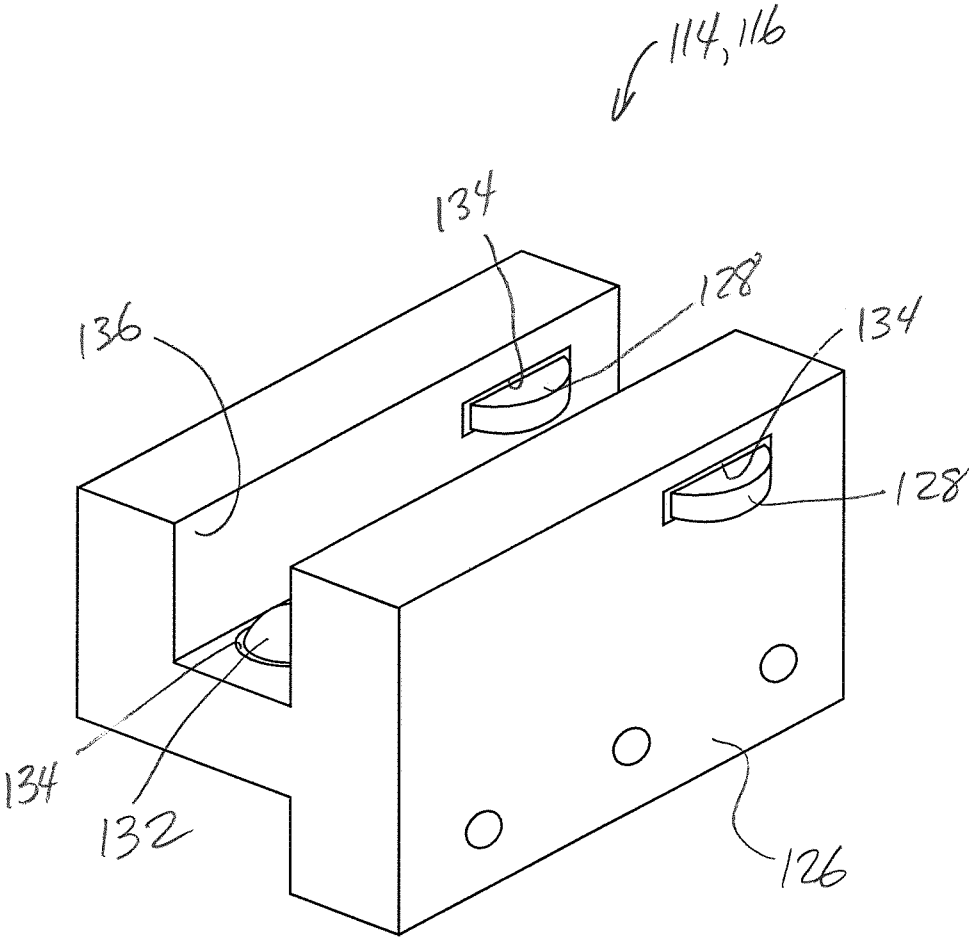

FIG. 12

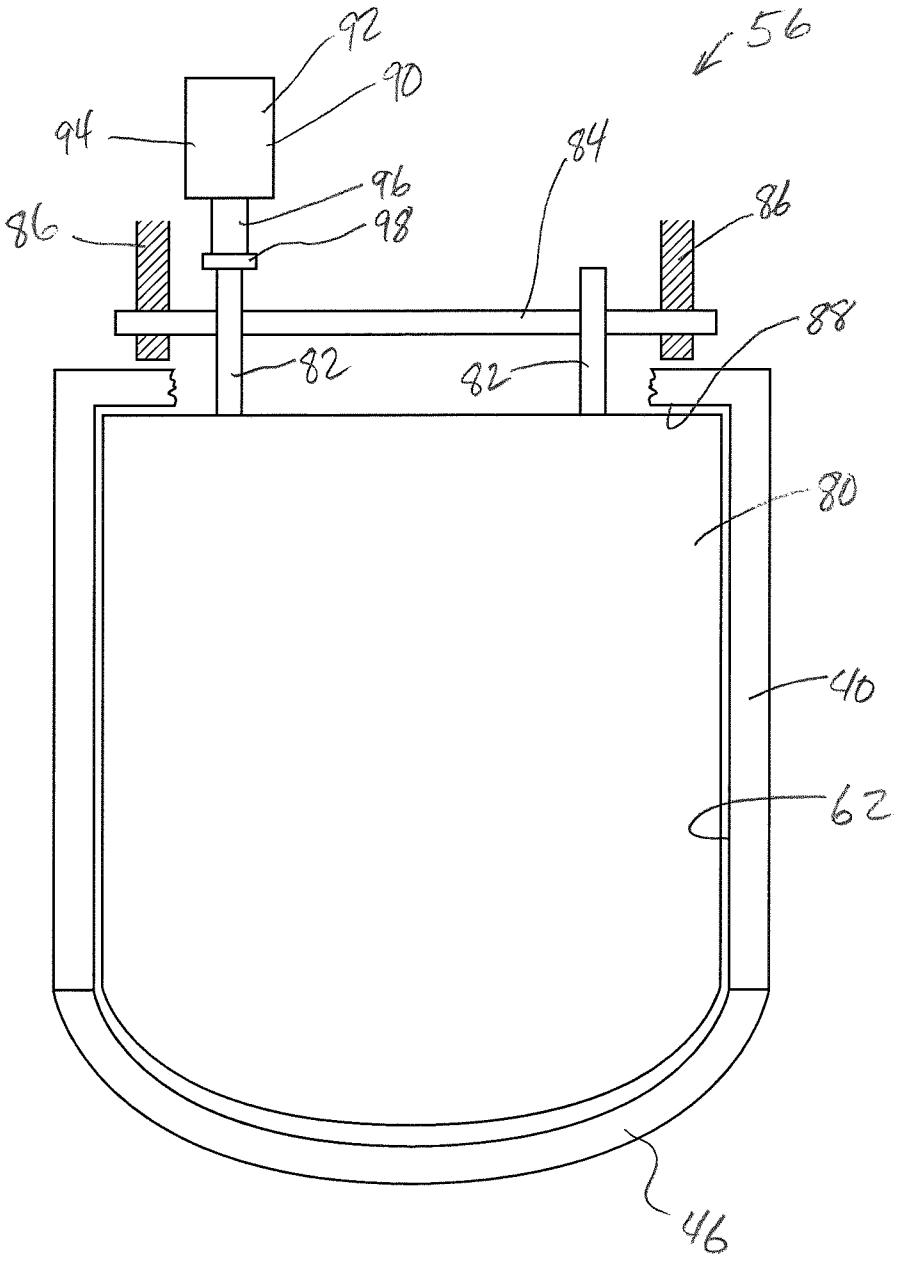

FIG. 13

WATERSLIDE CAPSULE WITH SLIDING DOOR

BACKGROUND

[0001] 1. Field

[0002] The present invention relates generally to amusement rides. More specifically, embodiments of the present invention concern a waterslide system that includes a capsule assembly with a sliding access door.

