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R. YORK

3,422,732

ARTIFICIAL SKI MAT

Filed Aug. 15, 1966

Sheet 1 of 2

Fig. 1

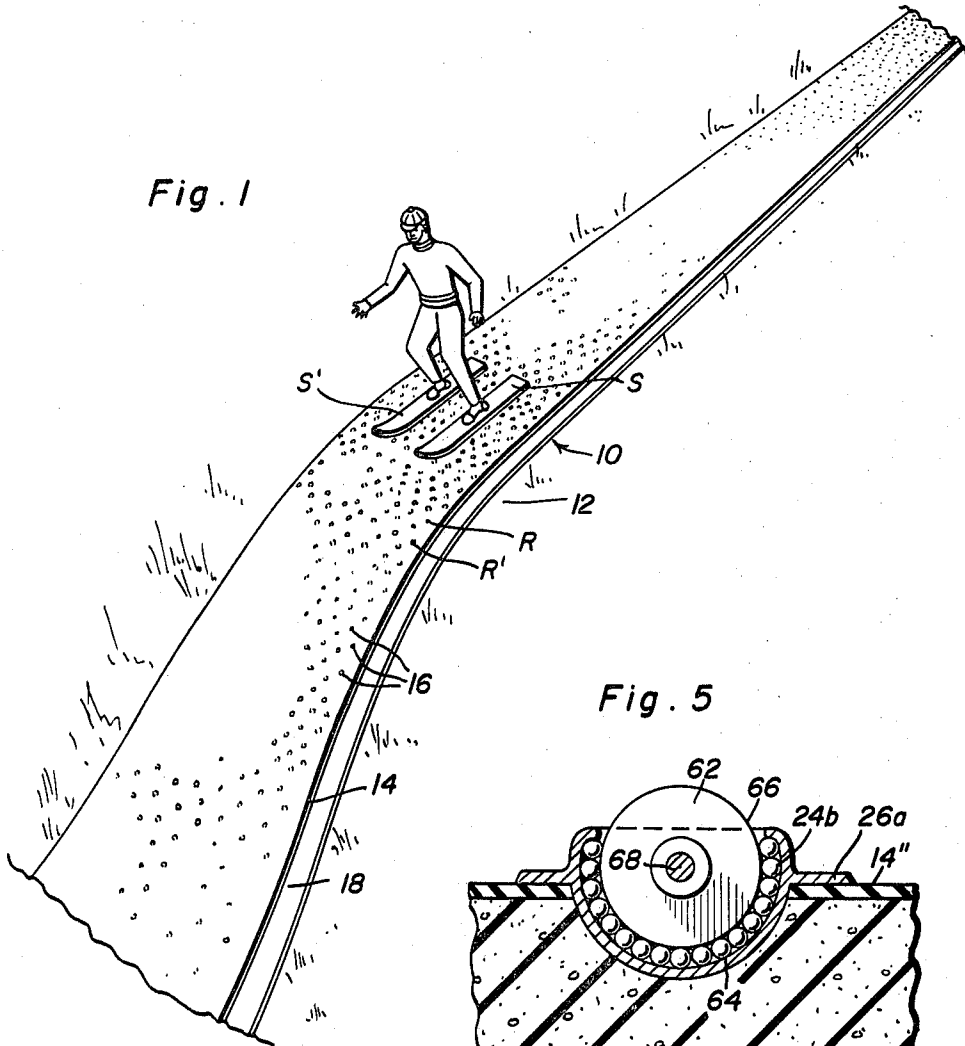


Fig. 5

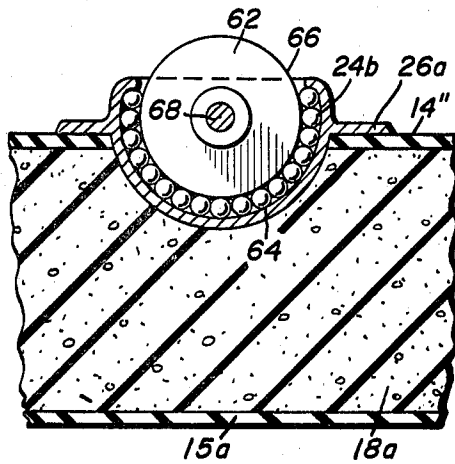
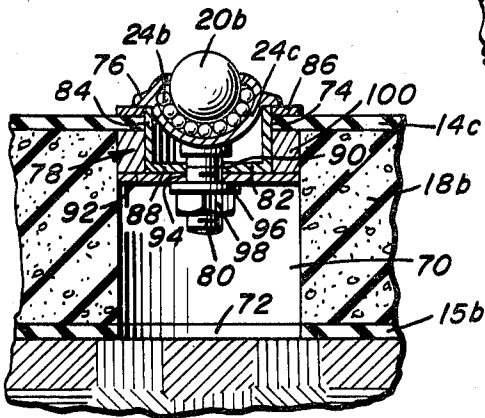


