PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 3 :		(11) International Publication Number: WO 83/ 04375
A63G 21/18	A1	(43) International Publication Date: 22 December 1983 (22.12.83)

(21) International Application Number: PCT/US82/00772

(22) International Filing Date: 8 June 1982 (08.06.82)

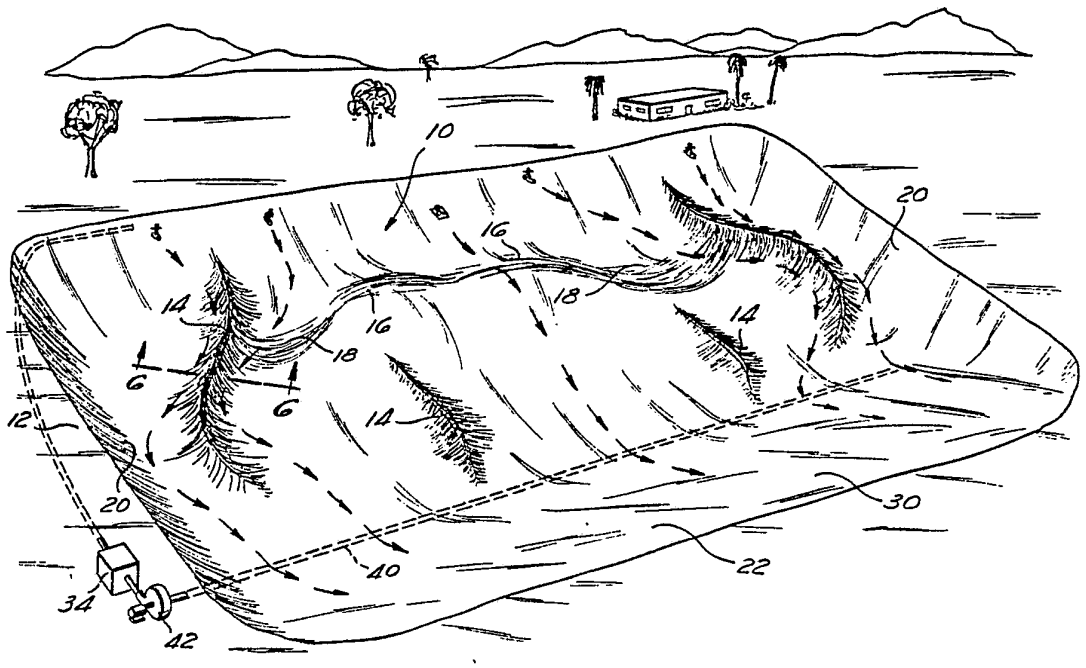
(71)(72) Applicant and Inventor: CROUL, Richard, D. [US/US]; 427 Fernleaf, Corona Del Mar, CA 92625 (US).

(74) Agents: OLSON, Gordon, H. et al.; Knobbe, Martens, Olson, Hubbard & Bear, 610 Newport Center Drive, Suite 1600, Newport Beach, CA 92660 (US).

(81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent).

Published
With international search report.

(54) Title: SURFING HILL



(57) Abstract

An amusement apparatus which simulates the riding experience encountered in ocean surfing, composed generally of a shaped slope (12) having plural, stationary wave forms and multiple surface irregularities (14, 16, 18), covered with a plurality of interconnected vinyl-coated foam sections (50), and including an irrigation system (72, 76) to distribute a thin film of water over the upper surface of the apparatus. The interconnected prefabricated sections yield an inclined planing surface which is adapted to slightly deform in response to shifting body weight of a user thereby permitting a user to turn and maneuver during travel down the apparatus on a surfboard-like vehicle (100).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**LI**	Liechtenstein
AU	Australia	**LK**	Sri Lanka
BE	Belgium	**LU**	Luxembourg
BR	Brazil	**MC**	Monaco
CF	Central African Republic	**MG**	Madagascar
CG	Congo	**MR**	Mauritania
CH	Switzerland	**MW**	Malawi
CM	Cameroon	**NL**	Netherlands
DE	Germany, Federal Republic of	**NO**	Norway
DK	Denmark	**RO**	Romania
FI	Finland	**SE**	Sweden
FR	France	**SN**	Senegal
GA	Gabon	**SU**	Soviet Union
GB	United Kingdom	**TD**	Chad
HU	Hungary	**TG**	Togo
JP	Japan	**US**	United States of America
KP	Democratic People's Republic of Korea		

SURFING HILL

Background of the Present Invention

The present invention relates to amusement apparatus, and more particularly to an aquatic amusement apparatus which simulates the natural ocean wave action encountered during body and board surfing.

In recent years, there has been a dramatic resurgence in the United States in the well-known sport of body and/or board surfing. Heretofore, the sport has been best practiced in only those few states, such as California, Florida, and Hawaii, which not only possess long coastlines, but tropical or semi-tropical climates yielding relatively warm water temperatures to permit surfing throughout the majority of the year.

Although attempts have been made to duplicate the natural wave conditions of ocean bodies at inland locations, such attempts have typically comprised artificial wave making apparatus, wherein a large, man-made body of water is provided with suitable mechanical means to generate a water wave form. Although such prior art artificial wave generating apparatus have permitted body and board surfing in inland areas, there are substantial deficiencies associated in their use.

Foremost of these deficiencies is the extreme high cost incurred in their initial installation and subsequent operation and maintenance. As will be recognized, the construction of a man-made water reservoir and complex hydraulic-mechanical wave generating system requires substantial capital expenditure. Further, the constant chemical treatment of the water and maintenance of the hydraulic/mechanical system yields a significant financial obstacle which has made the widespread use of such prior art apparatus cost prohibitive.

Additionally, due to he prior art's use of a large body of water and hard concrete reservoir bottom, such devices continuously pose a significant safety hazard to

the user requiring constant monitoring of the apparatus by professional lifeguards. These safety hazards become acute when the apparatus is congested with novice users with surfboards often kicking out of the wave form and impinging upon other swimmers and surfers in the water. Further, such prior art apparatus have been severely limited as to site location, typically requiring relatively warm climate environments so that the water reservoir need not be heated throughout the major portion of the year.