[0003] 2. Discussion of Prior Art

[0004] Water amusement parks have long included waterslides and other types of water rides. Conventional waterslides have one or more flumes supported by load-bearing framework so that an uppermost section of the flume is spaced one or more stories above the ground. Riders access the waterslide by climbing the stairs that lead to the uppermost section and entering the uppermost flume section. Generally, riders are drawn by gravity from the uppermost section to a lowermost section of the flume.

[0005] Prior art waterslides have a hinged access door that opens and closes to selectively allow a rider to enter the slide. It is also known in the art where the hinged access door is powered by an air piston so that the air piston can be operated to drive the door open and/or closed.

[0006] Conventional waterslides suffer from various deficiencies. For instance, prior art waterslides with multiple flumes require multiple slide operators to attend to the flumes. In particular, operation of each flume generally requires an operator to be stationed at the top of the flume and at the bottom of the flume. While a waterslide operation can have a single operator monitor the top or bottom of multiple flumes, this mode of conventional operation can be problematic because it is difficult to simultaneous monitor multiple flumes and assist riders using multiple flumes.

[0007] Prior art waterslides having a hinged access door are also problematic because such door arrangements are prone to various types of mechanical failure. For instance, hinged doors as known to bind with other components of the slide as the door is swung open and closed. Moreover, the use of hinged access doors generally requires that an attendant be located at the door when a rider is entering the slide.

SUMMARY

[0008] The following brief summary is provided to indicate the nature of the subject matter disclosed herein. While certain aspects of the present invention are described below, the summary is not intended to limit the scope of the present invention.

[0009] Embodiments of the present invention provide a waterslide system that does not suffer from the problems and limitations of the prior art water rides set forth above.

[0010] A first aspect of the present invention concerns a waterslide capsule assembly operable to fluidly communicate with a waterslide flume to contain a rider and release the rider into the flume. The waterslide capsule assembly broadly includes a capsule and a sliding access door. The capsule at least partly defines a capsule chamber to receive the rider, with the capsule presenting opposite capsule ends and extending longitudinally therebetween. The capsule presents a longitudinal entry opening located between the capsule ends, with the entry opening communicating with the chamber to permit chamber ingress and egress by the rider. The capsule presents an exit opening adjacent one of the capsule ends that permits fluid communication between the capsule chamber and the flume when the capsule is operably coupled to the flume. The sliding access door is slidably mounted relative to the capsule and is slidable between a closed position and an open position. The sliding access door substantially spans the entry opening in the closed position to prevent chamber ingress and egress through the entry opening by the rider. The sliding access door exposes the entry opening in the open position to permit chamber ingress and egress through the entry opening by the rider.

[0011] A second aspect of the present invention concerns a method of operating a water ride including a plurality of waterslide flumes and a plurality of waterslide capsules that fluidly communicate with respective waterslide flumes to selectively release riders into the respective waterslide flumes. The method includes the step of holding multiple ones of the riders within respective waterslide capsules so that the multiple riders are restricted from entering the waterslide flumes from the respective waterslide capsules. The method also includes the step of activating the waterslide capsules with a controller to release the multiple riders to permit rider egress from the waterslide capsules to the waterslide flumes, with all of the multiple riders being released before having other riders occupy the waterslide capsules.

[0012] This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the detailed description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter. Other aspects and advantages of the present invention will be apparent from the following detailed description of the embodiments and the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0013] Embodiments of the invention are described in detail below with reference to the attached drawing figures, wherein:

[0014] FIG. **1** is a schematic perspective of a waterslide capsule assembly constructed in accordance with one embodiment of the present invention, with the capsule assembly being provided as part of a waterslide system;

[0015] FIG. **2** is a fragmentary exploded perspective of the waterslide capsule assembly shown in FIG. **1**;

[0016] FIG. **3** is a schematic side elevation of the waterslide capsule assembly shown in FIGS. **1** and **2**, showing the capsule assembly mounted on a deck;

[0017] FIG. **4** is a perspective of the front wall section shown in FIGS. **1** and **3**;

[0018] FIG. **5** is a fragmentary perspective of the waterslide capsule assembly shown in FIGS. **1-3**;

[0019] FIG. **6**A is a fragmentary side elevation of an access door shown in FIGS. **1** and **3**;

[0020] FIG. **6**B is an end elevation of the access door shown in FIG. **6**A;

[0021] FIG. **7** is a fragmentary perspective of the capsule assembly shown in FIGS. **1-6**B;

[0022] FIG. **8**A is a fragmentary schematic cross section of the capsule assembly shown in FIGS. **1-7**, showing the access door in a closed position, with a driven rack being in driving engagement with the drive pinion and one of the driven pinions;

[0023] FIG. **8**B is a fragmentary schematic cross section of the capsule assembly similar to FIG. **8**A, but showing the access door shifted to an open position;

[0024] FIG. **9** is a schematic diagram of the waterslide system shown in FIGS. **1**-**8**B;

[0025] FIG. **10** is an elevation of the user interface shown in FIG. **9**, with the user interface including a plurality of switches and a digital display and input device;

[0026] FIG. **11** is a fragmentary schematic cross section of the waterslide capsule assembly shown in FIGS. **1**-**9**, showing the access door mounted on upper and lower weldments, with tracks fixed to the weldments to engage corresponding upper and lower bearing assemblies;

[0027] FIG. **12** is a schematic perspective of one of the bearing assemblies shown in FIGS. **7** and **11**; and

[0028] FIG. **13** is a fragmentary schematic top view of the waterslide capsule assembly shown in FIGS. **1**-**9**, showing a release door spanning an exit opening of the capsule in a holding position.

