Dec. 17, 1963 J. W. FOWLER ETAL 3,114,333

SUBMARINE AMUSEMENT RIDE

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Fig. 1.

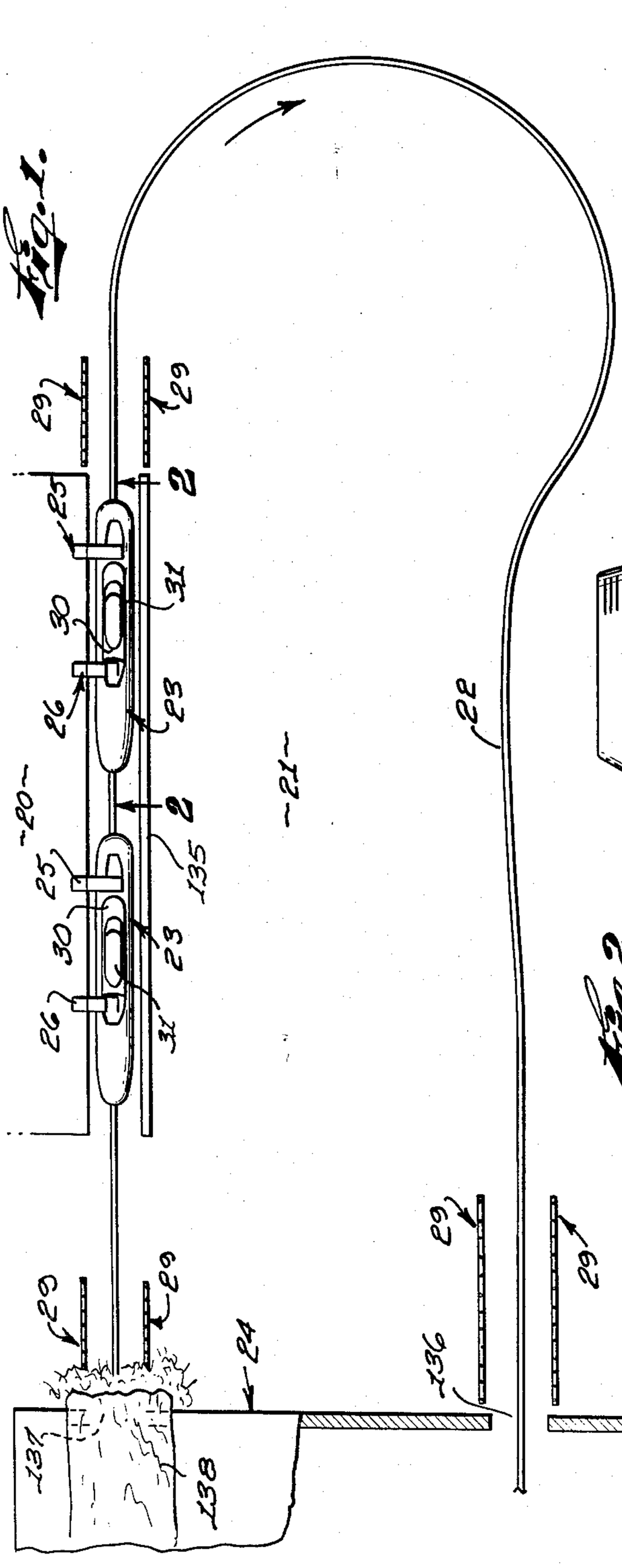


Fig. 2.

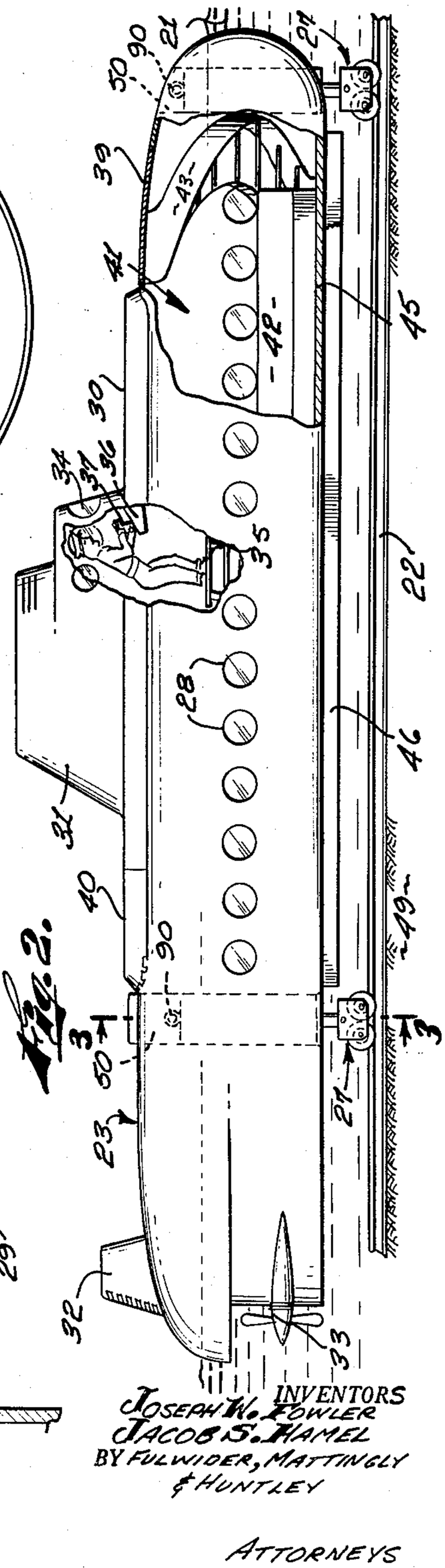


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Fig. 3.