Although a few devices have recently been introduced to permit body planing, skiing, or tobogganing on an artificial surface, as disclosed in Carrier (Pat. No. 2,982,547) and Wehr et al (Pat. No. 3,091,998), such devices have failed to provide any means for simulating ocean wave action.

Thus, there exists a substantial need for a relatively low-cost amusement apparatus, simulative of natural ocean wave action, which may be located at inland locations and efficiently operated without posing a significant safety hazard to the user.

Summary of the Present Invention

The present invention comprises an aquatic amusement apparatus which simulates the riding experience encountered in ocean surfing while eliminating the substantial cost, site location, and safety hazards associated with the prior art wave generating apparatus.

According to the invention, there is provided an amusement apparatus characterized by being for simulating riding motion over an ocean wave as encountered in ocean surfing, and comprising a shaped slope having a generally downward inclination to provide a desired rate of descent, and a plurality of prefabricated panel sections positioned on said slope forming a relatively seamless covering with a smooth surface finish on which a user may slidably travel, said panel sections adapted to deform to direct a

user's path in response to forces exerted against them by said user in sliding travel, each of said sections comprising an upper and lower surface sheet, said upper sheet having a smooth surface finish to provide a slippery surface when wet; a resilient core disposed between said surface sheets; means for interconnecting said panel sections to provide a relatively seamless upper smooth surface including means for anchoring said panel sections to said slope; and means for applying a film of water to the smooth surface of said upper sheet in continuum.

Another embodiment of the invention provides a method for adapting a hillside to form an amusement device characterized by simulating a natural wave action encountered during ocean surfing by shaping said hillside to form a sloped surface having one or more surface irregularities and a downward inclination sufficient to provide a desired rate of descent; covering said sloped surface with a smooth planing surface; and applying a sufficient quantity of water onto said planing surface to flood said planing surface with a water film to permit a user to plane down said sloped surface.

Particularly, the present invention comprises a shaped slope having a plurality of stationary wave-like contours and surface irregularities, which is covered with a vinyl-coated foam substrate. The foam substrate incorporates an irrigation system to distribute a thin film of water over its smooth upper vinyl surface which reduces friction to enable a user to rapidly travel down the slope on either his body, an innertube or a surfboard-like vehicle. Due to the slightly deformable, resilient nature of the foam substrate, a user is able to turn and maneuver as he travels down the slide by shifting his weight on the surfboard-like vehicle, thereby obtaining a bite from the deformation of the foam. Further, by banking off the stationary wave-like contours of the apparatus, a user may selectively increase or stall his speed on the apparatus, and cut back transversely across the slope.

In the preferred embodiment, the vinyl-coated foam substrate is supplied in prefabricated elongate panel sections each including vinyl extensions along their edges which permit adjacent panels to be abutted and cemented together to form a contiguous covering for the slope. Additionally, each of the prefabricated panel sections is provided with one or more primary irrigation tubes along its length, which include a plurality of fittings adapted to accept plural irrigation leads extending upward through the foam substrate and terminating at the upper surface of the panel sections. The primary irrigation tubes of each ofthe panel sections may be interconnected to a common recirculating water supply to distribute a thin film of water through the distribution tubes and onto the top surface of the entire slope.

Due to the relatively thick foam substrate covering the entire apparatus, a user, accidentally falling from his surfboard-like vehicle, may simply slide down the slope on his body without injuring himself. Additionally, due to the apparatus functioning as a wave action simulator without the use of large quantities of water, the present invention may be installed at substantially all inland locations and efficiently operated throughout the majority of the year.

Description of the Drawings

These, as well as other features of the present invention, will become more apparent upon reference to the drawings wherein:

Figure 1 is a perspective view of the surfing slide apparatus 10 of the present invention, illustrating a preferred shaped slope configuration, and depicting the irrigation recirculation system;

Figure 2 is a perspective view of a portion of the surfing slide of Figure 1 illustrating the brick-like lattice orientation of multiple panel sections thereon;

Figure 3 is an enlarged perspective view of a portion of two elongate panel sections showing the preferred method of attaching adjacent panel sections together upon the excavation;

Figure 3A is an enlarged cross-sectional view taken about lines 3A-3A of Figure 3 showing the preferred manner in which the attachment panels of individual panel sections are secured to the planing surface of an adjacent panel section.

Figure 4 is an enlarged perspective view of a first embodiment of a central irrigation system provided in each of the panel sections;

Figure 4A is an enlarged perspective view of a second embodiment of the central irrigation system provided in each of the panel sections;

Figure 5 is an enlarged cross-sectional view, taken about lines 5-5 of Figure 4, showing the preferred orientation of the irrigation lead lines which extend from the undersurface of the panel sections to the top surface thereof;

Figure 6 is a perspective view of one of the stationary wave-like contours formed on the surfing slide apparatus of the present invention;

Figure 7 is a perspective view of a surfboard-like vehicle which may be utilized on the apparatus of the present invention; and

Figure 8 is a cross-sectional view of one of the panels of the present invention illustrating the manner in which the vehicle of Figure 7 permits maneuverability during travel down the apparatus.

Detailed Description of the Preferred Embodiment

Referring to Figure 1, there is shown the surfing slope apparatus 10 of the present invention. The apparatus 10 may be formed in any desired size and configuration and the specific configuration illustrated in Figure 1 is disclosed merely by way of example. The

surfing slope apparatus 10 is formed on an excavated or shaped slope 12, having a preferred downward inclination of approximately 7 to 20 degrees. The slope 12 includes a plurality of stationary wave-like contours 14 jutting vertically upward from its main planar slope as well as various rises 16 and depressions 18 which form a generally smooth but irregular slope surface. The side walls 20 of the slope 12 are preferably disposed in a substantially vertical orientation whereas the frontal portion 22 is disposed at a slight upward inclination. By such a configuration, a user is prevented from traveling off the apparatus 10 adjacent the side walls 20 and is gradually decelerated upon entry onto the frontal portion 22.