[0029] The drawing figures do not limit the present invention to the specific embodiments disclosed and described herein. The drawings are not necessarily to scale, emphasis instead being placed upon clearly depicting features of the illustrated embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0030] Turning initially to FIGS. **1** and **9**, a waterslide system **20** serves as a water amusement ride. The illustrated system **20** includes six (6) flumes **22** that begin from a location elevated well above the ground and end at a location adjacent the ground. However, it is within the scope of the present invention for the waterslide system **20** to include an alternative number of flumes **22**. In the usual manner, the flumes **22** are supported by a load-bearing structure (not shown) that includes a framework of beams and decking **24**. The illustrated system **20** also preferably includes six (6) capsule assemblies **26** associated with corresponding flumes **22**. However, the principles of the present invention are equally applicable where the system **20** has an alternative number of flumes **22** and/or capsule assemblies **26**. While components of the illustrated system **20** are preferably used in connection with a water amusement ride, it is within the ambit of the present invention where such components are utilized with other types of amusement rides. The waterslide system **20** preferably includes the waterslide flumes **22**, capsule assemblies **26**, and a control system **28**.

[0031] Each of the flumes **22** is conventional and extends from an upper flume end **30** to a lower flume end (not shown), where the lower flume end generally delineates the end of the water ride. Each flume **22** includes a tube section **32** that extends from the upper flume end **30** in a generally downward direction to a lower tube end (not shown). Each flume **22** also includes a slide section (not shown) that presents an upper slide end (not shown) attached to and in fluid communication with the lower tube end. The tube section **32** and slide section are dimensioned so that a rider can slide through the flume **22** from the top of the flume **22** to the bottom of the flume **22**.

[0032] While the waterslide system **20** preferably includes the illustrated flumes **22**, it is within the ambit of the present invention where the waterslide system **20** has an alternative flume arrangement. Furthermore, the system **20** could have other ride features, such as a water pool. For instance, the system **20** could be constructed so that riders drop from the capsule assemblies **26** into a ride element other than a flume **22**, such as a water pool.

[0033] Turning to FIGS. **1**-**5** and **9**, each of the illustrated capsule assemblies **26** is operable to hold a rider (not shown) and to selectively release the rider into the corresponding flume **22**. Furthermore, the capsule assembly **26** preferably has an upright orientation so that the rider is released in a generally downward releasing direction D. As will be discussed, the capsule assembly **26** is preferably elongated to present a longitudinal axis A and present opposite upper and lower capsule ends **34**,**36**. While the illustrated capsule is preferably arranged to define upper and lower capsule ends **34**,**36** associated with respective upper and lower extremities of the capsule assembly **26**, it will be appreciated that the capsule could have a different orientation (e.g., where the capsule is more horizontally oriented). The capsule assembly **26** preferably includes an upper front shroud **38**, a lower front shroud **40**, a back shroud **42**, upper and lower back wall sections **44**,**46**, end caps **48**,**50**, front wall section **52**, water sprayer **54**, a door chassis **55**, release door assembly **56**, access door **58**, and an access door drive assembly **60**.

[0034] The lower front shroud **40** and the lower back wall section **46** are secured to one another to cooperatively form a lower capsule section of the capsule assembly **26** that defines an exit opening **62** (see FIG. **13**). The lower capsule section serves as a transition from the upper section of the capsule assembly **26** to the flume **22**. The lower back wall section **46** includes water feeds **64** that are in fluid communication with a water supply system (not shown) and serve to inject water below the release door assembly **56**.

[0035] The upper back wall section **44** is unitary and presents a curved rider support surface **66**. The back wall sections **44**,**46** are preferably attached end-to-end to cooperatively form a continuous slide structure. The water sprayer **54** includes a water spray nozzle (not shown) and a flow meter (not shown) that senses the amount of water flow to the water spray nozzle. The water spray nozzle is located within the capsule adjacent the upper capsule end **34**. The water spray nozzle is positioned to direct a continuous water spray across the width of the rider support surface **66** so that the water spray substantially covers the rider support surface **66**.

[0036] The front wall section **52** preferably includes a transparent acrylic panel **68** and a frame **70** attached to the panel **68** (see FIG. **4**). The panel **68** preferably presents a substantially continuous thickness of about one-half (½) inch, but could present an alternative thickness. While the panel **68** preferably includes a transparent acrylic material, the panel **68** could include other materials without departing from the scope of the present invention. For instance, the panel **68** could include a translucent material that is not clear (e.g., where the material has a colored tint). Yet further, the material of the panel **68** could be opaque. The frame **70** includes three (3) angle sections that extend along three corresponding edges of the panel **68**.

[0037] The upper front shroud **38**, lower front shroud **40**, back shroud **42**, and the upper and lower back wall sections **44**,**46** are each preferably formed of a fiberglass material and also include steel reinforcement sections. However, these components could include alternative materials without departing from the scope of the present invention.

[0038] The end caps **48**,**50** are conventional, with each end cap **48**,**50** preferably including a transparent window (not shown), e.g., to permit a rider to look through the end caps **48**,**50**.

[0039] Again, the illustrated capsule is preferably elongated to receive a rider. The back and front wall sections **44**,**46**,**52**, end cap **50**, release door assembly **56**, and access door **58** cooperatively define a capsule chamber **72** that extends longitudinally between the capsule ends **34**,**36** (see FIGS. **1** and **3**). As will be discussed, each capsule chamber **72** serves to hold a rider until the rider is selectively released into the flume **22**. The capsule also preferably defines an elongated entry opening **74** that extends longitudinally between the capsule ends **34**,**36** and communicates with the capsule chamber **72** (see FIGS. **1** and **3**). The entry opening **74** preferably permits rider ingress and egress relative to the capsule chamber **72**.

[0040] The door chassis **55** is attached relative to and supports the back shroud **42** and the upper back wall section **44** above the deck **24** (see FIGS. **1**-**3** and **5**). The back shroud **42** is generally mounted behind the door chassis **55** and the upper back wall section **44** is generally mounted in front of the door chassis **55**. The door chassis **55** also supports components of the access door drive assembly **60**, as will be discussed (see FIG. **5**).

