Nov. 14, 1967 R. I. SWANSON 3,352,567

PRE-STRESSED SNOW COASTER

Filed Sept. 3, 1965

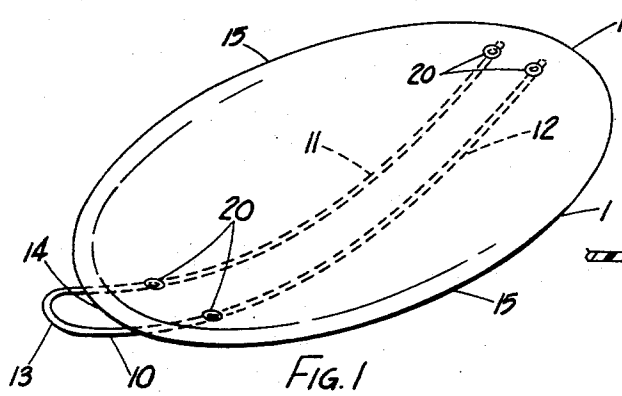


FIG. 1

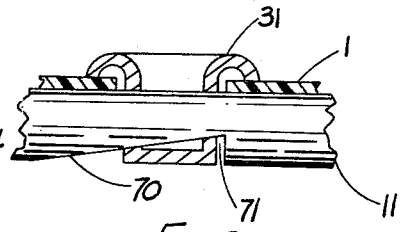


FIG. 8

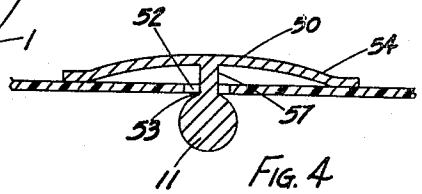


FIG. 4

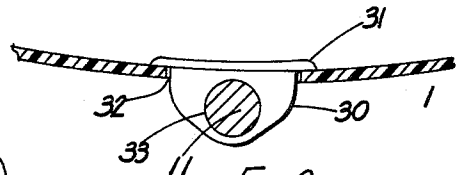


FIG. 2

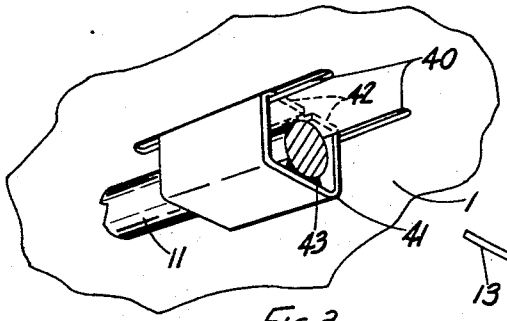


FIG. 3

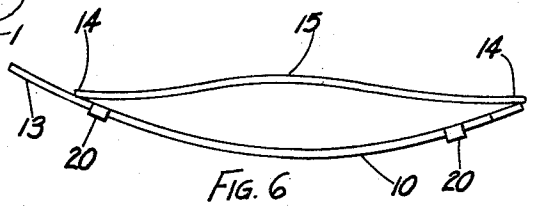


FIG. 6

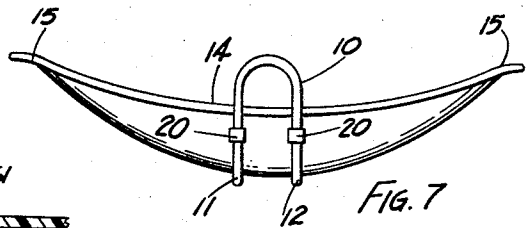


FIG. 7

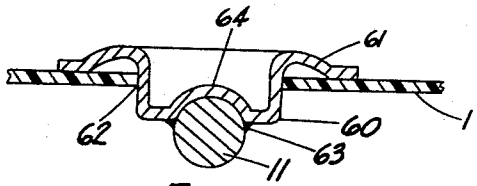


FIG. 5

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PRE-STRESSED SNOW COASTER

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ABSTRACT OF THE DISCLOSURE

A pre-stressed coaster having a flexible concave-convex shell and an elongated flexible U-shaped runner. The runner is abuttingly affixed to the convex side of the shell and the relative flexibilities of the runner and the shell cause a flattening of the shell along one diameter thereof. The connections between the runner and shell permits the runner to slide with respect to the shell when the runner strikes an object, thus preventing tearing of the shell at the runner attachment points.

This invention relates to sporting goods and more particularly to a pre-stressed snow coaster.

Saucer-shaped snow coasters are well known in the sporting goods field. They are usually fabricated from either metal or a fibrous glass reinforced plastic. These saucer-shaped snow coasters suffer from a number of serious disadvantages pertaining to both manufacture and use.

