May 7, 1963 E. MALMO 3,088,748

HARD-PACKED SNOW SKIS

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Fig. 1.

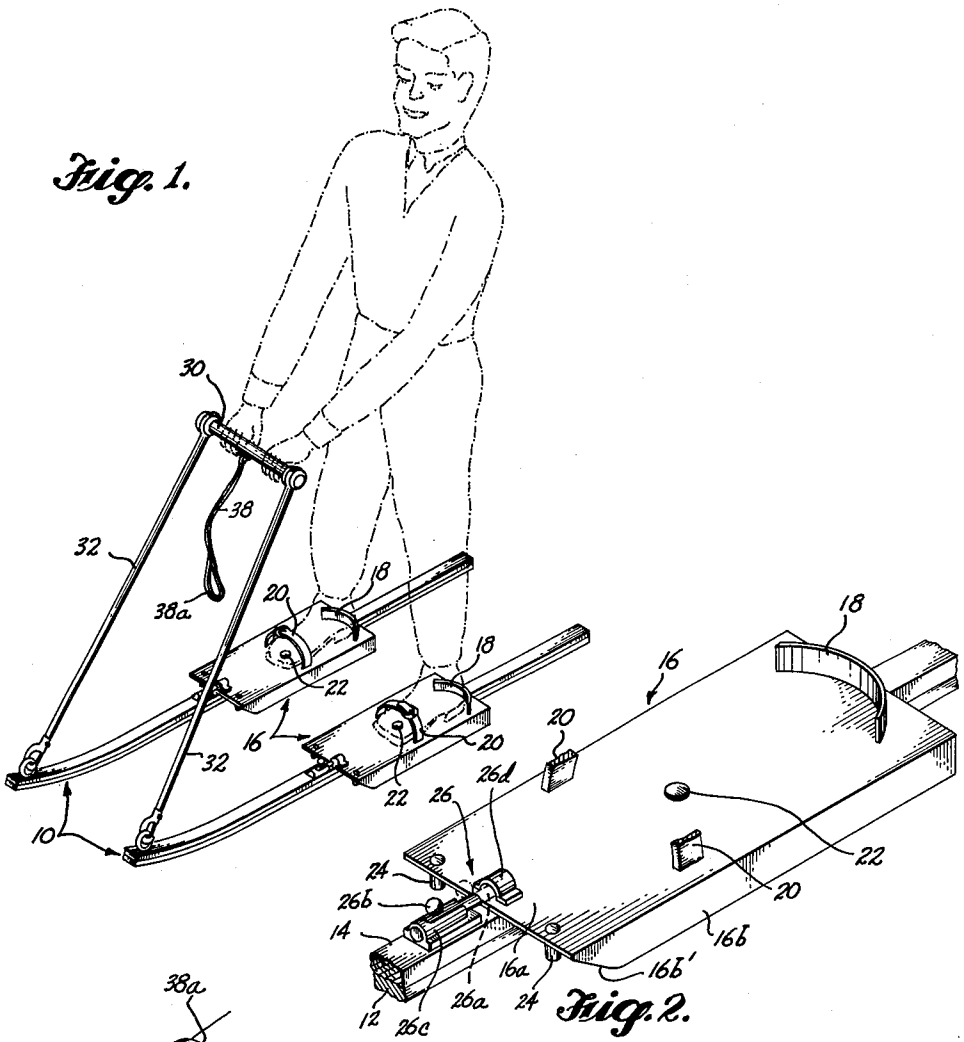


Fig. 2.

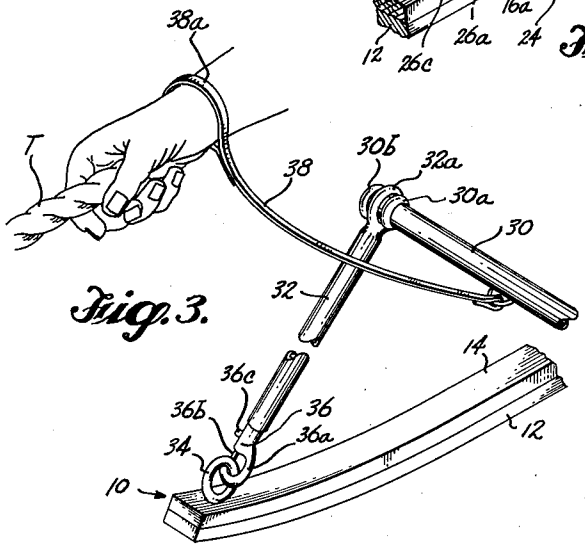


Fig. 3.

INVENTOR.
ERLING MALMO

BY
Reynolds & Christensen
ATTORNEYS

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Fig. 4.