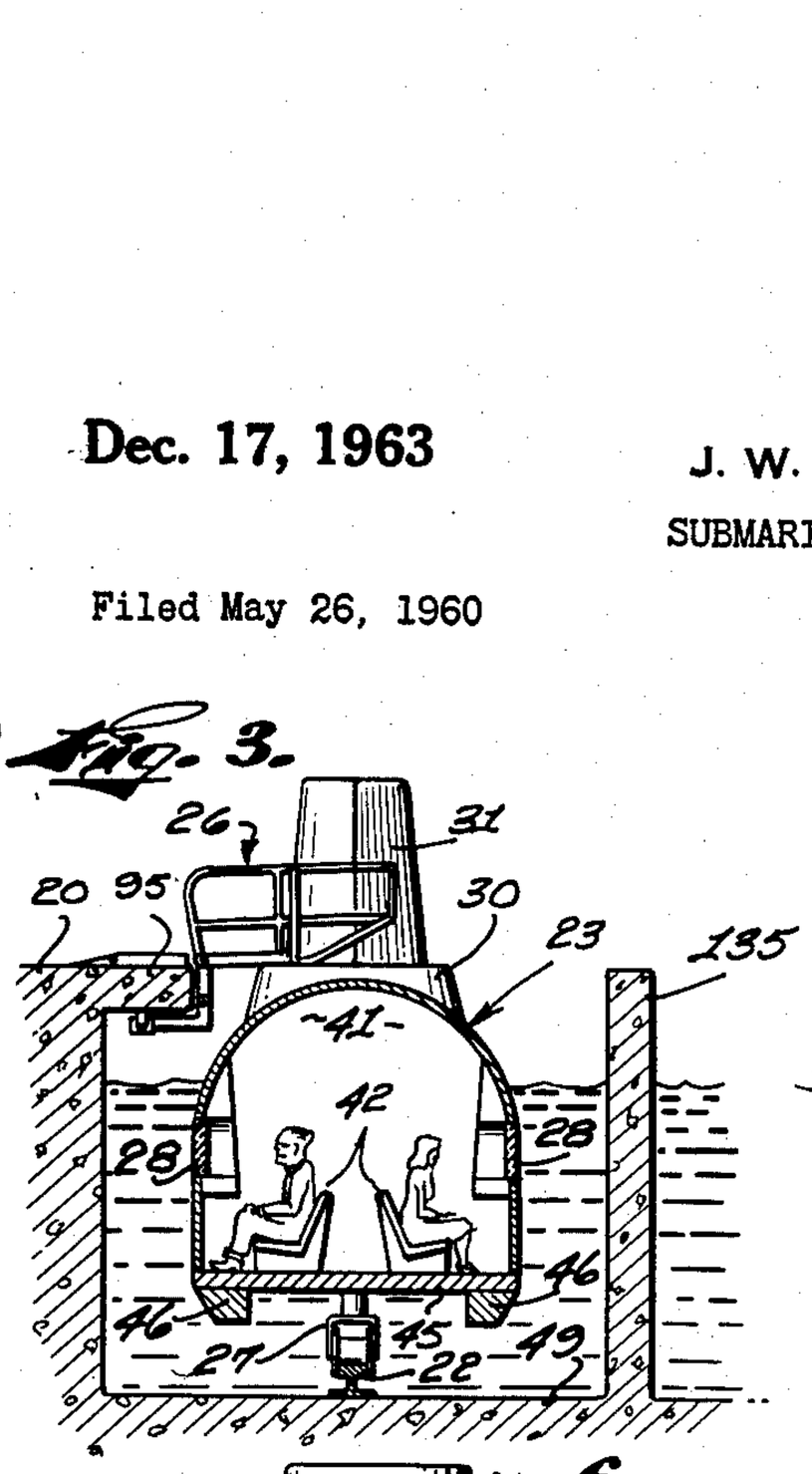


Fig. 4.

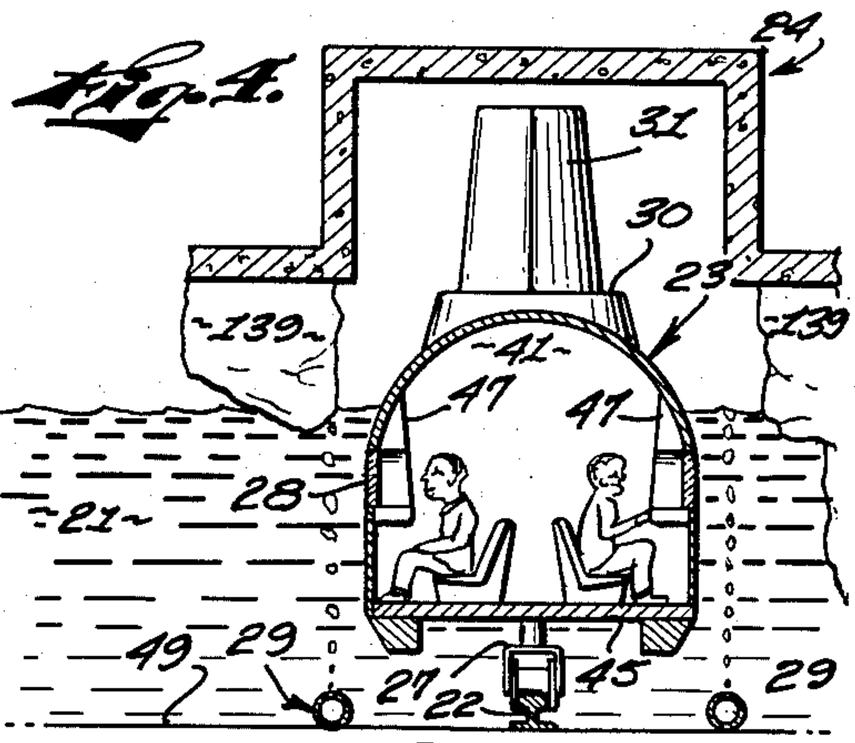


Fig. 6.

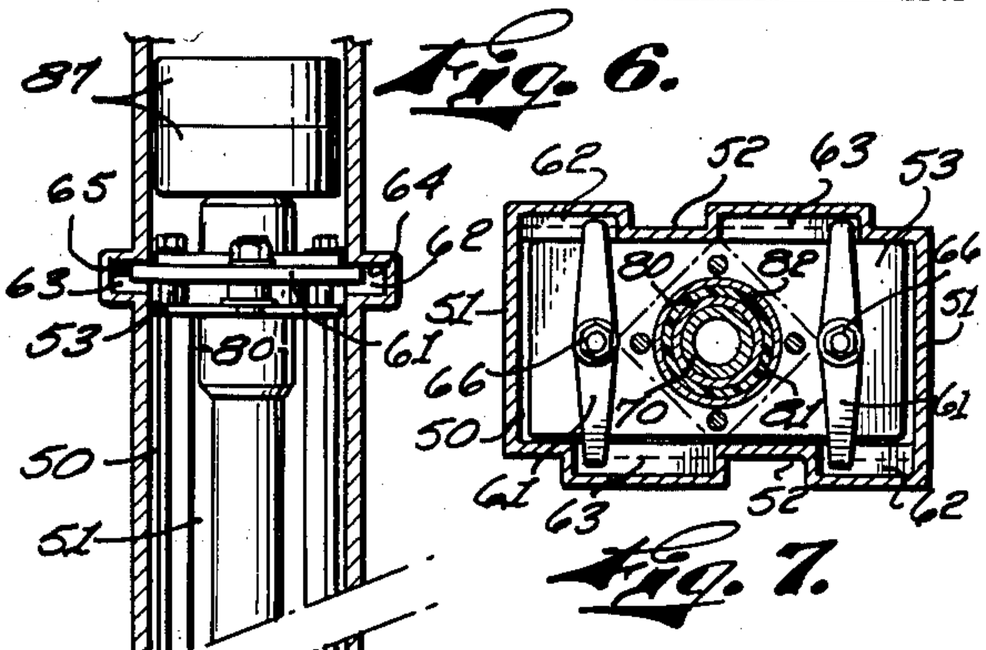


Fig. 7.