Fig. 6



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ARTIFICIAL SKI MAT

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3,422,732

ARTIFICIAL SKI MAT

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9 Claims

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ABSTRACT OF THE DISCLOSURE

A mat including upper and lower flexible surface portions for placement on an inclined ground surface. The mat includes deformable resilient structure disposed between the lower and upper surface portions thereof supporting the upper surface portion in elevated position relative to the lower surface portion for selective independent downward depression of portional areas of the upper surface portion of the mat relative to adjacent areas of the mat upper surface portion in response to the application of downward forces applied throughout given portional areas of the upper surface portion of the mat. The upper surface portion of the mat being provided with a plurality of journaled members substantially circular in vertical cross-section spaced closely apart both transversely and longitudinally of the mat with the upper peripheries of the journaled members projecting slightly above the upper surface portion of the mat.

This invention generally appertains to improvements in artificial ski slope constructions and more particularly relates to novel improvements in an artificial ski mat which can be employed to simulate natural skiing conditions in association with conventional skis.

The provision of artificial ski mats is known but such known artificial ski mats only permit a skier to travel in a straight line, simulative of the straight downward skiing movements of a skier on a snow covered slope or hill. In the instance where an artificial ski mat is employed whereby true skiing conditions can be simulated, known constructions require some structural association between a pair of skis and the surface of the ski mat, so that conventional skis cannot be employed.

An important object of the present invention is to provide an artificial ski mat which overcomes the drawbacks and disadvantages of such artificial ski mats or ski slopes of a known nature and with which a conventional pair of skis may be used and the ski mat will react to the shifting of weight by the skier on the skis in the same fashion as a naturally or artificially snow or ice covered surface.

Another important object of the present invention is to provide an artificial ski mat which can be used with conventional skis and whereby movement of the skis can occur in bodily forward gliding or shifting movements of the skier so that turning in any direction or changing movements may be volitionally executed by the skier in a smooth and frictionless manner.

Another important object of the present invention is to provide an artificial ski mat for use with conventional skis, the mat being so constructed that it has a frictionless ski supporting surface possessing a full extent of independent depressibility under the shifting weight of a skier using the conventional skis so that the skis can slide freely on the surface with the surface reacting in portional independent fashion to the shifting of weight by the skier on the skis with a portion of the surface supporting a more weighted ski being lowered in difference to an adjoining portion of the surface supporting the ski bearing less weight, and also, whereby turning in any direction or

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changing movements may be volitionally executed by the skier in a smooth and frictionless manner.

Another important object of the present invention is to provide a universal supporting means arranged in pre-selected patterns on the ski supporting surface so that movement of the skis can occur in bodily forward gliding or shifting movements of the skier.

Another important object of the present invention is to provide a simple, compact and inexpensive artificial ski mat, which is adapted for use with conventional skis without any structural modification of the skis, and which can be employed or utilized in the same manner by a skier as the skier would ski on a snow covered slope, for example, and which can also be used with a conventional bob sled or the like.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a view in perspective of an artificial ski mat, constructed in accordance with the present invention, and showing the same in use;

FIGURE 2 is a vertical, cross-sectional view thereof, showing the relationship of a pair of skis in use therewith;

FIGURE 3 is a fragmentary, detailed vertical sectional view, illustrating one manner of attaching one of the universal supporting elements to the ski supporting surface of the ski mat;

FIGURE 4 is a modified construction of the ski mat and showing a modified manner of supporting and attaching one of the universal supporting elements to the ski supporting surface;

FIGURE 5 is a fragmentary, vertical sectional view, showing a further form of supporting means and the manner of attaching the same to the ski supporting surface of the artificial ski mat; and

FIGURE 6 is a fragmentary, detailed vertical sectional view, illustrating a modification of the attaching arrangement of FIGURE 3.