[0041] The upper front shroud **38** is mounted above the lower front shroud **40** and presents an upper surface **76** to support the rider as the rider prepares to enter the capsule. The upper front shroud **38** preferably includes a load sensor **78** configured to sense the rider's weight, with the weight generally being sensed prior to the rider entering the capsule (see FIG. **9**).

[0042] Turning to FIG. **13**, the release door assembly **56** includes a release door **80**, frame members **82** attached to the release door **80**, and a rod **84** attached to the frame members **82**. The rod **84** is pivotally mounted on supports **86** fixed relative to the lower front shroud **40** so that the release door **80** can pivot between a holding position (see FIG. **13**), where the release door **80** substantially spans the exit opening **62**, and a releasing position (not shown), where the release door is pivoted downwardly to expose the exit opening **62**. In the releasing position, the release door **80** preferably extends along and substantially parallel to the flat wall section **88** of the lower front shroud **40** (see FIG. **2**). The release door **80** preferably includes a fiberglass door body and a transparent acrylic window section (not shown), e.g., so that the rider can look through the release door **80**.

[0043] The release door assembly **56** also preferably includes a release door drive **90** including a pneumatic power cylinder **92**, with a body **94** and a reciprocating piston **96**, and a pneumatic system (not shown) to provide pressurized air to the power cylinder **92**. The exposed end of the piston **96** is attached to one of the frame members **82** at a pivot joint **98** so that reciprocating movement of the piston **96** causes corresponding rotation of the release door **80** between the holding position and the releasing position.

[0044] Turning to FIGS. **6**A-**8**B, **11**, and **12**, the access door **58** serves to selectively permit rider ingress and egress relative to the capsule chamber **72**. The illustrated access door **58** is preferably slidable between an open position (see FIG. **8**B) and a closed position (see FIG. **8**A). In the closed position, the access door **58** substantially spans the entry opening **74** to prevent chamber ingress and egress through the entry opening **74** by the rider. In the open position, the access door **58** exposes the entry opening **74** to permit chamber ingress and egress through the entry opening **74** by the rider.

[0045] To support the access door **58**, the capsule assembly **26** also includes upper and lower semicircular weldments **100**,**102** (see FIGS. **1** and **11**). The illustrated lower weldment **102** is attached relative to the door chassis **55** and the upper front shroud **38** and extends along a curved edge **104** of the upper front shroud **38**. The upper weldment **100** is attached relative to the door chassis **55** (see FIG. **1**). The capsule assembly **26** further includes a pair of semicircular tracks **106** fixed to corresponding weldments **100**,**102** (see FIG. **11**).

[0046] The illustrated access door **58** preferably includes a door panel **108**, an exterior handle **110**, a backing plate **112**, upper door bearing assemblies **114**, and lower door bearing assemblies **116**. The door panel **108** preferably comprises a unitary curved sheet of transparent acrylic that presents a substantially continuous thickness (see FIGS. **6**A and **6**B). The panel **108** preferably has a thickness of about one-half (½) inch, but could present an alternative thickness. In this manner, the door panel **108** permits a waterslide rider (or another person) to look through the access door **58**. However, the door panel **108** could include alternative materials without departing from the scope of the present invention. For instance, the door panel **108** could include a translucent material that is not clear (e.g., where the material has a colored tint). Yet further, the material of the door panel **108** could be opaque.

[0047] The door panel **108** presents a plurality of holes spaced along upper and lower door ends **118**,**120** of the access door **58** (e.g., to attach corresponding bearing assemblies **114**,**116** thereto). The door panel **108** also presents holes between the ends **118**,**120** to secure the backing plate **112** and handle **110** on opposite sides of the door panel **108**.

[0048] The illustrated door panel **108** extends along a longitudinal door axis S and preferably curves about the door axis S. More preferably, the door panel **108** defines a radius of curvature R that is substantially continuous from one door side edge **122** to the other door side edge **124**. However, while the illustrated door panel **108** is preferably curved, the door panel **108** could have an alternative shape without departing from the scope of the present invention. For instance, the door panel **108** could be substantially planar. The side edges **122**, **124** cooperatively define an angle α that preferably ranges from about ninety (90) degrees to about one hundred (100) degrees and, more preferably, is about ninety-five (95) degrees.

[0049] Turning to FIGS. **11** and **12**, the access door **58** preferably has a pair of the upper bearing assemblies **114** attached along the upper door end **118** and a pair of lower bearing assemblies **116** attached along the lower door end **120** so that the access door **58** is preferably slidably supported on the weldments **100**,**102**, with the access door **58** generally operating as a pocket door. In the illustrated embodiment, each bearing assembly **114**,**116** preferably includes a housing **126**, a pair of lateral rollers **128** supported by pins **130**, and a vertical roller **132** supported by pin **130**. The illustrated housing **126** presents slotted openings **134** that receive the rollers **128**,**132** and permit rotating movement by the rollers **128**,**132** about the corresponding pins **130**.

[0050] Preferably, the housing **126** also presents a longitudinal groove **136**, with the lateral rollers **128** being located on opposite sides of the groove **136**. The illustrated rollers **128** preferably project into the groove **136** to engage the track **106**, as will be discussed. For some aspects of the present inven-

tion, the bearing assemblies **114**,**116** could provide an alternative roller arrangement for supporting the access door **58**.

[0051] When attached to the door panel **108**, the housings **126** of the lower bearing assemblies **116** are preferably arranged so that the respective grooves **136** face in a generally downward direction. Also, the housings **126** of the upper bearing assemblies **114** are preferably arranged so that the respective grooves **136** face in a generally upward direction. When the access door **58** is mounted on the weldments **100**, **102**, the grooves **136** of each housing **126** slidably receive a corresponding one of the tracks **106**. Additionally, the rollers **128**,**132** of the bearing assembly **114**,**116** engage the respective track **106**, with the lateral rollers **128** engaging respective side track surfaces **138** and the vertical roller **132** engaging a track edge **140**.