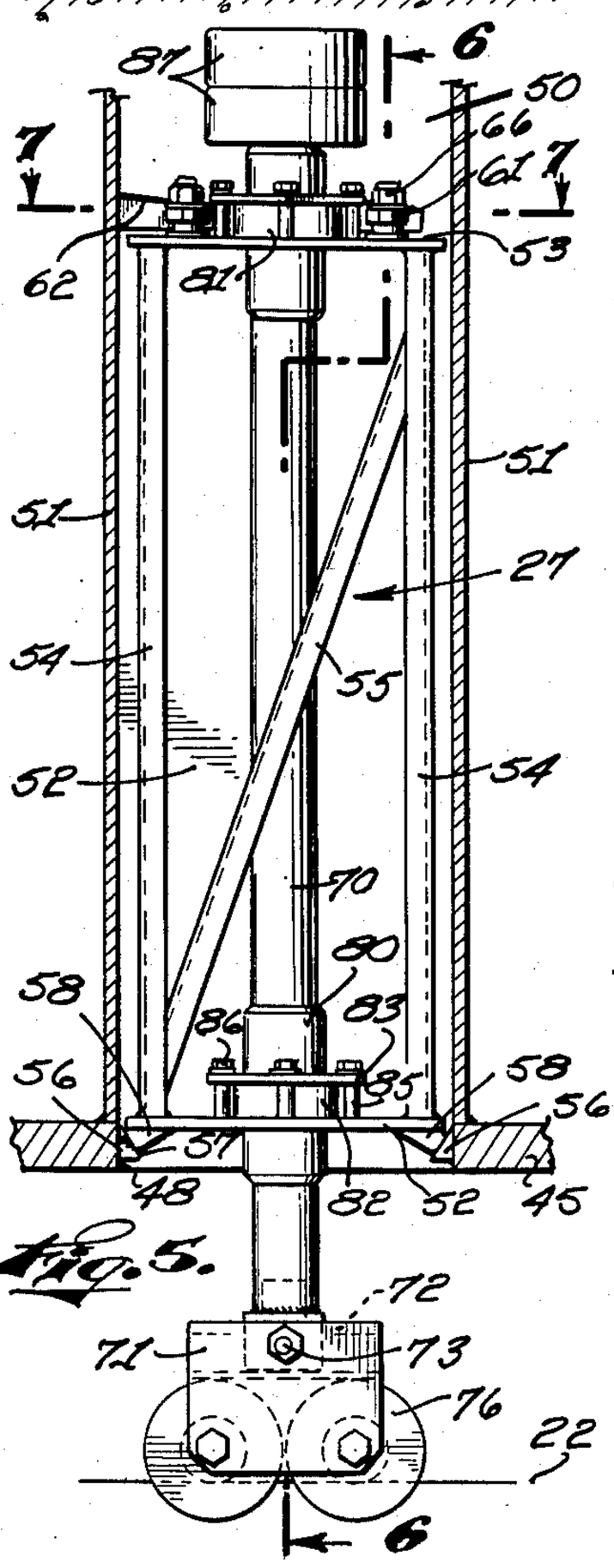


Fig. 5.

Fig. 8.

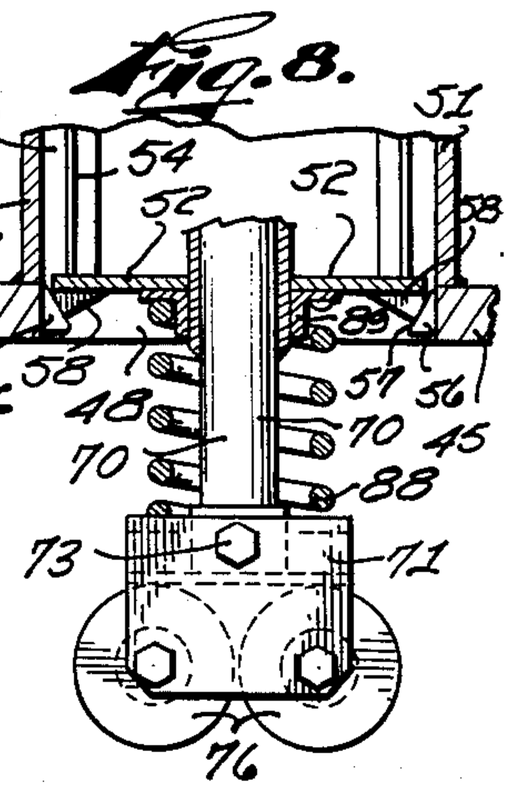


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Fig. 9.

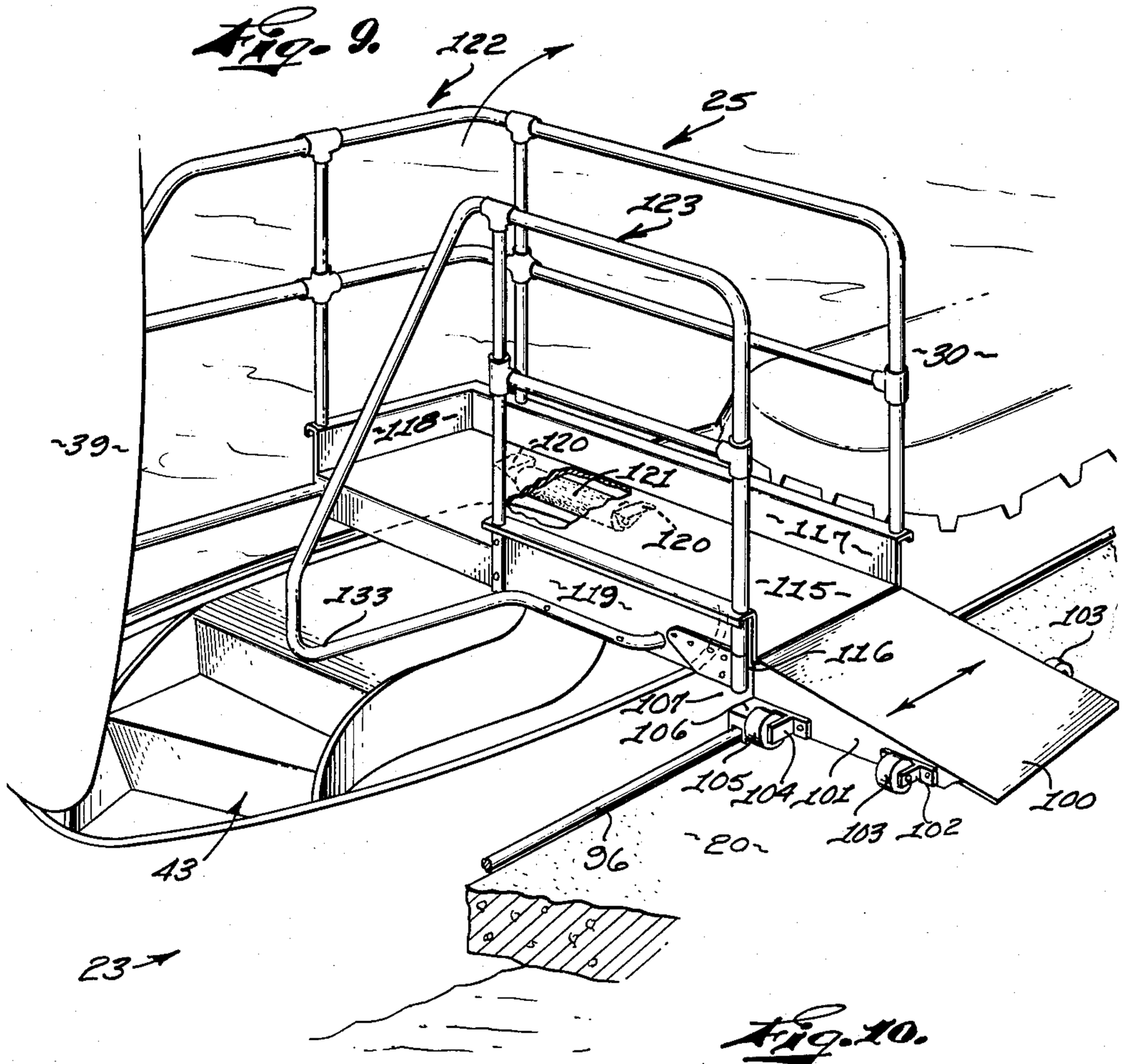


Fig. 10.