The entire slope 12 is covered with a vinyl-coated resilient substrate 30 which is rigidly attached and readily conforms itself to the contours of the slope 12. The resilient substrate 30 is preferably formed from a plurality of prefabricated elongate panel sections 50 which are abutted in an end-for-end and side-by-side orientation upon the slope 12 to form a contiguous surface covering. As best shown in Figures 2 and 3, each of the panel sections 50 is fabricated having a resilient core 52 formed of a urethane foam or foam rubber material, having upper and lower vinyl sheets 54 and 56, respectively, rigidly attached to its opposite planar surfaces. In the preferred embodiment, the panel sections 50 are sized to be approximately 54 inches wide and 100 feet in length, having a core thickness of approximately 1 inch.

Both the upper and lower vinyl sheets 54 and 56 extend a short distance outboard on opposite side edges of the foam core 52 forming upper and lower side attachment panels 58 and 60, respectively. Additionally, the upper vinyl sheet 54 extends a short distance beyond the frontal edge of the foam core 52 forming a front attachment panel 62, whereas the lower vinyl sheet forms a corresponding rear attachment panel 63.

The preferred method and procedure for installing the panel sections 50 upon the slope 12 is illustrated in Figure 3. As shown, a first panel section 50a (Figure 3) is laid upon the slope 12 and oriented such that its length dimension extends downward in the general direction of the excavation or shaped slope 12. The panel section 50a is subsequently attached to the slope 12 by a plurality of metallic or plastic spikes 64 which are driven through the lower side attachment panel 60 and rear attachment panel (not shown) extending into the slope 12 at spaced intervals along the length of the panel section 50a. With the first panel 50a located upon the excavation, a second panel section 50b may be juxtapositioned and registered with the first panel section 50a such that adjacent side edges of the foam core 52 of each of the panel sections 50a and 50b are abutted together. In this abutted orientation, the lower side attachment panel 60 of the panel section 50b is positioned to lie beneath a portion of the panel section 50a whereas the upper side attachment panel 58 of the panel 50a overlays a portion of the panel section 50b.

Aligned in such a manner, the upper side attachment panel 58 and adjacent edge portion of the panel section 50a may be rolled back, off the surface of the slope 12 to expose the lower side attachment panel 60 of the panel section 50b. Additional spikes 64 may then be driven through the lower side attachment panel 60 and rear attachment panel (not shown) of the panel section 50b and into the slope 12. A suitable cement or vinyl adhesive (not shown) may then be applied to the upper surface of the lower side attachment panel 60 of the panel section 50b as well as the lower surface of the upper side attachment panel 58 of the panel section 50a. Subsequently, the previously rolled back portion of the panel section 50a may be released and tightly pressed upon the panel section 50b wherein the adhesive interface

securely joins the panel sections 50a and 50b together. A think layer of vinyl coating 71 (shown in Figuyre 3A) may then be applied to the exposed edge of the upper side attachment panel 58 of the panel section 50a to yield a relatively smooth surface transition between the adjacent panel sections 50a and 50b.

In a similar manner, opposite ends of each of the elongate panel sections 50 may be joined with an additional panel section by use of the frontal and rear attachment panels 62 and 63, respectively. As shown in Figure 3, the additional section 50c is juxtapositioned at one end of the panel section 50b such that their foam cores 52 lie in an aligned abutted relationship. The frontal attachment panel 62 and end portion of the panel section 50b may be rolled off the surface of the slope 12 exposing the rear attachment panel 63 of the panel section 50c. Additional spikes 64 may then be driven through the rear and side attachment panels 63 and 60 of the panel section 50c thereby anchoring the panel 50c to the slope 12. Subsequently, a suitable adhesive may be applied to the upper surface of the rear attachment panel 63 of the panel section 50c and under surface of the frontal attachment panel 62 of the panel section 50b with the panel sections 50b and 50c being pressed tightly upon each other to form a secure juncture. As previously described, a thin vinyl layer 71 (Figure 3A) may then be applied over the exposed edge of the frontal attachment panel 62 to form a substantially smooth surface transition joint between the panels 50b and 50c.

As may be recognized, by such a procedure, multiple panel sections 50 may be anchored to he slope and secured to adjacent panel sections on both sides and opposite ends to form a contiguous vinyl-coated foam covering for the entire surface of the slope 12. Additionally, as shown in Figure 2 and 3, the ends of panel sections 50 in adjacent rows are preferably staggered or offset upon the slope

excavation 12 to form a brick-like lattice construction. By such an offset staggered arrangement, the discontinuities formed at the abutment of the foam cores 52 of adjacent panel sections 50 are distributed over the entire surface of the apparatus 10 rather than being concentrated along a single line, so that the strength of the vinyl foam covering 30 is maintained through prolonged use.

In the preferred embodiment, the contiguous resilient substrate 30 formed by the interconnected panel sections 50 is provided with a water irrigation system which distributes a thin film of water over the upper vinyl surface of the apparatus to reduce surface friction and yield a slippery planing surface. Referring to Figures 4 and 5, the detailed construction of a first embodiment of this water irrigation system may be described.

As shown in the first embodiment of the irrigation system, each of the panel sections 50 includes a groove or recess 70 positioned along its lower surface which extends centrally throughout its length. The groove 70 is sized to loosely receive a length of flexible plastic tubing 72 including a plurality of standard "T" fittings 74 paced at intervals along its length. The tubing length 72 is typically formed of polyvinyl chloride material and is rigidly affixed and maintained within the recess 70 as by way of an adhesive during manufacturing of the prefabricated panel sections 50.

Each of the pipe fittings 74 is sized to accept one end of a flexible distribution tube 76 which may be formed in varying lengths to extend laterally outward from the central tubing length 72 to selected areas of the panel section 50. The opposite end of each of the distribution tubes 76 may be inserted through an aperture 80 formed in the panel section 50 and maintained therein by the application of a suitable adhesive within the aperture 80. As will be recognized, the aperture 80 may be

manually formed during the installation of the panel section 50 upon theslope 12 or alternatively prefabricated into the panel section 50 during manufacture.