[0052] Thus, as the access door **58** slides between the open and closed positions, the rollers **128**,**132** preferably rotate so that the access door **58** slides smoothly in a circumferential direction along the tracks **106**. The bearing assemblies **114**, **116** and tracks **106** cooperatively restrict longitudinal movement of the access door **58**. In particular, the vertical rollers **132** and tracks **106** cooperatively engage one another to restrict such longitudinal movement. The bearing assemblies **114**,**116** and tracks **106** also cooperatively restrict movement of the access door **58** along a radial direction. In particular, the lateral rollers **128** and tracks **106** cooperatively engage one another to restrict radially inner and outer movement of the access door **58**.

[0053] The capsule assembly **26** also preferably includes semicircular trim pieces **142** attached to the weldments **100**, **102** (see FIGS. **7** and **11**). The trim pieces **142** serve to cover and restrict access to the bearing assemblies **114**,**116** and tracks **106** from outside the capsule.

[0054] While the illustrated access door **58** preferably slides in the circumferential direction, it is within the scope of the present invention where the access door **58** slides in an alternative direction. For instance, the access door **58** could also be constructed to slide in the longitudinal direction. Also, if the access door **58** has a substantially planar shape, the access door **58** could be mounted to slide in a generally horizontal direction parallel to a plane of the access door **58**.

[0055] The illustrated bearing assemblies **114**,**116** and tracks **106** are preferred to provide sliding movement of the access door **58**. It has been found that the illustrated arrangement of rollers and tracks provides secure and robust support for the access door **58** while permitting smooth sliding movement of the access door **58**, and while restricting the access door **58** from binding with the tracks **106**, the weldments **100**,**102**, and/or other capsule structure. This structure is particularly effective for the illustrated door arrangement because the longitudinal door axis A is angled from the vertical direction, which results in variable loading on the bearing assemblies **114**,**116** and tracks **106** as the access door **58** shifts between the open and closed positions. However, the bearing assemblies **114**,**116** and/or tracks **106** could be alternatively configured to support the access door **58** without departing from the scope of the present invention. Also, for some aspects of the present invention, the access door **58** could be alternatively shiftably mounted relative to upper and lower capsule weldments **100**,**102** to be selectively shifted between the open and closed positions.

[0056] The capsule assembly **26** also preferably includes a bump sensor (not shown). The bump sensor comprises a motion sensor that senses abrupt slowing and/or stopping movement of the access door **58** when the access door **58** is sliding toward the closed position. It will be appreciated that various motion sensors, such as an accelerometer, velocity sensor, proximity sensor, etc., could be employed to sense slowing and/or stopping of the access door **58**. As will be discussed, the bump sensor operates to sense if the access door **58** is being restricted from closing by an interfering element, e.g., when part of the rider is positioned in the entry opening **74**. The bump sensor is operably coupled to the control system **28** so that when the bump sensor senses interference with closing of the access door **58** the control system **28** stops closing movement of the access door **58** and opens the access door **48**.

[0057] Turning to FIGS. **5**, **7**, **8**A, and **8**B, the access door drive assembly **60** is preferably operable to power the access door **58** between the open and closed positions. Furthermore, the access door drive assembly **60** is preferably operably coupled to the control system **28** so that the access door drive assemblies **60** of each capsule are centrally controlled by the control system **28**.

[0058] The access door drive assembly **60** preferably includes an electric servo motor **144**, a coupling **146**, drive pinion **148**, upper and lower driven racks **150**,**152**, a drive shaft **154**, and upper and lower driven pinions **156**,**158** mounted on the drive shaft **154**.

[0059] The servo motor **144** is conventional and is mounted with the coupling **146** and drive pinion **148** on the door chassis **55**. While the servo motor **144** is preferred, it is within the scope of the present invention where an alternative motor is employed to power the access door **58**.

[0060] Preferably, the lower driven rack **152** includes a unitary curved plate that is elongated and presents opposite toothed gear surfaces **160**. One end of the lower driven rack **152** is fixed to the access door **58** so as to extend along the circumferential direction. When mounted on the access door **58**, the lower driven rack **152** extends circumferentially to drivingly engage the drive pinion **148** and the lower driven pinion **158**. As a result, rotation of the drive pinion **148** by the servo motor **144** results in corresponding movement of the lower driven rack **152** and the access door **58** in the circumferential direction. Movement of the lower driven rack **152** also causes rotation of the lower driven pinion **158**.

[0061] Again, the driven pinions **156**,**158** are preferably mounted on the drive shaft **154**, which is rotatably mounted on the door chassis **55** (see FIG. **5**). Thus, movement of the lower driven rack **152** causes rotation of the drive shaft **154** and both of the driven pinions **156**,**158**.

[0062] The upper driven rack **150** includes a unitary curved plate that is elongated and presents a radially inner toothed gear surface **160** (see FIG. **7**). One end of the upper driven rack **150** is also fixed to the access door **58** so as to extend along the circumferential direction. When mounted on the access door **58**, the upper driven rack **150** extends circumferentially to drivingly engage the upper driven pinion **156** (see FIG. **5**). Consequently, rotation of the drive pinion **148** by the servo motor **144** causes circumferential movement of the lower driven rack **152**, which causes rotation of the drive shaft **154** and driven pinions **156**,**158**, which in turn causes circumferential movement of the upper driven rack **150** and the access door **58**. In other words, because the driven racks **150**,**152** are both attached to the access door **58** and drivingly engage driven pinions **156**,**158** mounted on the drive shaft **154**, rotation of the drive pinion **148** by the motor **144** causes

the driven racks **150**,**152** to move at generally the same time and speed and to cooperatively slide the access door **58** along the circumferential direction.

[0063] It has been found that the illustrated drive mechanism provides smooth sliding movement of the access door **58** while restricting the access door **58** from binding with the tracks **106**, weldments **100**,**102**, and/or other capsule components. This structure has also been found to be particularly effective for the illustrated door arrangement because the longitudinal axis A of the capsule, and the door axis S, are angled relative the vertical direction. While the illustrated drive mechanism is preferred, it is within the ambit of the present invention to power the access door **58** with an alternative drive mechanism. For instance, the drive could include a pair of servo motors with respective drive pinions, with each drive pinion being powered by the respective motor to drive a corresponding one of the driven racks **150**,**152**.