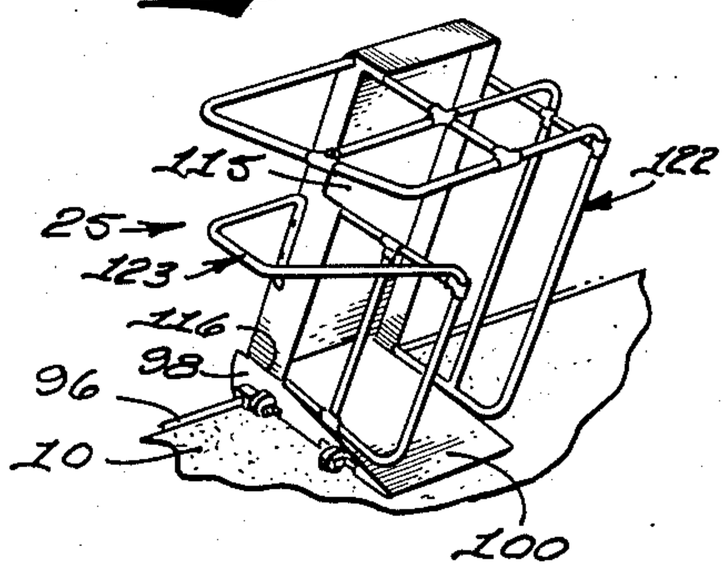


Fig. 11.

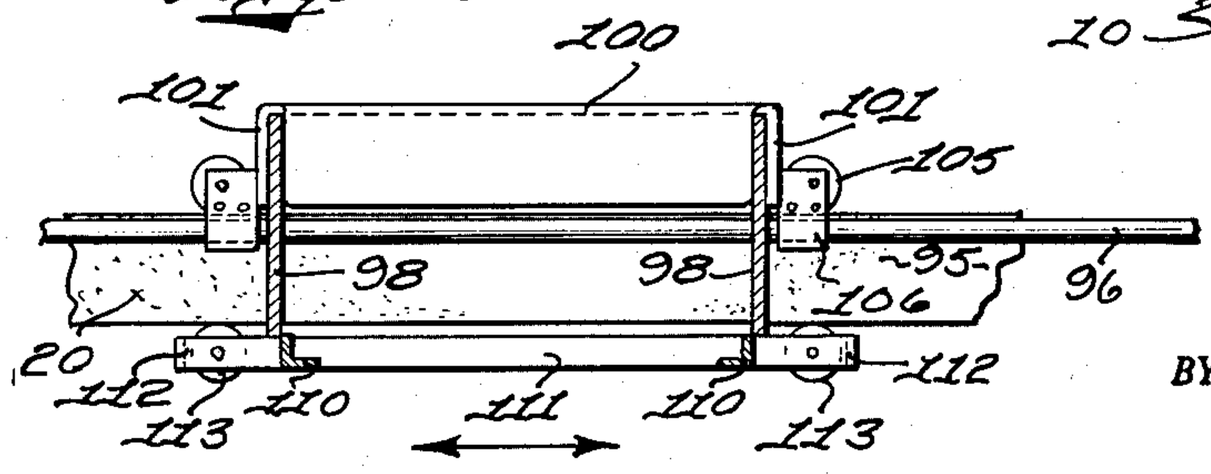


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Fig. 12.

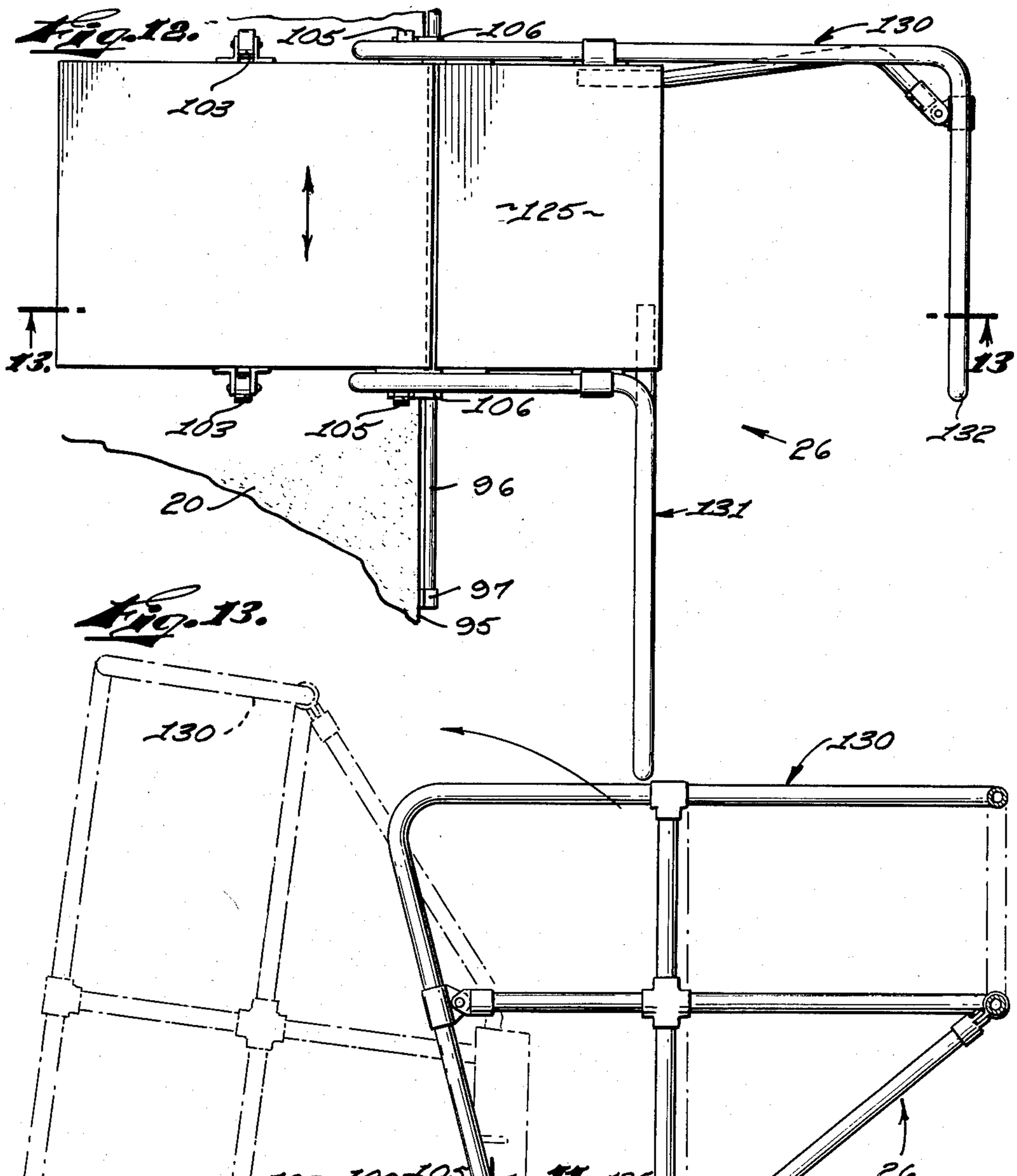


Fig. 13.




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United States Patent Office

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Patented Dec. 17, 1963



# 3,114,333
# SUBMARINE AMUSEMENT RIDE

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Filed May 26, 1960, Ser. No. 61,038
9 Claims. (Cl. 104—71)

The present invention relates to amusement ride apparatus and more particularly to apparatus for simulating a submarine journey.