The metallic saucers are heavy and develop jagged edges when slightly deformed by striking a tree or rock. Also they rapidly become dented and lose their smooth surfaces and ability to slide over the snow. The lighter fibrous glass reinforced plastic saucers are fragile and suffer serious abrasion damage when the coasting surface is not perfectly smooth. The plastic saucers also tend to split or tear whenever any object is struck by them.

Snow coasting saucers currently in use are difficult for the rider to control. The fibrous glass reinforced plastic saucers in particular tend to deform under the rider's weight. This deformation increases and makes irregular the surface area contacting the coasting surface, thus resulting in a relatively circular and irregular pivot base that moves from one position to another as the rider's weight is shifted. Such a pivot base allows tracking and direction control only to the extent dictated by the contour of the terrain. This often permits uncontrolled spinning, a contributing factor to many serious accidents resulting from riders descending a slope backwards and unable to see upcoming objects. Aside from this dangerous aspect, it is difficult, if not impossible, to control such saucers so that desired turns and maneuvers may be executed.

When manufacturing current snow coaster models, handles must be provided on opposite sides of the coaster so that the rider will have something to grasp. These handles also serve as a means of storing the coaster when it is not in use.

Objects and specifications

It is an object of this invention to provide a pre-stressed snow coaster which retains the advantages of saucer-shaped snow coasters currently in use, and yet, is not subject to the above outlined disadvantages.

More particularly, it is an object of this invention to provide a pre-stressed snow coaster which is capable of withstanding uneven terrain, bumps, and stresses without fracturing.

It is an object of this invention to provide a light pre-stressed snow coaster which is relatively unaffected by the abrasive effects of the coasting surface.

It is an object of this invention to provide a pre-stressed snow coaster which has a shock resistant member affixed to the front thereof to prevent fracturing of the coaster when an object is struck.

It is another object of this invention to provide a pre-stressed snow coaster which may be easily and positively controlled by the rider.

It is an object of this invention to provide a pre-stressed snow coaster which has a short, parallel pivot base which is pre-stressed in such a manner that the runner contact retains its original position on the sled with respect to the rider, thus allowing a controlled change in direction by a mere shift of the rider's weight.

It is an object of this invention to provide a pre-stressed snow coaster which can be slowed when the rider so desires.

It is an object of this invention to provide a pre-stressed snow coaster which will not experience uncontrolled spins during descent of the slope.

It is another object of this invention to provide a snow coaster which does not have to be provided with handles during the manufacturing process.

These and other objects of this invention will be clearly understood with reference to the following specification and figures in which:

FIG. 1 is a perspective view of the pre-stressed snow coaster which is the subject of this invention;

FIG. 2 is a cross-sectional view illustrating one mode of attaching the runner to the shell;

FIG. 3 is a perspective view partially in cross-section illustrating another mode of attaching the runner to the shell;

FIG. 4 is a cross-sectional view illustrating another mode of attaching the runner to the shell;

FIG. 5 is a cross-sectional view illustrating yet another mode of attaching the runner to the shell;

FIG. 6 is a side elevation view of the pre-stressed snow coaster which is the subject of this invention;

FIG. 7 is a front elevation view of the pre-stressed snow coaster which is the subject of this invention; and

FIG. 8 is a cross-sectional view showing means whereby the runner may be locked into the runner attachment device.

Briefly, the objects of this invention are accomplished by affixing a flexible U-shaped runner to the convex side of a flexible, saucer-shaped shell. The relative flexibilities of the runner and shell are such that the surface of the shell is partially flattened along one diameter thereof. This flattening results in a rolling up of the sides of the shell, thus providing handles for the rider. Referring now to the figures several preferred embodiments of this invention will be discussed in detail.

FIGS. 1, 6 and 7 show a saucer-shaped shell **1**. A U-shaped runner **10** has been affixed to the convex side thereof. Preferably, the shell **1** is fabricated from fibrous glass reinforced plastic and the runner **10** is fabricated from the steel wire. The shell initially is in the form of a spherical segment and the runner is initially flat before the two parts are joined by fasteners **20**. By way of example it has been found that a 5/16 inch diameter wire will provide the desired degree of contour for a 24 inch saucer. Four of these fasteners have been found sufficient and they are preferably spaced near the outside edges of the shell as shown in FIG. 1. When runner **10** is affixed to the shell **1** it pre-stresses the shell as shown best in FIGS. 6 and 7. That is to say, that the runner **10** bows upward while the shell **1** tends to flatten out along the axis of the runner. This flattening results in a rolling up the sides **15** of the shell. These rolled up sides serve as handles during use of the coaster. Thus, viewed from the side in FIG. 6, peripheral sections **15** of shell **1** are higher than peripheral sections **14**. This stressing of the fibrous glass reinforced plastic renders it much stronger than it is in its

relaxed configuration. The base of U-shaped runner **10** provides a convenient carrying and storing handle **13**. It has been discovered that the snow coaster will be most durable when means are provided for fastening the runner to the shell which allow some degree of axial sliding movement between the shell and the runner. The fastener must have a relatively high friction constant such that sliding will occur only when necessary to absorb shock and other stresses on the fastener.