As shown in Figure 5, the apertures 80 are preferably formed to extend angularly through the panel sections 50 and be oriented to face downward upon the slope. The upper end of the distribution tubes 76 are cut along a bias to be flush mounted with the top vinyl sheet 54 of the panel sections 50 and may be subsequently sealed to the top vinyl sheet 54 by the application of a vinyl coating about its outside diameter. By such an arrangement, it will be recognized that the flexible distribution tubes 76 may deform within the urethane core 52 of each of the panel sections 50 without tearing loose from the upper vinyl sheets 54. Additonally, due to the bias/cut flush mounting with he vinyl sheet 54, a user may harmlessly slide over their exposed opened ends while traveling down the apparatus 10.

Each of the central tubing lengths 72 of the panel sections 50 is interconnected to form a composite irrigation system by means of suitable couplings (not shown) which are positioned during the previously described installation process of the individual panel sections 50 upon the excavation 12. The composite irrigation system is connected as by way of a manifold (not shown) to a water supply introduced at the uppermost elevation of the apparatus 10 such that gravity aids in the flow of water through the irrigation system, releasing small quantities of water through each of the open ends of the distribution tubes 76.

As shown in Figure 1, a drain line or collector 40 is preferably provided at the lowermost elevation of the slope 12 which receives the water flowing down the slope surface of the apparatus 10. The drain line 40 may be connected in series with a pump 42 and suitable filtering unit 34 to recirculate the water back to the manifold (not

shown) at the uppermost elevation of the apparatus wherein the water may again travel through the composite irrigation system. As will be recognized, the irrigation system thus applies a continuous thin film of water to the upper vinyl sheets 54 of the panel sections 50 as depicted in Figure 3.

In those instances where the general downward inclination of the apparatus is great, it may be necessary to use a second embodiment irrigation system which reduces any pressure gradient within the irrigation system between the uper and lower portions of the apparatus. The construction of this second embodiment is depicted in Figure 4A wherein instead of the central tubing 72, each of the panel sections 50 includes plural primary tubing sections 73 which are spaced along the length thereof and extend laterally across the width of the panel sections 50. Each of the primary tube sections 73 is provided with a plurality of distribution tubes 75 which as with the distribution tubes 76 of Figures 4 and 5 preferably are attached to the primary tube sections 71 by way of a T connection and extended angularly through panel sections 50 being bias/cut at their upper end to be flush mounted with the top vinyl sheet 54.

Each of the primary tubing sections 71 of the panel sections 50 may be interconnected by way of a coupling (not shown) to a corresponding tubing section of an adjacent panel section 50 to form a composite irrigation system during the previously described installation process of the individual panel sections 50 upon the slope 12. Once interconnected upon the excavation, each of the primary sections 71 may be connected to a suitable manifold (not shown) extending throughout the length and on one side of the apparatus which is connected to a suitable water supply. Further, the manifold may include conventional pressure regulation means to ensure that constant pressure is applied to each of the interconnected

primary tube sections 71 along the length of the apparatus.

In Figure 6, the detailed construction of one of the stationary wave-like contours 14 of the present invention is depicted. The excavation 12 in the vicinity of the wave-like contour 14 is formed to protrude vertically upward having a substantially convex outer surface configuration. The upper portion 90 of the wave-like contours 14 is typically formed having a tooth-like cross-sectional configuration such that opposite sides of the wave form 14 both approximate the crest of a wave. Although the upper portion 90 of the wave form 14 may be formed of earth fill, it is preferable to fabricate the portion 90 from either concrete which is poured in place upon the excavation 12, or rigid urethane foam which may be prefabricated and positioned upon the excavation 12. In either instance, the upper portion 90 may be anchored to the excavation by plural support rods 91 extending a substantial distance into both the upper portions 90 and excavation 12.

The entire wave form 14 is covered with one or more resilient vinyl panel sections 50 in a manner previously described and interconnected to adjacent panel section 50 to form a contiguous surface covering. The particular configuration of the wave form 14 may be varied to provide differing shaped wave contours; however, it is preferable that the uppermost surfaces 92 of the upper portion 90 extend outwardly from the center line of the wave form 14 so that a user is prevented from passing over the wave form 14 during travel down the apparatus 10.

Although the present invention is designed to permit a user to plane down the apparatus on his body, tire inner tube or a mat, typically a board vehicle 100, specifically adapted for use upon the apparatus 10, will be utilized by a user to simulate ocean wave board surfing. As shown in Figure 7, the board vehicle 100, preferably fabricated of

a fiberglass, a semi-rigid polymer, or vinyl-coated rigid urethane substrate, is formed having a generally surfboard-like configuration including a wedge-shaped rudder member 102 formed along its lower surface. (Note that in Figure 7 the board vehicle 100 is shown in an inverted orientation for purposes of illustration.) The rudder member 102 is preferably tapered, initiating at a distance spaced from the front end 101 of the board 100 and increasing in height as well as width dimensions as it approaches the board's rear end 103. The lower surface of the board may be formed in a generally planar configuration or alternatively with a slight convexity to augment maneuverability upon the apparatus 10.

With the structure defined, the operation and specific manner in which the apparatus 10 of the present invention simulates natural ocean wave surfing conditions may be described. As shown in Figure 1, a user may stand or kneel upon the board vehicle 100 and embark upon the apparatus at its uppermost elvation. Due to the thin film of water distributed over the upper vinyl sheets 54 of the panel sections 50 and the downward inclincation of the excavation 12, the user accelerates as he travels generally downward upon the apparatus 10.

The speed of travel on the apparatus may be controlled by the user selectively positioning his body weight upon either the frontal portion of the board vehicle 100, wherein the smooth concave lower surface of the board vehicle may freely plane across the thin film of water, or alternatively upon the rear portion of the vehicle 100, wherein the rudder member 102 is forced downward thereby deforming the foam cores 52 of the panel sections 50 and displacing the water film to increases frictional drag.