One of the objects of our invention is to provide an amusement ride apparatus that realistically provides the illusion of a submarine voyage, but without actually subjecting the passengers to the hazards of submarine travel. For this purpose we have provided a vessel which accommodates the occupants in positions below the water line of the vessel. The passengers thus have a submarine view of the environment through suitably located viewing ports.

Another object of the invention is to provide apparatus for simulating a submarine voyage and including means to provide an illusion of diving or ascending in the sea. In order to enhance this illusion, the apparatus also includes means for defining the viewing field of the passengers vessel, such means comprising an arrangement in the vessel itself and also objects positioned along the course of the vessel.

It is also an object of the invention to provide amusement ride apparatus of this character in which a plurality of submarine-simulating vessels are guided along a predetermined path without any danger of collision of the vessels. Additionally, the invention provides means for accommodating large numbers of passengers in each of the vessels with a minimum of lost time in loading and unloading.

Another important object of the invention is to provide a submarine-simulating vessel that is individually controllable as to rate of speed along the predetermined path. In this connection, the invention also provides a novel and improved means of guiding the vessel around the predetermined path.

Yet another object of the invention is to provide a submarine-simulating vessel for an amusement ride apparatus of this character which is buoyantly supported in the body of water, the vessel further being provided with a guide mechanism which also permits a change in the draft of the vessel to accommodate different passenger loads. At the same time, the buoyant vessel is adapted to be stable under all load and ride conditions. Further, the use of a buoyant vessel greatly simplifies the guide means, which is not subjected to unduly high loads.

Another object of the invention is to provide passenger loading apparatus at the landing dock having special utility in permitting the easy and rapid loading and unloading of passengers between the stationary dock and the buoyantly supported vessel.

These and other objects and advantages of our invention will be apparent from the following description when taken in conjunction with the annexed drawings wherein:

FIGURE 1 is a partial plan view of a presently preferred embodiment of our amusement ride apparatus;

FIGURE 2 is an elevational view of a presently preferred embodiment of a submarine-simulating craft for use in our amusement ride apparatus, portions of the vessel being cut away to show interior details, and the view also illustrating a portion of the guide rail or member that defines the path of the vessel;

FIGURE 3 is a sectional view on the line 3—3 of FIGURE 2;

FIGURE 4 is a view similar to FIGURE 3 but illustrating the vessel at another portion of its route;



FIGURE 5 is a partial vertical sectional view taken along the longitudinal center line of a vessel in a portion of the vessel containing one of the guides;

FIGURE 6 is a vertical sectional view taken on the line 6—6 of FIGURE 5;

FIGURE 7 is a horizontal sectional view taken on the line 7—7 of FIGURE 5;

FIGURE 8 is a partial vertical sectional view similar to FIGURE 5 and showing an alternate arrangement of a detail of the guide means;

FIGURE 9 is a perspective view of one of the loading ramps shown in relationship to an entrance into the submarine vessel;

FIGURE 10 is another perspective view of the loading ramp shown in FIGURE 9, with the ramp being positioned in a raised position;

FIGURE 11 is a sectional view taken on the line 11—11 of FIGURE 13 to illustrate the adjustable mounting of a passenger ramp;

FIGURE 12 is a plan view of another passenger ramp for use at the opposite end of the vessel from the ramp shown in FIGURE 9; and

FIGURE 13 is a vertical sectional view taken on the line 13—13 of FIGURE 12.

The general arrangement of the invention is shown in FIGURE 1. A dock 20 is provided adjacent a body of water 21 and a guide rail 22 is fixed in place at the bottom of the water. This rail extends throughout the body of water 21 and defines the path to be individually followed by a plurality of passenger vessels 23. In the present instance, this body of water comprises an artificial lagoon and canal-like structures inside a building 24. The passengers embark and disembark through opposite ends of the vessels 23 by the use of front and rear end loading ramps 25 and 26, respectively, located on the dock 20. Each vessel 23 is provided with a pair of guide means 27 which roll on the guide rail 22. The vessels are self-propelled and are controlled as to speed by an operator and follow the guide rail 22 through the lagoon and the building 24. Each passenger has a submarine view through an individual viewing port or window 28 and receives the illusion of descending or ascending to different levels in the body of water 21 because of the presence of bubble producing means 29.

Each of the vessels 23 simulates a submarine and on a deck 30 has a conning tower 31. Although the vessels simulate, a submarine, they are not actually submersible but preferably comprise completely buoyant craft. A rudder-simulating dorsal fin 32 in reality is the exhaust for a diesel engine or the like (not shown) mounted in the vessel just forwardly of the fin and drivingly connected to a propeller 33. The conning tower 31 is provided with operator's viewing windows 34 and the operator stands on a suitable pedestal 35 before a control panel 36 having controls 37 for the engine, whereby the speed of the propeller 33 can be regulated. Each vessel thus is propelled along the guide rail 22 at a speed selected by the operator and because the operator has a clear above-water view forward there will be no danger of overrunning a preceding vessel.

The vessel 23 has a front loading hatch 39 just forward of the deck 30 and a rear hatch 40, comprising a continuation of the deck just aft of the conning tower 31. Both of these hatches give access to a passenger cabin 41, which is divided in two along the longitudinal center line of the cabin by two back-to-back rows of passenger seats 42. When the hatches are open the passengers board the vessel over the ramps 25 or 26, each of which conducts the passenger to a 180° spiral ladder 43. Thus, as viewed in FIGURE 2, the passengers boarding the vessel 23 through the front hatch 39 start descending the latter 43 facing forward and on the starboard side of the vessel,

and come off the ladder facing aft on the port side and are seated on the port side seats 42. Conversely, the passengers entering the rear hatch 40 initially face aft and start their 180° descent on the port side of the vessel 23 and finally assume the starboard side seats 42. In debarking, the passengers use the same ladder 43 by which they embarked. It has been found that this arrangement greatly facilitates the loading and unloading of the vessels 23 so that very little time is lost at dockside.

As can be seen from the plan view of one of the vessels 23 in FIGURE 1, the vessel has a substantially uniform beam dimension throughout the major portion of its length. Additionally, the vessel's midship section is similar to transverse sections at other stations along the length of the vessel 23, and this is shown in FIGURES 3 and 4. The vessel has a flat keel 45 from opposite edges of which the hull plates rise substantially vertically to define the side walls of the vessel. Above the load water line the hull plates curve concavely inward to define a a substantially semi-circularly cambered hull top configuration.

This configuration provides an inherently stable vessel. The keel 45 is preferably a very thick steel plate and along its opposite edges and on the underside thereof is provided with lead ballast 46, preferably extending throughout the length of the cabin 41. The center of gravity is thus spaced very far beneath the metacenter to provide a strong righting moment. Because the cambered top of the hull is faired into the side walls below the load water line, the metacenter will not shift appreciably in response to any listing which may occur.

Once within the vessel 23, each passenger is seated before one of the viewing ports 28. Each of these ports is set substantially flush with the outer surface of the hull but when viewed by the passenger appears to be recessed in the interior surface 47 of the vessel. This interior surface comprises sheet metal trim behind which conduits (not shown) for air conditioning the vessel may be disposed and the air conditioning includes vents exhausting into the viewing port recess to prevent fogging up of the viewing port. The interior surface 47 and the recessing of the viewing ports 28 limit the extent to which the passenger can approach the glass pane of the viewing port and this serves to inhibit an upward view. The passenger's views is thus directed horizontally, well beneath the surface of the body of water 21, in order to enhance the illusion of a submarine voyage.