Referring now more particularly to the accompanying drawings, and initially to FIGURES 1 and 2, the artificial ski 10 may be of any desired dimensions in plan, and the specific showing thereof in FIGURE 1 is merely exemplary in nature. As shown in FIGURE 1, the artificial ski mat 10 is elongated and is laid on an inclined ground surface 12 and conforms itself to the contour of the ground surface. The mat 10 may be of various widths and may be laid in a straight line or may be laid crosswise of an inclined ground surface or slope, such being matters of choice and depending upon the particular contour of the slope and the desires of the skiers.

The ski mat 10 comprises a strip 14, which is formed of suitably sturdy flexible material, preferably boiler rubber or other hard rubber or the like material. The strip 14 constitutes or defines a ski supporting surface, in structural and functional association with universal supporting elements 16, which protrude slightly above the upper face 14a of the surface forming strip 14.

The underface or side 14b of the strip is bonded or otherwise attached in superimposed face to face fixed relationship onto the upper face of a supporting body or block 18 of resilient multi-cellular, foam rubber, plastic or similar material, which supports the surface, as shown in FIGURE 2, with a bottom or base strip 15 of hard rubber, such as boiler rubber, or other suitable flexible material being bonded or otherwise secured to the underside of the supporting body and being adapted to rest on the ground or other supporting surface.

Each of the universal supporting elements 16 comprises

a spherical ball 20 which is mounted in a semi-spherical socket 22 and the corresponding concave face of the socket and confronting portions of the periphery of the ball 22 are spaced apart by a plurality of anti-friction ball bearings 24. Thus, the ball 20 is mounted in the socket for universal movement and for friction free movement, by virtue of the ball bearings 24.

Means is provided for attaching the retaining socket 22 for the ball 20 in a fixed position on the upper face 14a of the flexible strip 14, with the annular flange 26 of the socket clamped tightly on the upper face 14a. As shown in FIGURE 3, the attaching means comprises an elongated stud 28, which has its upper end fixed to or integral with the outer face of the socket and extending down through a vertical bore 30 in the resilient block 18. The stud 28 terminates in a lower, exteriorly threaded end portion 32, which is engaged by a clamping and locking member 34, that has a threaded opening 36 in its wall 38, the clamping and locking member being in the form of a nut or the like, which is seated in a counterbore 40 formed in the bottom portion 42 of the supporting body 18, the base strip 15 having an opening 41 in alignment with the counterbore 40.

As shown in FIGURES 1 and 2, the supporting elements 20 are formed in adjoining rows R and R' along the length of the mat, with the rows being in staggered relationship, so that the supporting elements 16 of the adjoining rows R and R' are in offset staggered relationship, relative to the length of the mat. The rows are in close adjacency, with respect to the length of the mat, and the elements 16, having the balls 20, of each row are offset, along the length of the mat.

Thus, as can be appreciated from a consideration of FIGURE 2, the mat is made up of the ski supporting surface, defined by the flexible element or strip 14 and the protruding balls 20 which protrude slightly above the upper face 14a of the strip and which lie in a common plane, when the strip has no weight placed thereon, and the foam rubber block or similar material 18 which constitutes body means in structural relationship with the ski supporting surface imparting to the frictionless ski supporting surface a resiliency so that the surface possesses a full extent of independent depressibility under the shifting weight of a skier using conventional skis S and S'. The base strip 15 provides a base for the body portion or means 18. Thus, the skis, under the weight of the skier, will depress the immediately underlying supporting portion of the mat and the undersides of the conventional skis S and S' will be supported at all points, widthwise and lengthwise, by the balls 20, due to the staggered row arrangement thereof, and the weight of the skier will depress the immediately subjacent portion of the block 18. In this respect, the skis can slide freely on the surface with the surface reacting in portional independent fashion to the shifting of weight by the skier on the skis with a portion of the surface supporting a more weighted ski being lowered in difference to an adjoining portion of the surface supporting the ski bearing less weight, as can be appreciated from a consideration of FIGURE 2.