Maneuverability is additionally provided by the user shifting his weight upon the board vehicle 100 causing the rudder member 102 to selectively deform the foam core 52 of the panel sections 50. As shown in Figure 8, by

shifting body weight laterally upon the board vehicle 100, a user may depress the portion 106 of the foam core 52 lying on one side of the rudder section 102 causing the portion 105 of the foam core 50 lying on the other side of the rudder section 102 to raise vertically upward due to the depression and corresponding raisng of the foam between the board vehicle 100 and the core 52 is selectively increased which causes the board vehicle 100 to be urged in the path of least resistance. As such, the frictional forces permit a user to obtain a "bite" from the foam core 52, thereby generating user-selected directional changes upon the apparatus.

As will be recognized, the resilient vinyl surface covering 30 of the apparatus deforms (i.e., reacts) in a proportional manner to the shifting of weight upon the board 100, with the greater foam depression 106 generating greater frictional drag and permitting greater direction changes. As such, a user may traverse down the apparatus, banking off the wave-like contours 14 to selectively increase and decrease speed andshifting his body weight upon theboard vehicle 100 to obtain a "bite" from the foam core to cut back and stall during travel down the apparatus. Thus, board surfing can be effectively simulated on the apparatus 10.

In the preferred embodiment, the apparatus 10 is formed to provide a plurality of discrete paths of travel down the slope, indicated by the arrows in Figure 1. By proper excavation, shaping or construction, each of the paths may be calibrated to provide varying levels of skill and speed thereby accommodating both novice and experienced users. In addition, a children's path may be provided which extends substantially straight down the slope without encountering any wave forms 14 or large surface irregularities.

Although in the preferred embodiment, it is contemplated that the surfboard-like vehicle 102 (as shown

in Figure 8) will be utilized upon the apparatus 10, it is within the scope of the present invention that other similar board structures, such as sleds or mats, may be utilized without departing from the spirit of the present invention. Additionally, due to the thin layer of water flowing down the apparatus 10, as well as the soft resilient foam core 52 of the individual panel sections 50, users falling off the vehicle apparatus may travel harmlessly down the slope, safely decelerating when they reach the frontal portion 22 of the apparatus.

As such, it will be recognized that the present invention provides a relatively low cost aquatic amusement apparatus which simulates the natural wave action encountered during surfing, while eliminating the substantial safety and site location difficulties heretofore associated in prior art wave simulating apparatus.

IT IS CLAIMED:

1. An amusement apparatus 10 characterized by being for simulating riding motion over an ocean wave as encountered in ocean surfing, and comprising:

a shaped slope 12 having a generally downward inclination to provide a desired rate of descent; and

a plurality of prefabricated panel sections 50 positioned on said slope forming a relatively seamless covering with a smooth surface finish on which a user may slidably travel, said panel sections 50 adapted to deform to direct a user's path in response to forces exerted against them by said user in sliding travel, each of said sections 50 comprising:

an upper and lower surface sheet 54, 56, said upper sheet 58 having a smooth surface finish to provide a slippery surface when wet;

a resilient core 52 disposed between said surface sheets;

means for interconnecting said panel sections 50 to provide a relatively seamless upper smooth surface including means for anchoring said panel sections to said slope; and

means for applying a film of water to the smooth surface of said upper sheet 54 in continuum.

2. An apparatus as claimed in Claim 1, characterized in that interconnecting means comprises:

an extended portion 58 of said upper surface sheet 54 extending outwardly along the peripheral edges of said core 52; and an extended portion of said lower surface sheet 56 extending outwardly along the peripheral edges of said core 52, each of said panel sections 50 positioned adjacent to and along an edge of another panel section with said upper and lower surface sheet 54, 56 extended portions 58, 60 overlaying and underlaying the respective upper and lower surfaces of adjacent panel sections and bonded thereto.

3. An apparatus as claimed in any of Claims 1 to 5, characterized in that said applying means 72, 74, 76 is included within each prefabricated panel section 50 positioned beneath and extending through said upper surface sheet 54 to flexibly cooperate with said resilient core 52 to yield when said panel section 50 is deformed by a user sliding thereon.

4. Apparatus as claimed in Claim 1, 2, or 3, characterized in that said water applying means is adapted to supply water upwardly through openings distributed throughout the upper surface 54 of said panel sections 50.

5. An apparatus as claimed in any of Claims 1 to 4, characterized in that said water applying means is positioned in each of said prefabricated panel sections and comprises:

at least one fluid conduit 72 positioned in and extending through said panel section 50;

one or more distribution tubes 76 positioned within said panel section 50, having one end connected to said conduit 73 and a second opposite end opening through and to said smooth surface of the panel section;

coupling means 74 for interconnecting said fluid conduits to adjacent ones of each of said panel sections; and

means for supplying water to said interconnected fluid conduits.

6. An apparatus as claimed in Claim 5, characterized in that said second end of the distribution tube 76 opening to said smooth surface extends angularly through said panel section from said conduit forming an acute angle with said surface to flexibly cooperate with said panel section when it is deformed.

7. An apparatus as claimed in any of Claims 1 to 6, characterized in that said shaped slope 12 included plural surface irregularities 14, 16, 18 to selectively increase and decrease the descent of said user upon said slope.

8. An apparatus as claimed in any of Claims 1 to 7, characterized by further comprising one or more raised wave-like contours 14 formed on said shaped slope 12, said contours 14 having a generally concave outer surface configuration and adapted to permit a user to bank against them during sliding travel down said slope.

9. An apparatus as claimed in Claim 8, characterized in that said wave-like contours 14 are positioned to form a curvilinear path having a generally downward inclination.

10. An apparatus as claimed in any of Claims 1 to 9, characterized in that said shaped slope includes a frontal portion 22 adjacent its lowermost elvation having a slight upward inclination to gradually decelerate auser after travel down said slope.

11. An apparatus as claimed in any of Claims 1 to 10, characterized by further comprising at least one vehicle 100 adapted to be ridden by a user on said covering to permit a user to maneuver during travel down said slope.