[0064] Also, the principles of the present invention are applicable where the access door drive assembly **60** includes alternative transmission components to transmit rotary power and/or linear power between the motor **144** and the access door **58**. For instance, a belt-and-pulley system or a chain-and-sprocket system could be used to transmit power from the motor **144** to the drive shaft **154**. While the access door **58** is preferably powered by the access door drive assembly **60**, for some aspects of the present invention, the access door **58** could be manually powered (i.e., manually shiftable between the open and closed positions).

[0065] Turning to FIGS. **9** and **10**, the control system **28** is preferably operably coupled to all of the capsule assemblies **26** so that all of the capsule assemblies **26** are centrally controlled by a single ride operator. The control system **28** preferably includes a controller **162** and a user interface **164** operably coupled to one another. The controller **162** is preferably conventional and includes a processor (not shown) and a memory element (not shown) operably coupled to one another. The processor receives command signals from switches and from a digital display and input device D**1** of the user interface. Preferably, the processor is also operably coupled to the motor **144**, weight sensor **78**, intercom **165**, and door lock of each capsule.

[0066] The processor may include microprocessors, microcontrollers, digital signal processors (DSPs), field-programmable gate arrays (FPGAs), analog and/or digital application-specific integrated circuits (ASICs), and the like, or combinations thereof. The processor may generally execute, process, or run instructions, code, software, firmware, programs, applications, apps, or the like, or may step through states of a finite-state machine.

[0067] The memory element may include data storage components such as read-only memory (ROM), random-access memory (RAM), hard-disk drives, optical disk drives, flash memory drives, and the like, or combinations thereof. The memory element may include, or may constitute, a "computer-readable medium". The memory element may store the instructions, code, software, firmware, programs, applications, apps, or the like that are executed by the processor. The memory element may also store settings or data.

[0068] The illustrated control system **28** may also be operably coupled to a communications network (not shown) that may be wired or wireless and may include servers, routers, switches, wireless receivers and transmitters, and the like, as well as electrically conductive cables or optical cables. The network may also include local, metro, or wide area networks, as well as the Internet, or other cloud networks. Furthermore, the communications network may include cellular or mobile phone networks, as well as landline phone networks, public switched telephone networks, fiber optic networks, or the like.

[0069] Each of the capsule assemblies **26** also preferably includes the intercom **165** mounted within the capsule chamber **72** and operably coupled to one another and to the controller **162**. The intercoms **165** permit multiple riders located within respective chambers **72** to communicate with one another and with the ride operator. The illustrated intercoms **165** permit audio communication between the riders and the operator. But the intercoms **165** could also provide video communication between the riders and operator. For instance, each capsule chamber **72** could be associated with a corresponding video camera (e.g., to take video of the respective rider) and a corresponding video screen for the respective rider to view video (e.g., video of one or more other riders, the operator, and/or a prerecorded video presentation). Similarly, the control system **28** could be associated with a corresponding video camera (e.g., to take video of the operator) and a corresponding video screen for the operator to view (e.g., video of one or more riders and/or a prerecorded video presentation).

[0070] The motor **144**, intercom **165**, weight sensor **78**, and/or door lock may be connected to the controller via the network. Also, the motor **144**, intercom **165**, weight sensor **78**, and/or door lock may be connected to the network via the controller **162** or via another computing device.

[0071] The controller **162** is operably coupled to the motor **144** to selectively drive the motor **144** in either of opposite motor directions and thereby slide the access door **58** from the open position to the closed positions, and vice versa. The controller **162** can be used to open or close the access door **58** by entering a door open command or door close command at the interface **164**. However, as will be discussed, the controller **162** can independently and automatically open or close the door **58** as part of one of the operation programs described below.

[0072] The controller **162** is operably coupled to the weight sensor **78** to sense the weight of the rider when the rider is standing on the upper front shroud **38**. The controller **162** can then store the sensed weight in memory and compare the sensed weight of the rider to a predetermined weight range associated with a range of rider weights that can be suitably accommodated by the waterslide system **20**. Preferably, the range of rider weights is programmed into the controller **162**. For instance, the programmed range of rider weights preferably is from about fifty (50) pounds to about three hundred (300) pounds, although an alternative range could be used.

[0073] The controller **162** also preferably includes a release program to compare the sensed weights of multiple riders held in corresponding ones of the capsules at the same time. If the controller **162** is operated to initiate a simultaneous release of the held riders, the release program uses the sensed weights to determine a release door delay to delay the opening of release door **80** associated with held riders that have a relatively large sensed weight. In this manner, the controller **162** can delay the opening of one or more release doors **80** so that a relatively heavier rider drops at about the same time as a relatively lighter rider.

[0074] The capsule assembly **26** preferably includes a door lock **166** to selectively lock the access door **58** in the closed position (see FIGS. **8**A, **8**B, and **9**). The door lock **166** pref-

erably includes a pneumatically-powered locking mechanism that engages a latch plate (not shown) attached to the backing plate **112** of the access door **58**. The door lock **166** preferably includes a pneumatic cylinder (not shown) with a cylinder body and a piston. The exposed end of the piston is connected to a latch (not shown), with the piston being shiftable between a locked position and an unlocked position. The door lock **166** is preferably provided as a normally-locked device. Thus, when no pneumatic power is applied to the cylinder, the piston is in a locked position so that the latch engages the latch plate to lock the door closed. Application of pneumatic power to the cylinder serves to shift the piston to the unlocked position to permit opening and closing of the access door.

[0075] The door lock **166** is preferably pneumatically coupled to a pneumatic system (not shown) that can provide pressurized air to the cylinder. However, the door lock **166** could be alternatively powered. For instance, an electromagnetic lock could be employed to remotely lock and unlock the door. Also, the door lock **166** could be a mechanically-actuated lock, such as a tongue lock arrangement. The controller is operably coupled to the pneumatic system to selectively pressurize the cylinder (to unlock the door) or to selectively depressurize the cylinder (to lock the door).

[0076] Again, the release door drive **90** preferably includes the power cylinder **92**, with the piston **96** being drivingly attached to one of the frame members **82**. The power cylinder **92** is preferably provided so that the release door **80** is normally closed. Thus, when no pneumatic power is applied to the cylinder **92**, the release door **80** is shifted into the holding position to restrict rider egress. Application of pneumatic power to the cylinder **92** serves to shift the piston **96** so that the release door **80** is shifted to the releasing position (i.e., where the release door is opened).