In the present instance, the body of water 21 comprises an artificial lagoon, with connecting canal-like parts, having a concrete bottom 49. This bottom is preferably level and has the continuous guide rail 22 affixed thereto, and the rail may be of the type used for railroad tracks. The pair of guide means 27 are supported in the vessel 23 immediately fore and aft of the cabin space 41 and are disposed along the longitudinal center line of the vessel. As has been mentioned, in the preferred embodiment of the invention the guide means 27 do not support the weight of the vessel 23, which is preferably buoyant, but serve to guide the vessel along the path defined by the rail 22.

Each guide means is disposed in a well 50, comprising a shaft of substantially rectangular horizontal cross-sectional configuration, that extends vertically through the vessel 23. Each well 50 is open to the water at its bottom end and may have a grating over its upper end and is defined by fore and aft walls 51 and port and starboard walls 52.

Each of the guide means 27 includes a supporting cage that can be freely lowered into one of the wells 50 and then locked in place. The cage includes a bottom plate 52 and a top plate 53 which are rectangular but appreciably smaller in length than the well 50. The two plates are held together in aligned and vertically spaced-apart relationship by four corner posts 54, and the pairs of posts 54 on the port and starboard sides of the cage are braced by a diagonally extending member 55.



At each well position, the flat keel plate 45 has a rectangular portion removed, as indicated at 48, to define the lower end opening of the well. The fore and aft sides of this opening have cage support members 56 affixed thereto for the guide cage. These members 56 have upwardly facing tapered seats 57 for complementary engagement with downwardly tapering seats of a pair of members 53 affixed to the lower face of the bottom plate 52 of the cage. This tapered seating arrangement assures proper centering of the cage and guide mechanism within the well 50.

Each of the cages is locked in place by being wedged against the cage support members 56. For this purpose, the top plate 53 of the cage supports a pivotal pair of dogs 61, on its upper surface. The dogs are positioned along the longitudinal center line of the top plate 53 adjacent fore and aft ends of the plate and are shown in FIGURE 7 in locked positions. The port and starboard side walls 52 of the well 50, at the level of the dogs 61, each having a horizontally extending pair of recesses 62 and 63, to provide downwardly facing shoulders 64 and 65, respectively.

When the dogs 61 are disposed normally to the longitudinal axis of the top plate 53, the opposite tapered ends of each dog extend into a recess 62 and a recess 63. The upper face of each dog tapers slightly downwardly away from its center pivot and the opposite ends of the dog thus have a slight camming engagement with the shoulders 65 and 64 of the recesses 63 and 62, the cages thus being wedged tightly against the tapered seats 57 of the support members 56. The supporting stud for each dog 61 is provided with a lock nut 66 to hold the dogs in their locked positions. As will be apparent, these lock nuts are loosened and the dogs 61 then rotated counterclockwise from their positions shown in FIGURE 7, after which the cage and the guide mechanism supported therein can be lifted out of a well 50.

The guide means 27 also includes an elongated vertical steering column 70 mounted on top of a saddle 71. This saddle is of inverted U-shaped configuration and in its upper face, or horizontal web portion, is formed with a central opening 72 which is larger than and receives the lower end of the column 70. A horizontally disposed pivot bolt 73 is held at opposite ends in the vertical side walls of the saddle 71 and extends through a bore in the lower end of the steering column 70 to pivotally support the column. Suitable washers 74 are interposed between the inner faces of the saddle side walls and the pivotally held lower end of the steering column 70. Each saddle 71 mounts a tandem pair of wheels 76, between its side walls and at opposite ends of the saddle, for rolling engagement with the rail 22. Each of these wheels has an opposite pair of peripheral flanges 77 to straddle opposite edges of the enlarged head of the guide rail 22.

Each steering column 70 is rotatably and axially slidably supported in its cage. At its upper end and near its lower end the column 70 coaxially carries a pair of sleeves 80, of a hard plastic such as nylon. The column 70 extends through aligned openings formed in the bottom plate 52 and top plate 53 of the cage and each of these openings is surrounded, on top of the plate, by a bushing 81, which may also be of a hard plastic material and set within a ring 82 (see FIGURE 6). This ring is secured to the lower surface of a plate 83 around a central opening through the plate. Stud bolts are secured to the upper surface of the plates 52 and 53 within suitable spacers 85, on top of which the plate 83 rests. The stud bolts pass through suitable openings in the plate 83 and the sub-assembly of the plate, the ring 82, and bushing 81 is held in place by nuts 86 threadedly engaged with the upwardly protruding ends of the stud bolts.

Different passenger loads will vary the draft of the vessel 23 but this will have no effect on the guide means 27

because the cage is free to slide up and down on the steering column 70. The steering column assembly is itself held firmly into guided engagement of the flanged wheels 76 with the guide rail 22 by means of lead weights 87 affixed to the upper end of the column 70. Alternatively, the steering column assembly may be held down by the arrangement shown in FIGURE 8. In this case, a spring 88 is mounted around the column 70 between the upper face of the saddle 71 and the lower face of a keeper 89 secured to the lower face of the bottom plate 52 of the cage. As is shown in FIGURE 2, an eye bolt 90, or the like, can be secured to the upper end of the guide means 27 so that the guide means may be lowered into or raised out of one of the wells 50.

The guide means 27 is particularly well adapted to insure that a vessel 23 follows the path of the guide rail 22 exactly. This is of some importance in creating the illusion of the operator steering the vessel extremely close to submerged objects without any danger of actually coming into contact with the objects. In this connection, the rather great height of the steering columns 70 and their contact with their supporting cages at vertically spaced-apart point, i.e., the spacing between the sleeves 80, is helpful in causing the vessel 23 to follow the path of the wheeled saddles 71 on the guide rail 22. While the steering columns 70 are held within the central, vertical, longitudinally extending plane of the vessel 23, the saddle pivots 73 permit fore and aft tilting of the vessel without affecting the guidance system.

In FIGURE 1, the right hand or front vessel 23 is shown in a loading area of the dock while the rear vessel 23 is shown in the unloading area of the dock 20. Both of these areas of the dock are provided with the front and rear passenger ramps 25 and 26. Although not shown, it will be understood that these two areas of the dock are provided with the customary fixed guard rails to limit the movement of passengers during loading and unloading to prescribed aisles. The aisles in the loading area of the dock 20 terminate at one of the ramps 25 or 26 and the aisles in the unloading area of the dock commence in the area of the corresponding ramps 25 and 26.

When the ramps are used for loading and unloading passengers, portions thereof are moved downwardly from vertical to horizontally extending positions over a vessel 23. Since a vessel may not always come to a halt at the same position adjacent the dock 20, the ramps 25 and 26 are also movable within a limited range longitudinally of the dock whereby they can always be lowered into the proper relationship to the ladders 43 when the hatches are open.

Both of the ramps 25 and 26 are mounted on the dock 20 in similar fashion. Referring to FIGURE 13, it will be seen that the dock is formed with a horizontal projection 95 overhanging the channel through which the vessels 23 enter and leave the dock area. A horizontally extending guide rod 96 is affixed to the vertical face of the projection 95, substantially flush with the upper surface of the dock 20. This guide rod is held in place at opposite ends by suitable brackets 97 secured to the front vertical face of the projection 95, and the ramps 25 and 26 are slidable along the guide rod.