12. An apparatus as claimed in Claim 11, characterized in that said vehicle(s) 100 comprises an elongate member, including a rudder 102 on one surface thereof for selectively deforming said covering in response to the shifting of a user's body weight on said elongate member, said rudder comprising a wedge-shaped protrusion on said one surface of said elongate member initiating at a distance spaced from one end 101 of said member and increasing in height and width toward the opposite end 103 of said member.

13. A method for adapting a hillside to form an amusement device characterized by simulating a natural wave action encountered during ocean surfing by:

shaping said hillside to form a sloped surface 12 having one or more surface irregularities 14, 16, 18, and a downward inclination sufficient to provide a desired rate of descent;

covering said sloped surface with a smooth planing surface 20; and

applying a sufficient quantity of water onto said planing surface to flood said planing surface with a water film to permit a user to plane down said sloped surface.

14. A method as claimed in Claim 13, further characterized by forming one or more raised barriers 14 on said sloped surface having a generally concave outer surface configuration approximating the crest of an ocean wave.

15. A method as claimed in Claim 13 or 14, characterized in that said covering step comprises covering said sloped surface with a deformable layer having a resilient lower surface pad and a slippery upper surface.

16. A method as claimed in any of Claims 13 to 15, characterized in that said smooth planing surface comprises a plurality of individual deformable panel sections and said covering step comprises:

placing said plurality of said panel sections 50 upon said sloped surface;

juxtapositioning said plurality of panel sections so that adjacent panel sections are abutted together along opposite edges; and

securing adjacent panel sections together along said edges to form a continuous covering for said sloped surface.

17. A method as claimed in Claim 16, characterized in that said panel sections include attachment panels 60, 63 extending outboard along their opposite edges, and between said juxtapositioning step and said securing step, said method comprising the further steps of:

placing one of said attachment panels 60, 63 of one of said plurality of panel sections 50 to underlay an edge of an adjacent panel section;

affixing said one of said attachment panels 60, 63 to said sloped surface;

placing the corresponding one of said attachment panels 60, 63 located on said edge of said adjacent panel 50 sections to overlay an edge of said one of said plurality of said panel sections 50; and

repeating said above steps for all of said plurality of said panel sections.

18. A method as claimed in Claim 17 characterized in that said securing step comprises:

applying an adhesive to the respective portion of each of said attachment panels 60, 63 which underlay and overlap said edges of said plurality of said panel sections 50.

19. A method as claimed in Claim 18, further characterized by:

applying a flexible material to each of said attachment panels 60, 63 overlaying said panel sections to form a generally smooth transition between said attachment panels 60, 63 and said upper surface of said panel sections 50.

20. A method as claimed in any of Claims 16 to 19, characterized in that said panel sections each include an irrigation conduit 72 positoned beneath said planing surface and said covering step additionally comprises:

connecting one end of a distribution tube 76 to said irrigation conduit 72;

extending the other end of said distribution tube 76 outward from said conduit to a selected area of said panel section 50;

inserting the other end of said tube 76 through said panel section 50 to expose said other end to said smooth planing surface; and

affixing said other end of said tube to said panel section to maintain said tube in said inserted position.

21. A method as claimed in Claim 20, further characterized by comprising:

inserting said other end of said tube 76 to extend angularly through said panel section 50, so that said other end of said tube forms an acute angle with said planing surface.

22. A method as claimed in Claim 21, further characterized by comprising:

cutting said other end of said tube 76 along a bias to permit said other end to be flush mounted with said planing surface.

23. A method as claimed in any of Claims 13 to 22, further characterized by providing a vehicle 100 adapted to support a user on said deformable layer during travel down said sloped surface.

24. A method as claimed in Claim 23, further characterized by:

forming a rudder member 102 on said vehicle 100 adapted to selectively deform said deformable layer in an amount proportional to the shifting of said user's body weight on opposite sides of said rudder member 102, said deformation permitting said user to maneuver during travel down said sloped surface.