Another applied arrangement, which accomplishes the same result, is shown in FIGURE 4, wherein the flexible strip 14' is supported by but vertically spaced from a flexible base strip 44, which is adapted to come into contact on its underface 44a with the ground surface. The ball elements 20a are rotatably mounted in supporting sockets 22a by anti-friction ball bearings 24a. The convex face 24' of the socket, which face lies below the underside of the strip 14', is supported by a spring 46. The upper coil 46a of the spring is attached, as by spot welding, soldering or the like 48, to the face 24', so that the spring will not shift relative thereto, while the lower coil 46b is secured and held captive by an anchoring plate 50, which has a circumferential flange 52 that grips and overlies the coil 46b. The plate 50 is formed with a substantially centrally disposed, internally threaded bore 54 to receive the threaded shank portion 56 of a locking screw or fastener

58, which has its kerf formed in head 58a seated or housed in a counterbore 60a of a bore 60 formed in the base strip 44.

Thus, the spring 46 for each ball 20a, which constitutes a universal supporting element, is the equivalent of the common supporting means namely, the foam rubber or plastic body or block 18 or block of similar material. The reaction and action of the supporting elements 20a and the ski supporting surface, defined by the flexible strip 14' and the balls 20a will be the same, in the embodiment of FIGURE 4, as that described in connection with the embodiment of FIGURES 1 through 3.

It can be appreciated that, due to universal mounting of the ball supporting elements 20 or 20a and the arrangement and placement thereof and the supporting thereof, the skier, using the conventional skis S and S' can move in any desired direction, that is, bodily forward or in sidewise or shifting movements, so that turning in any direction or changing movements may be volitionally executed by the skier in a smooth and frictionless manner.

Obviously, the mat can be laid in a straight, downward manner on an inclined slope and may be laid diagonally of the inclined slope or may be otherwise positioned in any laid manner on a ground surface and will conform itself to the contour of the ground surface or any other supporting surface.

In FIGURE 5, the body or block 18a supports a strip 14'' which has a semi-spherical socket 24b attached thereto, with the mounting flange 26a of the socket suitably fixed on the upper surface of the strip. A flexible base strip 15a is attached to the underside of the body 18a.

A wheel or roller 62 is rotatably mounted within the socket and is spaced from the inner concave face thereof by antifriction ball bearings 64. The peripheral surface 66 of the roller or wheel is adapted to roll on the ball bearings and a portion thereof projects above the upper open face of the socket, as shown in FIGURE 5. The wheel roller 62 is mounted for rotation within the socket by an axle or shaft 68, as shown in FIGURE 5.

A modified form of mounting the ball elements 20 of FIGURES 1-3 on the supporting surface is shown in FIGURE 6. With reference thereto, the foam body 18b is formed with a vertical opening or bore 70 which extends entirely therethrough. The flexible base strip 15b and the upper supporting strip 14c are formed with openings 72 and 74 which are in alignment with the bore 70, the opening 72 being of substantially the same cross-sectional area as the bore 70 while the opening 74 is of lesser cross-sectional area.

The semi-spherical socket 24c supports the spherical ball 20b for free rotation by means of the ball bearings 24b and the socket 24c has an annular shoulder 76.

In the mounting arrangement of FIGURE 3, the ball retainer socket 24 for the ball 20 is anchored onto the supporting surface, constituted by the strip 14, by bolt means attached to the body member 18. However, in the anchoring or attaching arrangement of FIGURE 6, the ball retainer socket 24c is attached or clamped directly to the flexible rubber strip 14c by an anchoring or attaching means 78.

The attaching means 78 includes a threaded stud or bolt 80 which fixedly depends from the underside of the convex face of the socket 24c. A cup-shaped member 82 is provided and is inserted in the opening 74 in the strip 14c with the open end thereof receiving the convex side of the socket 24c. The flat underside of the shoulder 76 seats on the upper edge of the side wall 84 of the member 82 and on a spacer washer 86 which encircles the upper end of the side wall 84 and has its upper face disposed substantially coplanar with the upper edge of the side wall. The washer 86 rests on the upper face of the strip 14c and surrounds the opening 74 formed therein to reinforce the portions of the strip around the opening. The upper end portion of the side wall 84 of the mem-

ber 82 is disposed within the opening 74 and reinforces the bounding wall thereof.