[0077] The release door drive **90** is preferably pneumatically coupled to the release pneumatic system (not shown) that can provide pressurized air to the cylinder **92**. The controller **162** is operably coupled to the release pneumatic system to selectively pressurize the power cylinder (to open the release door) or to selectively depressurize the cylinder (to close the release door).

[0078] The controller **162** is also preferably operably coupled to the water sprayer **54**. In particular, the controller **162** is operably coupled to the flow meter to monitor the sensed amount of water flow to the water spray nozzle. If the controller **162** determines that the sensed amount of water flow falls below a predetermined minimum amount of water flow, the controller **162** automatically turns off the corresponding capsule assembly **26** so that the release door **80** is prevented from being shifted out of the holding position.

[0079] The user interface **164** preferably includes a plurality of switches **168** and the digital display and input device D**1**, all of which are operably coupled to the controller **162**.

[0080] When the waterslide system is initially turned on by activating an "Operator Enable" switch **168***a*, the controller **162** preferably operates to close the release door **80** by depressurizing the power cylinder **92**. The controller **162** also operates to close and lock the access door **58** by first actuating the servo motor **144** to shift the access door **58** closed and then by depressurizing the door lock **166**. The waterslide system **20** also performs these steps when a system reset switch **168***b* is depressed by the operator.

[0081] When the waterslide system **20** is turned on or reset, the system **20** can accept one or more riders adjacent to corresponding capsules. When one or more riders stand on respective upper front shrouds **38**, the controller **162** senses the corresponding sensed weight and determines if the weight is within the predetermined weight range. If so, the controller **162** is programmed to automatically unlock and open the access door **58** to permit the rider to step onto the release door **80** and occupy the capsule chamber **72**. If not, the controller **162** is preferably programmed to activate visual indicia at the user interface **164**, e.g., by illuminating a warning light associated with the corresponding capsule.

[0082] The release door assembly **56** preferably includes a weight sensor (not shown) coupled to the release door **80** to sense the weight of the rider on the release door **80**. When the rider weight is sensed on the release door **80**, the controller **162** automatically closes and locks the access door **58** to restrict the rider from stepping out of the capsule.

[0083] As described above, capsule assembly **26** includes the bump sensor to sense interference with closing of the access door **58**. Again, the bump sensor operates to sense if the access door **58** is being restricted from closing by an interfering element, e.g., when part of the rider is positioned in the entry opening **74**. The bump sensor is operably coupled to the controller **162** so that the controller **162** can detect when the bump sensor senses an interference. Preferably, the controller **162** is programmed to have automated stop function where, in response to a sensed interference, the controller **162** reverses the motor **144** and thereby opens the access door **58**. In this manner, the controller **162** can automatically stop closing of the access door **58** if part of a rider is located within the entry opening. It will also be appreciated that the controller **162** and bump sensor could be used to halt opening of the access door **58** if the bump sensor senses a door opening interference. Also, for some aspects of the present invention, the illustrated system **20** can be operated by manually opening and closing the access door **58**.

[0084] During a release event, the illustrated controller **162** is preferably programmed to provide different rider release sequences when multiple riders are being released from corresponding capsules. The controller **162** preferably includes switches **168***c*,**168***d*,**168***e* for the operator to depress and thereby initiate corresponding sequences.

[0085] In a first sequence, referred to as simultaneous release, the controller **162** actuates the capsules to release the riders at substantially the same time. That is, the riders could be released simultaneously or nearly simultaneously with one another. The first sequence is activated when the operator depresses switch **168***c*.

[0086] In a second sequence, referred to as series release, the controller **162** actuates the capsules to release the riders one after another in a predetermined order so that no two of the capsules release riders at the same time. The second sequence is activated when the operator depresses switch **168***d*.

[0087] In a third sequence, referred to as random release, the controller **162** actuates the capsules to release the riders in series with one another, but in a random order. The third sequence is activated when the operator depresses switch **168***e*.

[0088] In a fourth sequence, referred to as expedited release, the controller **162** actuates the capsules to release the riders as quickly as possible and in a substantially simultaneous manner.

[0089] Once all of the riders have been released as part of the release event, the controller **162** preferably will automatically reset the capsules to return the release doors **80** to the

holding position. If necessary, the controller **162** will also return the access doors **58** to the closed position and lock the access doors **58**.

[0090] The forms of the invention described above are to be used as illustration only, and should not be utilized in a limiting sense in interpreting the scope of the present invention. Obvious modifications to the embodiments, as hereinabove set forth, could be readily made by those skilled in the art without departing from the spirit of the present invention.

[0091] The inventor hereby states his intent to rely on the Doctrine of Equivalents to determine and assess the reasonably fair scope of the present invention as pertains to any apparatus not materially departing from but outside the literal scope of the invention as set forth in the following claims.

What is claimed is:

1. A waterslide capsule assembly operable to fluidly communicate with a waterslide flume to contain a rider and release the rider into the flume, said waterslide capsule assembly comprising:

a capsule that at least partly defines a capsule chamber to receive the rider, with the capsule presenting opposite capsule ends and extending longitudinally therebetween,

said capsule presenting a longitudinal entry opening located between the capsule ends, with the entry opening communicating with the chamber to permit chamber ingress and egress by the rider,

said capsule presenting an exit opening adjacent one of the ends that permits fluid communication between the capsule chamber and the flume when the capsule is operably coupled to the flume; and

a sliding access door slidably mounted relative to the capsule and slidable between a closed position and an open position,

said sliding access door substantially spanning the entry opening in the closed position to prevent chamber ingress and egress through the entry opening by the rider,

said sliding access door exposing the entry opening in the open position to permit chamber ingress and egress through the entry opening by the rider.

2. The waterslide capsule assembly as claimed in claim **1**; and

an access door drive assembly including a powered motor and a door drive,

said door drive attached to the access door and the motor to transmit power from the motor to the access door, with the access door drive assembly operable to slide the access door between the open and closed positions.