Referring now to FIG. 2, one such mode of attaching the runner to the shell will be discussed in detail. A cup-shaped fastener **30** having a shoulder **31** is protruded through an aperture **32** in the shell **1**. The cup-shaped fastener **30** has two aligned runner receiving apertures **33** through which the runner **11** is passed. A high friction constant may be obtained partially by controlling the relative sizes of the runner leg **11** and the runner leg receiving aperture **33**. Preferably, however, the major portion of the friction constant should be provided by sizing cup-shaped fastener **30** in such a manner that runner leg **11** is drawn into tightly abutting relationship with the shell **1**. This may be accomplished, for example, by forming shoulder **31** after runner leg **11** has been passed through the runner leg receiving aperture and the cup-shaped fastener has been passed through the aperture **32** in the shell.

During use, when a force is exerted on the runner **10** such as, for example, by striking an object with the handle **13**, the force will be absorbed by a sliding movement between runner leg **11** and fastener **30**. In this manner, the shearing stress on the runner fastener is kept at a minimum. Since the cup-shaped fastener **30** is positioned near the outer diameter of the shell **1**, it does not experience a great deal of abrasive wear from the coasting surface.

When utilizing a fastener such as shown in FIG. 2, the runner **11** is preferably notched in the manner indicated at **70** in FIG. 8. The notch **70** has a shoulder **71** which prevents the runner from being pulled completely free of fastener **31**, thus allowing the pre-stressed coaster to relax. The shoulder **71** is positioned so that it lies on the opposite side of fastener **31** from handle **13**. In this manner stress absorbing axial movement is allowed when handle **13** strikes an object, but accidental pull out of the runner is prevented.

FIG. 3 illustrates another mode whereby the runner leg **11** may be slidably affixed to the shell **1**. Two axial slots **40** are provided in the shell **1** at the point where it is desired to attach the runner. A strap **41** is passed around runner leg **11** and through slots **40**. The width of the strap is less than the length of the slots **40**. The strap is welded to the runner leg **11** as indicated at **43** and then drawn tightly and crimped as indicated at **42** to affix the runner leg **11** in abutting relationship to the shell **1**. Of course, the ends of the straps could be joined by banding at **42** depending upon the particular type of material utilized.

In this embodiment, the high co-efficient of sliding friction between the runner leg **11** and the shell **1** is a product of the abutting relationship of runner **11** and shell **1**. As objects are struck by the lead end of the runner **13**, or as any other types of stresses are placed upon the runner **10**, the straps **41** merely slide back and forth in axial slots **40**. Again, this sliding action prevents the direct subjection of the fastening means to the high shear stresses resulting from impact.

Referring now to FIG. 4 a third mode of slidably affixing the runner to the shell will be discussed in detail. A fastener **50** having a shoulder **54** and a stem **51** is passed through an aperture **52** in shell **1**. Aperture **52** may take the form of an axial slot or, alternatively, may merely be a hole having a diameter considerably less than that of the shoulder **54** but considerably larger than that of stem **51**. The runner leg **11** is firmly abutted against shell **1** and welded **53** to the stem **51**, thus providing a high friction, slidable coupling. If aperture **52** takes the form of a slot, axial stresses are absorbed by a sliding of steam **51** in aperture **52**. If, on the other hand, aperture **52** takes the form of a generally circular hole, both axial and non-axial stresses are absorbed by the high friction sliding of shoulder **54** and runner leg **11** against shell **1**.

While a sliding coupling between the runner leg and the shell such as illustrated in FIGS. 2, 3, and 4 has many attributes, economic factors may dictate that such a coupling not be utilized. FIG. 5 shows one possible mode for rigidly affixing the runner leg **11** to the shell **1**. A cup-shaped fastener **60** having an axial recess **64** is spot welded to the runner leg **11** at **63**. The fastener **60** is then passed through a receiving aperture **62** in the shell **1** and its upper portion is bent over to form shoulder **61** and thus secure the runner leg to the shell. Alternatively, of course, the fastener **60** may initially be attached to the shell and the runner leg **11** then spot welded to recess **64**. A similar connection might be achieved by merely riveting runner leg **11** to shell **1**.