The base or supporting structure for the pivotal part of each ramp 25 and 26 is a generally U-shaped framework having vertically spaced-apart horizontally extending portions between which the projection 95 of the dock 20 is received. This framework includes a pair of vertically disposed beam members or beams 98 of irregular configuration and whose profile is best seen in FIGURE 13. Each of these beams has a sloping upper edge 99 that extends beyond the vertical face of the dock projection 95. The portions of the beams 98 superimposed over the projection 95 are fitted within a somewhat channel-shaped member 100 having triangularly shaped side walls 101, to the inside of which the beams 98 are affixed.

For moving the ramps along the dock 20 the channel-



shaped members 100 are mounted on rollers and, also, are slidably supported on the guide rod 96 in order to maintain the proper relationship of the ramps with respect to the edge of the projection 95. Thus, each side wall 101 near its shallow end is provided with a bracket 102 that mounts a roller 103. Another bracket 104 is mounted on each side wall 101 at its deeper end and mounts another roller 105. Each of the latter brackets 104 also mounts a block 106 overhanging the edge of the projection 95 and provided with a downwardly opening slot slidably receiving the guide rod 96.

In order to provide cantilever support for the foldable part of the ramp, each beam 98, in the portion projecting beyond the dock projection 95 has a greater beam depth in an enlarged head section 107 that extends downwardly to about the level of the under surface of the dock projection 95. These head portions of the beams 98 are tied together by a reinforcing rod 108 and a strap 109, in order to give greater rigidity to the assembly. A pair of angle iron members 110 are connected at their forward ends to opposite ends of the rod 108 and extend rearwardly under the strap 109 and beneath the dock projection 95. The rear ends of the angle iron straps 110 are inter-connected by another piece of angle iron 111. Brackets 112 are affixed at opposite ends of the angle iron 111 to support rollers 113 bearing against the undersurface of the dock projection 95.

FIGURE 9 shows the front hatch 39 pivoted forwardly into open position to expose the forward 180° spiral ladder 43. The upper end of this ladder is on the starboard side of the vessel 23 and the ladder conducts passengers to its lower end at the port side of the vessel. The ramp supporting structure which has just been described mounts a foldable portion of the front end ramp 25 which in lowered position guides passengers between the dock 20 and the starboard side of the vessel 23, leading them to the ladder 43.

The foldable part of the front end ramp 25 includes a platform or floor 115 whose rear or dockside end is pivotally mounted on a shaft 116. This shaft in turn is secured at opposite ends to the beam members 98, in the position shown in FIGURE 13. As is shown in FIGURE 9, the floor 115 is provided with abbreviated side walls 117, 118 and 119 along the aft, starboard and for a portion of the forward edges of the floor respectively. On the underside of the floor 115, and along its aft edge, are a pair of brackets 120 rotatably mounting a bumper 121. As is shown, this bumper comes to rest on top of the hull whereby the front end ramp 25 is supported in lowered position. A hand rail assembly 122 is mounted on the floor side walls 117 and 118 and turns the corner. A smaller hand rail assembly 123 is similarly mounted on the floor's side wall 119 and also turns the corner towards the ladder 43.

Since the front end ramp 25 must span the distance between the dock 20 and the starboard side of the vessel 23, it is relatively long and therefore is supported only in part in a cantilever fashion. The rear end ramp 26 must span only the distance between the dock 20 and the port side of the vessel 23 and, since this is a relatively short span, the rear end ramp 26 can be entirely supported by cantilever action. The cantilever action in either case will be clear from an inspection of FIGURE 13, and from the following description of the rear end ramp 26.

The rear end ramp 26 has a relatively short floor 125 hinged at its dock side on the previously mentioned shaft 116. This floor has depending opposite side walls 126 along its forward and aft edges, and a depending side wall 127 on its free edge. A piece of angle iron 128 is affixed to the bottom surface of the floor 125 for seating on the uppermost corners of the beams 98. Although not shown and described, it will be understood that a similar piece of angle iron 128 is secured to the underside of the floor 115 of the front end loading ramp 25. In the case of both ramps, it will be seen that when the passengers'

weight is on the floor the ramp tends to pivot the beams 98 about the axis of the guide rod 96, but this is resisted by the engagement of the rollers 113 with the underside of the projection 95 of the dock.

The rear end ramp 26 is provided with a pair of hand rail assemblies 130 and 131 that are affixed to the opposite side walls 126 of the floor 125, and both of these assemblies turn the corner. Attention is particularly drawn to the end portions 132 and 133 of the ramps 26 and 25, respectively. As is clearly shown in FIGURE 9 with specific reference to the front end ramp 25, the hand rail portion 133 is disposed on or about the axis of the steeply descending ladder 43 at approximately the level of the top of the hull. Accordingly, this portion and the similarly located portion 132 of the rear end passenger ramp assembly 26, serve as a convenient handhold usable by a passenger for the major portion of the travel through the ladder 43.

As is shown in FIGURES 1 and 3, a wall 135 is positioned parallel to the dock 20 defining a channel in which vessels 23 commence and finish their voyage. Referring to FIGURE 3, it will be noted that when each passenger assumes his seat before one of the viewing ports 28 his range of perception is limited by the wall 135 on the starboard side of the vessel 23 and by the wall of dock 20 on the port side of the vessel. The projection 95 of the dock 20 and the portion of the wall 135 extending above the surface of the body of water 21 both limit the amount of light penetrating into the channel between the wall and the dock. Such light as does enter is diffused. In addition, the recessing of the viewing ports in the inner surfaces 47 of the vessel's wall limits the upward view of the passenger. Because of these factors each passenger, upon taking his seat and peering out of the viewing port 28, immediately has the sensation of already being submerged in a submarine.

Referring now to FIGURE 1, it will be observed that bubble producing means 29 are positioned on both sides of the guide rail 22 at the exit from the dock 20, at an entrance 136 to the building 24 and also at the exit 137 from the building 24. An artificial waterfall 138 descends over the exit. At each of these positions the bubble producing means gives the illusion of changing depth to the occupants of the vessel 23. As a vessel leaves the exit 137 of the building 24, it is wetted by the waterfall 138 and this aids the illusion of a submarine rising from the sea to spectators on the dock 20.

As is shown n FIGURE 4, the bubble producing means 29 may simply comprise elongated hollow tubes resting on the bottom 49 and associated with means (not shown) such as a compressor producing compressed gas or air fed into the tubes and escaping through suitable perforations. The bubble producing means 29 are equally spaced on opposite sides from the guide rail 22 and are far enough apart to dispense bubbles upwardly past the viewing ports 28 without interference from the vessel 23.

Immediately upon leaving the dock the first bubble producing means 29 gives the illusion of diving, simultaneously with the vessels 23 entering the brighter light of the open lagoon portion of the body of water 21. Therefore, even though the lagoon is in broad daylight, the passengers have the illusion of having dived to a shallow depth and even though they can see fairly distant objects placed within the lagoon.

As a vessel aproaches the entrance 136 to the building 24, it passes through the second bubble producing means 29. Immediately upon leaving the second bubble producing means the vessel is inside the building 24, which is illuminated only by controlled artificial light. Referring specifically to FIGURE 4, depicting a vessel within the building 24, objects 139 are mounted in the building which penetrate the surface of the water and, in some instances, penetrate only to a depth just above the level of the viewing ports 28.

Because of the accuracy with which the guide means 27 conduct the vessel 23 along its path, these objects 139 can be positioned extremely close to the hull of the vessel without any danger of scraping. The objects 139 also limit the upward vision of the passengers of the vessel and if the objects be quite massive can very successfully give the illusion of cruising at a very great depth, as for example under a polar icecap. The objects 139 may, of course, also be mounted on the bottom 49 to simulate sunken cities and may also define underwater caverns. It will be understood that the representations mentioned are only by way of example and that the objects 139 have a definite function in limiting both horizontal and upward views of the passengers.