3. The waterslide capsule assembly as claimed in claim **2**,

said door drive comprising a rack-and-pinion drive including a driven rack attached to the access door and a drive pinion attached to and powered by the motor.

4. The waterslide capsule assembly as claimed in claim **3**,

said rack-and-pinion drive including a pair of driven pinions drivingly connected to one another and spaced longitudinally from one another,

said driven pinions rotatably mounted relative to and spaced from the drive pinion, with the driven rack drivingly engaging one of the driven pinions so that shifting of the driven rack rotates the pair of driven pinions,

said rack-and-pinion drive including another driven rack spaced from the first-mentioned driven rack,

said another driven rack attached to the access door and drivingly engaged with another one of the pair of driven pinions so that shifting of the first-mentioned driven rack causes shifting of the another driven rack.

5. The waterslide capsule assembly as claimed in claim **4**,

said access door presenting opposite door ends adjacent to corresponding capsule ends,

said driven racks being located adjacent to respective ones of the door ends.

6. The waterslide capsule assembly as claimed in claim **4**,

said driven pinions being mounted on a common drive shaft so as to spin with the drive shaft.

7. The waterslide capsule assembly as claimed in claim **2**,

said access door presenting opposite door ends adjacent to corresponding capsule ends,

said access door drive including upper and lower drive elements attached to the access door adjacent to respective door ends, with at least one of the drive elements being driven by the powered motor.

8. The waterslide capsule assembly as claimed in claim **7**,

both of said drive elements being driven by the powered motor, with the motor being the sole motor to power the drive elements.

9. The waterslide capsule assembly as claimed in claim **1**,

said access door presenting opposite door ends adjacent to corresponding capsule ends,

said access door including opposite roller assemblies attached adjacent respective door ends,

said capsule including opposite door tracks to support the access door while permitting sliding door movement,

said roller assemblies engaging the respective door tracks to permit sliding movement of the access door while restricting movement of the access door along the longitudinal direction.

10. The waterslide capsule assembly as claimed in claim **9**,

said roller assemblies each including a pair of roller assemblies spaced laterally from one another.

11. The waterslide capsule assembly as claimed in claim **9**,

said access door being curved about the longitudinal direction to present a continuous access door radius,

said roller assemblies engaging the respective door tracks to restrict movement of access door along a radial direction defined by the access door.

12. The waterslide capsule assembly as claimed in claim **11**,

each of said roller assemblies including a carrier and a plurality of rollers rotatably mounted on the carrier and in rolling engagement with the respective door tracks,

a first one of said rollers presenting a roller axis substantially parallel to the radial direction so that the first roller engages the respective door track to restrict access door movement along the longitudinal direction,

a second one of said rollers presenting another roller axis substantially parallel to the longitudinal direction so that the second roller engages the respective door track to restrict access door movement along the radial direction.

13. The waterslide capsule assembly as claimed in claim **1**,

said capsule presenting a longitudinal capsule axis,

said capsule including a rounded back wall presenting a rider support surface that extends longitudinally between the capsule ends and curves about the longitudinal capsule axis.

14. The waterslide capsule assembly as claimed in claim **13**; and

a water sprayer that communicates with the capsule chamber adjacent one of the capsule ends and injects a water mist onto the rider support surface.

15. The waterslide capsule assembly as claimed in claim **1**; and

a release door pivotally mounted relative to the capsule and pivotal between a supporting position and a releasing position,

said release door exposing the exit opening in the releasing position to permit rider egress from the capsule chamber into the flume.

16. The waterslide capsule assembly as claimed in claim **15**,

said sliding entry door substantially spanning the entry opening in the supporting position to prevent rider egress from the capsule chamber into the flume.

17. The waterslide capsule assembly as claimed in claim **1**,

said access door including a door panel formed of a translucent material.

18. A method of operating a water ride including a plurality of waterslide flumes and a plurality of waterslide capsules that fluidly communicate with respective waterslide flumes to selectively release riders into the respective waterslide flumes, said method comprising the steps of:

(a) holding multiple ones of the riders within respective waterslide capsules so that the multiple riders are restricted from entering the waterslide flumes from the respective waterslide capsules; and

(b) activating the waterslide capsules with a controller to release the multiple riders to permit rider egress from the waterslide capsules to the waterslide flumes, with all of the multiple riders being released before having other riders occupy the waterslide capsules.

19. The method as claimed in claim **18**,

step (b) including the step of activating the waterslide capsules to release the multiple riders simultaneously.

20. The method as claimed in claim **18**,

step (b) including the step of activating the waterslide capsules to release the multiple riders in series such that no two of the multiple riders are released at the same time.

21. The method as claimed in claim **20**,

step (b) including the step of activating the waterslide capsules to release the multiple riders in a random order.

22. The method as claimed in claim **18**,

step (b) including the step of opening a release door associated with each of the waterslide capsules from a closed door position where the release doors prevent the multiple riders from entering the waterslide flumes from the waterslide capsules.

23. The method as claimed in claim **22**,

step (b) including the step of having the multiple riders automatically drop from the waterslide capsule to the waterslide flume upon opening of the release door.

24. The method as claimed in claim **22**; and

(c) returning the release door to the closed door position after the multiple riders have exited the respective waterslide capsules, with all of the release doors being returned to the closed door positions before having other riders occupy the waterslide capsules.

25. The method as claimed in claim **24**; and

(d) opening an access door associated with each of the waterslide capsules to permit capsule ingress by the multiple ones of the other riders.

26. The method as claimed in claim **18**,

step (b) including the step of activating the waterslide capsules with a single controller that operably communicates with all of the waterslide capsules.

27. The method as claimed in claim **18**; and

(c) opening an access door associated with each of the waterslide capsules to permit capsule ingress by the multiple riders, with step (c) occurring before step (a).

28. The method as claimed in claim **27**,

step (a) including the step of closing the access door while the multiple riders occupy respective waterslide capsules and the step of restricting the multiple riders from opening the access door.

29. The method as claimed in claim **28**,

said restricting step including the step of locking the access door closed.

30. The method as claimed in claim **27**;

(d) sensing the weight of each of the multiple riders with the controller; and

(e) determining if the sensed weights fall within an accepted weight range using the controller, with step (c) being performed for the access door associated with each of the multiple riders who has a corresponding weight that falls within the weight range.

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