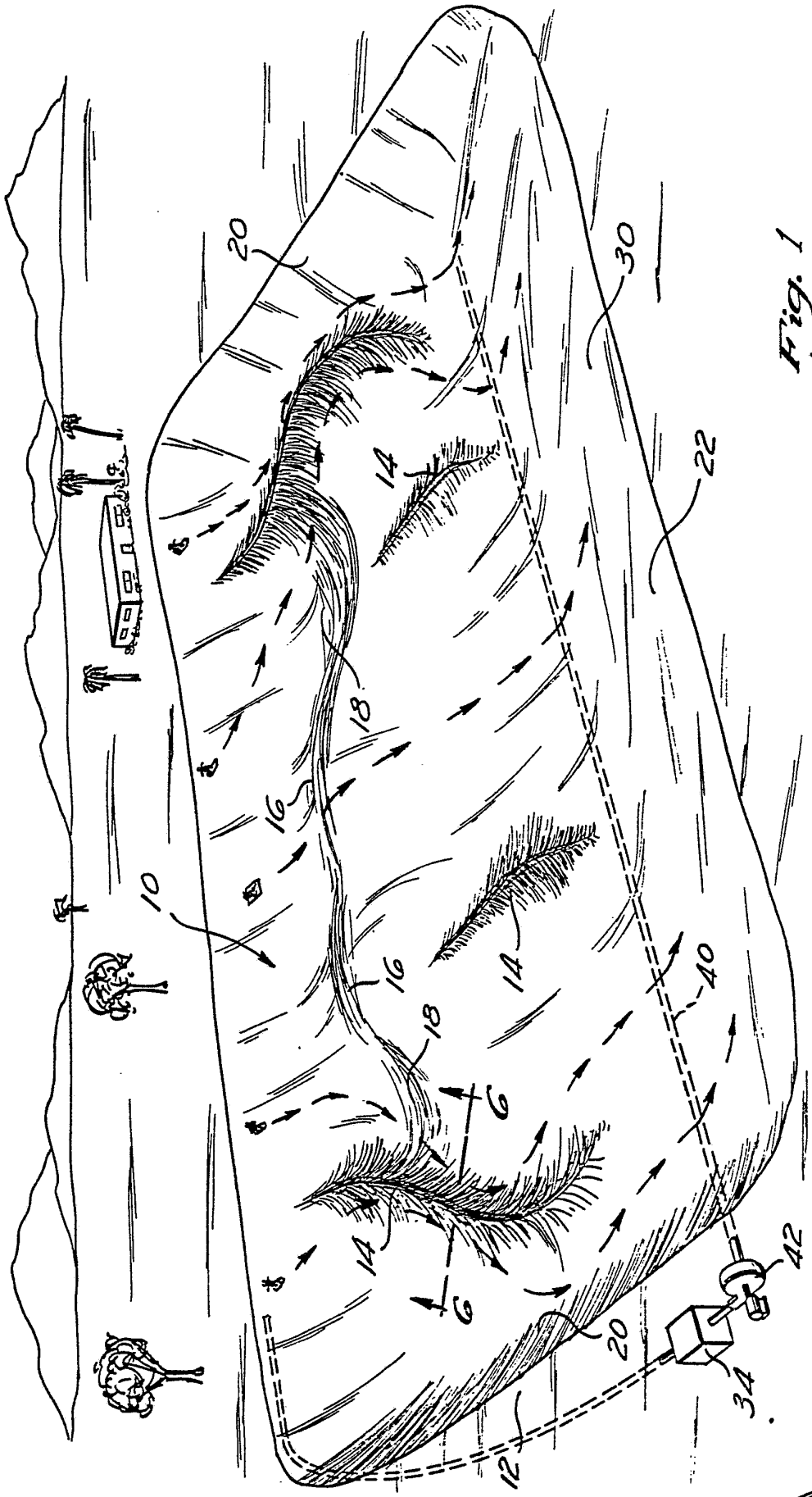


Fig. 1

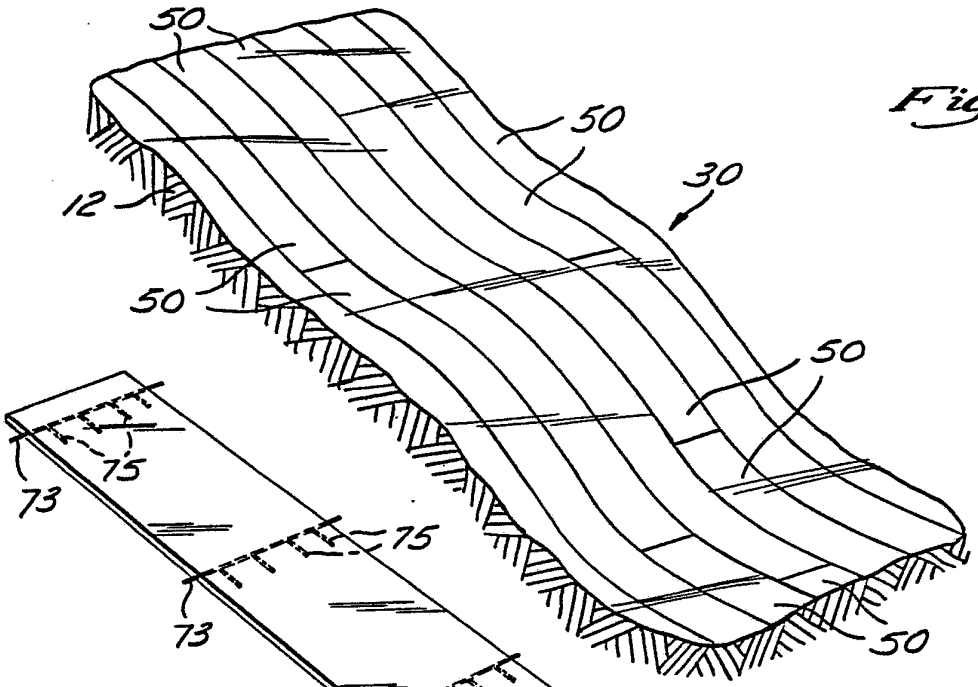


Fig. 2

Fig. 4a

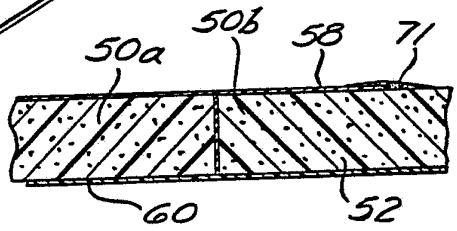
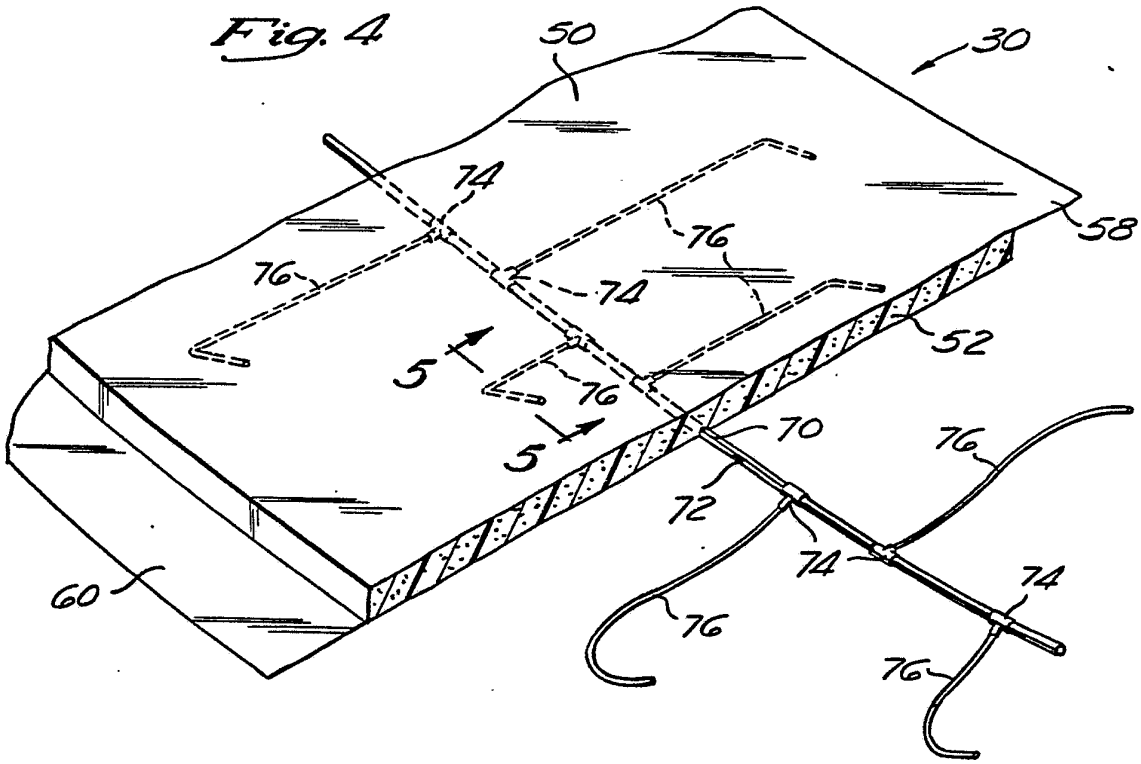