As a vessel 23 leaves the exit 137, it passes through the final bubble producing means 29. The bubbles released by the means 29, although they may pass upwardly in the view of a passenger, nevertheless give an illusion of rising to the passenger. This illusion is aided by the effect of the waterfall 138, whose kinetic and potential energy causes frothiness or turbidity of the water at the exit. As a consequence the bubble effect at the end of the voyage is somewhat different than in the other portions of the voyage and may be assumed by the passengers to be an upward change of elevation.

At the end of the voyage, the narrowness of the channel alongside the dock 20 is effective as a brake to insure a safe stop for the heavy vessels 23. The ratio of the width of this channel to the width of the vessels is preferably less than 2 to 1. The shallow, narrow channel greatly increases resistance to the passage of the vessels 23 and is a very efficient water brake.

Although a preferred embodiment of our invention has been illustrated and described, it should be understood that we do not mean to be limited to the specific details of construction hereinabove set forth but only by the spirit and scope of the appended claims.

We claim:

1. Amusement apparatus comprising a submarine-simulating buoyant vessel having port and starboard horizontal rows of viewing ports beneath the load water line of said vessel in a cabin, the top of the hull of said vessel having a pair of hatches at opposite ends of said cabin and said cabin having a pair of ladders, at opposite ends, one of which extends upwardly to a hatch from the port side of said vessel and the other of which extends upwardly to a hatch from the starboard side of said vessel, said cabin being divided by two rows of back-to-back seats disposed along the longitudinal center line of said cabin and extending between said ladders, each of said seats being before one of said viewing ports.

2. Amusement apparatus as set forth in claim 1 in which each of said ports comprises a transparent member set within a recess in the wall of said vessel, said recess having an axial length greater than the axial length of said transparent member whereby said recess limits the viewing angle of a passenger in the seat before said port.

3. An amusement apparatus as set forth in claim 1 in which each of said ladders extends through a 180° spiral, said ladder that extends upwardly from the port side of said vessel terminating at its upper end at the starboard side of the hatch over said ladder, and said ladder that extends upwardly from the starboard side of said vessel terminating at its upper end at the port side of the hatch over said ladder.

4. Amusement apparatus comprising a submarine-simulating buoyant vessel having port and starboard horizontal rows of viewing ports beneath the load water line of said vessel in a cabin, the bottom of said vessel in at least said cabin consisting of a flat keel having a width substantially the same as the beam of said vessel and said vessel having a hull shape, above said keel, comprising substantially vertically disposed port and starboard walls in which said ports are disposed, said walls developing into a top of said hull having a substantially semi-circular camber, said load water line being in the

cambered region of said hull, said keel having a unit weight exceeding the unit weight of the walls and top of said hull, the top of the hull of said vessel having a pair of hatches at opposite ends of said cabin and said cabin having ladders at opposite ends one of which extends upwardly to a hatch from the port side of said vessel and the other of which ladders extends upwardly to a hatch from the starboard side of said vessel, each of said ladders extending through a 180° spiral, said ladder that extends upwardly from the port side of said vessel terminating at its upper end at the starboard side of the hatch over said ladder, and said ladder that extends upwardly from the starboard side of said vessel terminating its upper end at the port side of the hatch over said ladder, the forward one of said ladders terminating at its upper end on the starboard side of said vessel, said cabin being divided by two rows of back-to-back seats disposed along the longitudinal center line of said cabin and extending between said ladders, each of said seats being before one of said viewing ports, each of said ports comprising a transparent member set within a recess in the wall of said vessel, said recess having an axial length greater than the axial length of said member whereby said recess limits the viewing angle of a passenger in the seat before said port.

5. Amusement apparatus comprising: a body of water; a submerged guide rail fixed in said body of water; a buoyant vessel; a pair of wells extending vertically through said vessel at fore and aft positions substantially along the longitudinal center line of said vessel; a cage removably affixed in each of said wells; a pair of steering columns each of which is vertically mounted in one of said cages to extend downwardly from said vessel towards said rail each of said cages having a top plate and a bottom plate through the centers of which said column passes, said plates having coaxially aligned bushings and said column having vertically spaced apart sleeves affixed thereto that have rotatable and axially slidable bearing engagement with said bushings, said sleeves and bushings being of different axial lengths; a saddle pivotally mounted on the lower end of each of said columns on a horizontal axis extending transversely of said rail; a tandem pair of flanged wheels in each of said saddles having rolling engagement with said rail, each of said wheels having a pair of flanges straddling opposite sides of said rails; and means to bias said steering columns, saddles, and wheels downwardly into engagement with said rail.

6. An apparatus as set forth in claim 5 in which each of said wells has a pair of upwardly facing opposite abutments at its lower end, said abutments and the lower end of said cage having complementary tapered seating surfaces for wedging engagement therebetween, said cage on its upper end having a pivotally mounted means whose upper surface is cammingly engageable with a downwardly facing shoulder formed in a confronting wall portion of said well when said means is pivoted whereby said cage is wedgingly forced against said abutments.

7. Amusement apparatus comprising: a body of water; a dock alongside said body of water; a buoyant vessel in said water having a passenger space, said space being divided longitudinally of said vessel into port and starboard sections; a front loading ramp movably supported on said dock that can be moved into and out of position at the fore end of said space of said vessel, said ramp when in said position spanning the distance between said dock and one of said sections of said space; and an aft loading ramp movably supported on said dock that can be moved into and out of position at the aft end of said space of said vessel, said aft loading ramp when in said position spanning the distance between said dock and the other of said sections of said space.



8. Amusement ride apparatus comprising: a body of water; a dock alongside said body of water; a submarine-simulating buoyant vessel having port and starboard horizontal rows of viewing ports beneath the load water line of said vessel in a cabin, the top of the hull of said vessel having a pair of hatches at forward and aft ends of said cabin and said cabin having ladders at opposite ends one of which ladders extends upwardly to a hatch from the port side of said vessel and the other of which extends upwardly to a hatch from the starboard side of said vessel, said cabin being divided into starboard and port sections; a forward loading ramp having a base mounted for guided movement along the edge of said dock and having a platform pivotally supported on said base for movement between vertical and horizontal positions, said platform in horizontal position spanning the distance between said dock and the upper end of said ladder in the forward one of said hatches; and an aft loading ramp having a base mounted for guided movement along the edge of said dock and having a platform pivotally supported on said base for movement between vertical and horizontal positions, said aft platform in horizontal position spanning the distance between said dock and the upper end of said ladder in the aft one of said hatches, both said platforms having hand rail assemblies on edges thereof.

9. An apparatus as set forth in claim 8 in which said edge of said dock comprises a horizontal projection which has a guide rod affixed along and spaced from the vertical face of said projection, said base of each ramp comprising a framework that embraces the top and bottom sides and face of said projection, said framework having a plurality of rollers in engagement with the top and bottom sides of said projection, the rollers on the bottom side of said projection being spaced rearwardly from said face of said projection and said framework having slidable engagement with the top and opposite sides of said guide rod at positions spaced longitudinally apart of said rod, said framework also having beam members projecting outwardly beyond the vertical face of said projection on top of which said platform can be lowered into substantially horizontal position, said platform being hinged to said base rearwardly of the projecting ends of said beam members.


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