Thus it may be seen, that this invention has provided a novel and useful concept in the art of snow coaster manufacture. The pre-stressing of the fibrous glass reinforced plastic renders it much less susceptible to damage than previous models. In operation, the rider sits on the shell **1** and grasps sides **15**. If he wishes to slow his rate of descent he need merely lean back on the saucer and the trailing ends of runner legs **11** and **12** will operate to slow the coaster. Alternatively, he may stand on the saucer utilizing the exposed portions of the fasteners **20** as foot pads. The exposed portions of the fasteners **20** also may be utilized to retain foot straps or bindings. Because of the short pivot distance of the runners, the slight shifting of the rider's weight will be effective to change the direction of descent. The coaster may be carried to and from the coasting area and stored by means of the handle **13** provided by the base of the U-shaped runner **10**.

While several preferred embodiments of this invention have been described together with minor modifications, it will be recognized that other modifications may be made without departing from the scope and spirit of the invention. Such modifications are to be deemed as included within the scope of the following claims unless these claims, by their language, expressly state otherwise.

I claim:

1. A snow coaster comprising:
a generally concave shell of resilient material;
a flexible U-shaped runner; and
means for attaching said U-shaped runner to the outer surface of said shell, the legs of said U-shaped runner forming separated elongated members on which said coaster is adapted to slide, said attaching means permitting relative sliding movement of said members with respect to said shell in a direction corresponding generally to the elongated reach of said members.

2. The combination as set forth in claim **1** which further comprises means for preventing the U-shaped runner from being pulled free from said attaching means.

3. A pre-stressed snow coaster comprising:
a flexible, generally circular, concave-convex shell normally having the shape of a shallow segment of a sphere;
an elongated flexible U-shaped runner, being substantially straight prior to attachment to said shell; and,
means for abuttingly affixing said runner to the convex side of said shell at at least four spaced points, the location of said affixing means and the relative flexibilities of said runner and said shell being such that the surface of said shell is partially flattened along one side thereof.

4. The combination as set forth in claim **3** in which said means for attaching comprises:
a plurality of pairs of relatively narrow slots in said shell, said slots running generally parallel to the legs of said U-shaped runner,

a plurality of straps having a width which is less than the length of said slots, each of said straps passing through one slot of a given pair of slots, around one leg of said U-shaped runner, and back through the other slot of said given pair of slots; and

means for securing the ends of said straps such that the U-shaped runner firmly abuts said shell.

5. The combination as set forth in claim 3 in which said means for attaching comprises:

a plurality of apertures in said shell, each of said apertures having a first width, and being centered along one leg of said U-shaped runner;

a plurality of fasteners, each of said fasteners having a shoulder portion abutting the inside surface of said shell, said shoulder portion being larger than said first width; said fasteners also having a stem portion which is smaller than said first width, said stem portion being affixed to said shoulder in such a manner that it passes through said aperture; and,

means for affixing said stem portion to said U-shaped runner leg.

6. The combination as set forth in claim 3 in which said means for attaching comprises:

a plurality of apertures in said shell, each of said apertures being centered along a leg of said U-shaped runner;

a cup-shaped fastener, said cup-shaped fastener having a shoulder abutting the inner surface of said shell and a cup portion extending through said aperture, said cup portion having means for slidably receiving the legs of said U-shaped runner.

7. A snow coaster comprising:

a shell of resilient material, said shell having the general shape of a portion of the surface of an ellipsoid which is defined by the partial intersection of said ellipsoid with a generally curved surface;

a flexible U-shaped runner; and

means for attaching said U-shaped runner to said shell, the legs of said U-shaped runner forming separated elongated members on which said coaster is adapted to slide, said attaching means permitting relative sliding movement of said members with respect to said shell in a direction corresponding generally to the elongated reach of said members.

8. The combination as set forth in claim 7 in which said means for attaching comprises:

a plurality of pairs of relatively narrow slots in said shell, said slots running generally parallel to the legs of said U-shaped runner;

a plurality of straps having a width which is less than the length of said slots, each of said straps passing through one slot of a given pair of slots, around one leg of said U-shaped runner, and back through the other slot of said given pair of slots; and,

means for securing the ends of said straps such that the U-shaped runner firmly abuts said shell.

9. The combination as set forth in claim 7 in which said means for attaching comprises:

a plurality of apertures in said shell, each of said apertures having a first width and being centered along one leg of said U-shaped runner;

a plurality of fasteners, each of said fasteners having a shoulder portion abutting the inside surface of said shell, said shoulder portion being larger than said first width; said fasteners also having a stem portion which is smaller than said first width, said stem portion being affixed to said shoulder in such a manner that it passes through said aperture; and,

means for affixing said stem portion to said U-shaped runner leg.

10. The combination as set forth in claim 7 in which said means for attaching comprises:

a plurality of apertures in said shell, each of said apertures being centered along a leg of said U-shaped runner;

a cup-shaped fastener, said cup-shaped fastener having a shoulder abutting the inner surface of said shell and a cup portion extending through said aperture, said cup portion having means for slidably receiving the legs of said U-shaped runner.

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