The member 82 has a bottom wall 88 which is formed with a substantially centrally disposed opening 90 through which the threaded bolt or stud passes and a flat washer member or plate 92 is disposed underneath the bottom wall 88. The washer member is of a size and shape in plan to complement the bore 70 in the foam body 18b and has a substantially centrally disposed opening 94 through which the bolt or stud 80 passes. A washer 96 and nut 98 are secured on the free depending end portion of the stud 80. A spacer ring 100 is positioned between the upper face of the washer member or plate 92 and the portion 102 of the strip 14c so that the socket 24c is clampingly attached or anchored to the flexible strip 14c.

It can thus be appreciated that the mat has a frictionless ski supporting surface possessing a full extent of independent depressibility under the shifting weight of a skier using conventional skis S and S' so that the skis can slide freely on on the surface with the surface reacting in portional independent fashion to the shifting of weight by the skier on the skis with a portion of the surface supporting a more weighted ski being lower in difference to an adjoining portion of the surface supporting a ski bearing less weight. Further, the mat has a universal supporting means arranged in a preselected pattern on the ski supporting surface so that movement of the skis can occur in bodily forward gliding or shifting movement of the skier whereby turning in any direction or change in movements may be volitionally executed by the skier in a smooth and frictionless manner.

Obviously, the mat may be used indoors by being placed on a supporting member or means as well as being usable outdoors by being laid on the ground surface. Furthermore, the mat may be used with a bob sled or the like type of flat bottom racer or a vehicle with flat ski-like runners.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An artificial ski mat for use with conventional skis, said mat including upper and lower flexible surface means spaced vertically apart and adapted to be laid on an inclined ground surface with said mat extending along said inclined surface and its lower surface means conforming to the contour of the ground surface, deformable shape retentive resilient means operatively disposed between said surface means and supporting said upper surface means in elevated position relative to said lower surface means for selective independent downward depression of portional areas of said upper surface means relative to the adjacent areas of said upper surface means in response to the application of downward forces applied thereon throughout given portional areas of said upper surface means, whereby the upper surface means of said mat may be depressed both horizontally and in inclined fashion in loaded areas thereof disposed beneath a pair of skis moving thereover, said upper surface means including rigid individual socket means recessed therein and supported therefrom at points spaced closely together both transversely and longitudinally of said mat, said socket means defining upwardly opening sockets, and a plurality of rigid anti-friction elements rotatably and

captively received in said sockets, said anti-friction elements being circular in vertical cross-sectional shape and projecting slightly above said socket means and said upper surface means, said socket means including outwardly projecting flange portions overlying and supported from areas of said upper surface means disposed therebeneath.

2. The invention of claim 1, wherein said resilient means includes a thick panel-like body of compressible material disposed between said upper and lower surface means.

3. The invention of claim 2, wherein said body of compressible material is formed of a multi-cellular foam material.

4. The invention of claim 2, wherein said anti-friction elements include rows of spherical balls.

5. The invention of claim 1, wherein said universal anti-friction elements include spherical balls and said socket means includes a semi-spherical cup-like socket for each ball, anti-friction means interposed between the surfaces of the socket and the ball and anchoring means attaching the socket to the resilient body.

6. The invention of claim 1, wherein said anti-friction elements include spherical balls and said resilient means includes a coil spring fixedly interposed between each socket and said lower surface means.

7. The invention of claim 1 wherein said anti-friction elements comprise spherical balls, said resilient means comprising a thick panel-like foam resilient body disposed between said upper and lower surface means, said upper surface means comprising a sheet of material secured on and overlying the body and means for attaching the socket means directly to said sheet.

8. The invention of claim 7 wherein said last-named means includes the provision of an opening in the sheet for each socket means, the flange portions of said socket means comprising an annular shoulder, and means clamping the shoulder on the bounding edge portion of the sheet portion surrounding the opening.

9. The invention of claim 8, wherein said last-named means includes the provision of a vertical bore in the body in alignment with the opening in the sheet and of a greater cross-sectional area than the opening, said socket having a stud depending therefrom into the bore, said shoulder overlying the bounding edge portion of the sheet, a clamping plate fixed on the stud and spacer means bearing between the clamping plate and the underside of the bounding edge portion and cooperating with the shoulder to clamp the socket on the sheet.

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272—3; 193—37