Fig. 3a

Fig. 3

Fig. 4



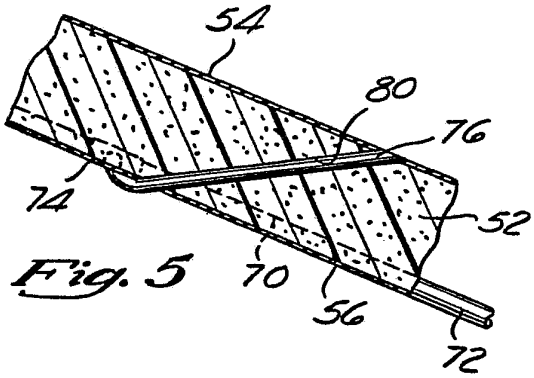


Fig. 5

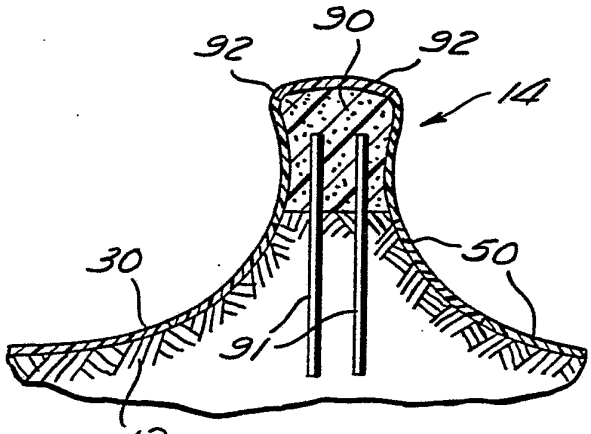


Fig. 6

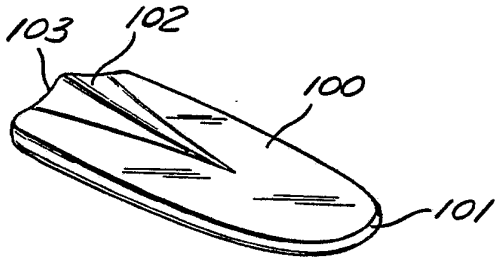


Fig. 7

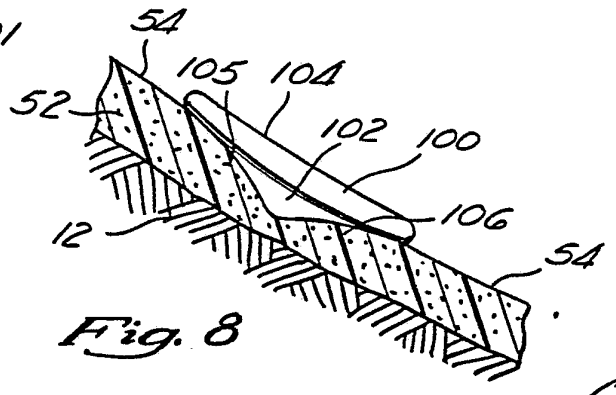


Fig. 8

INTERNATIONAL SEARCH REPORT

International Application No PCT/US82/00772

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL.[3] A63G 21/18

U.S. CL. 272/56.5R; 104/70

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	272/56.5R, 56. 5SS, 1R,1B,3,97,109 104/53,58,59,69,70,72,73,86,134 441/65 165/56,57,139, 180/125, 5/421,422,423,461,468, 469,473,417

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US, 695,444 Published 18 March 1902. See Col.1, lines 45-49 and Col.2,lines 55-61 Carson et al.	1,3,4,10
Y	US, 2,254,482 Published 02 September 1941 See Col.2, lines 21-23. Heller	1,7,8,9
A	US, 3,406,617 Published 22 October 1968 Randazzo	1
A	US, 2,982,547 Published 02 May 1961 Carrier	1
A	US, 2,174,716 Published 3 October 1939 Bethell	3,4,10,11
A	US, 3,690,265 Published 12 September 1972 Horibata	

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
October 04,1982	08 OCT 1982
International Searching Authority [1]	Signature of Authorized Officer [20]
ISA/US	A.W. Kramer

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A	US 1,441,126 Published	02 January 1923 Sherman et al.	6
Y	US 3,497,211 Published	24 February 1970 Nagin	1,11,12
X	US 3,923,301 Published	02 December 1975 Myers	13,14

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [10]

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

1. ☐ Claim numbers....., because they relate to subject matter [12] not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out [13], specifically:

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [11]

This International Searching Authority found multiple inventions in this international application as follows:

Claims 1-12 drawn to an amusement apparatus comprising a shaped slope having a wetted covering.

Claims 13-24 drawn to the method of adapting a hillside to form an amusement device comprising shaping a hillside to form a sloped surface and covering it with a wetted surface.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application. Supplemental search fees authorized in transmitted letter and verified by phone to charge to account No. 11-141 addit'l al $25 $125

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

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

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.