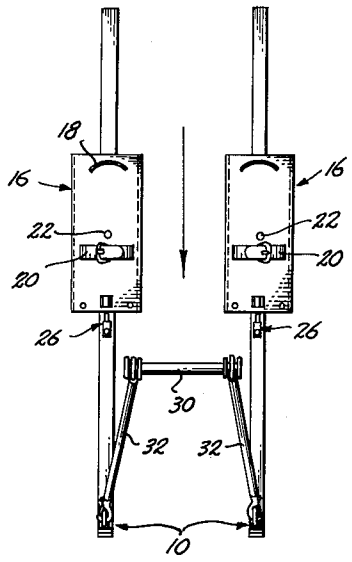


Fig. 5.

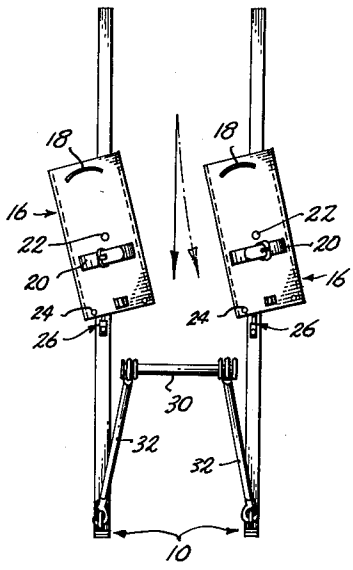


Fig. 6.

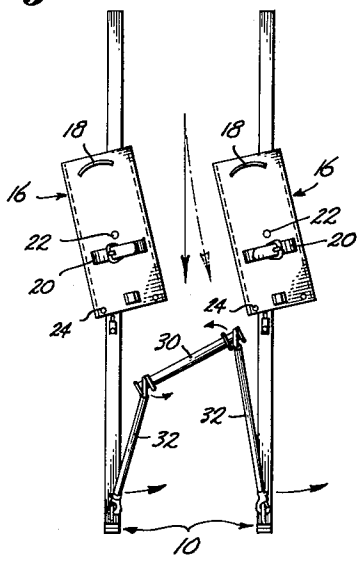
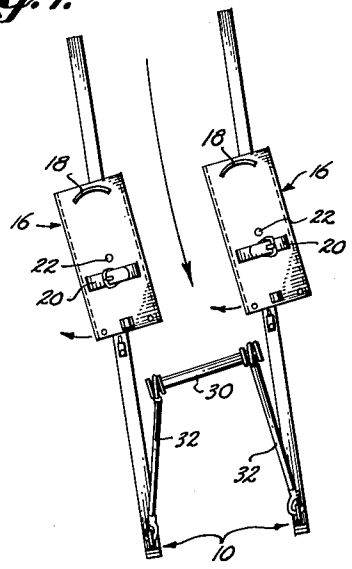


Fig. 7.



INVENTOR.
ERLING MALMO

BY
Reynolds & Christensen

ATTORNEYS

United States Patent Office

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HARD-PACKED SNOW SKIS

Erling Malmo, 3612 30th Ave. W., Seattle 99, Wash.

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The invention relates to a novel type of ski and skiing equipment and more particularly concerns skis which may be used effectively in snow which is packed so hard that control is difficult with conventional skis. The invention is herein illustratively described by reference to the presently preferred embodiment thereof; however it will be recognized that certain modifications and changes therein with respect to details may be made without departing from the underlying essentials involved.

While the invention is intended primarily for skiing on hard-packed snow or under icing conditions it will be appreciated that its use is not necessarily limited to these extreme conditions. These new skis may be used for executing any of the conventional types of maneuvers including schussing, braking, stem turning, Christiania turning, side-step climb, herring-bone climb, etc., and are primarily characterized by their novel construction which permits the skier to brake and turn on a very hard surface. Furthermore, the invention includes secondary features of construction facilitating turning with the aid of the hands and arms, and also assisting a novice to learn the technique of skiing and particularly the technique of skiing with the new type of ski herein disclosed.

Primarily it is an object of this invention to provide skis incorporating means for steering primarily by use of the feet but if desired with the aid of the hands and arms as well. Furthermore it is an object to provide skis which can be used in more conventional ways, and without use of hand control.

More specific objects include the provision of a new and interesting recreational device in the nature of a ski and ski control means which may be produced at moderate cost and will offer a new and exhilarating winter sport. A related object is such a ski device which may be manufactured in a durable, rugged form by use of readily available manufacturing techniques and equipment.

As herein disclosed the invention preferably employs a ski body which is relatively narrow for its length and preferably comprises a relatively thick metal runner and overlying wood or other light-weight resilient material reinforcing strip, with a foot plate mounted at an intermediate position along the length of the ski and having runner strips or flanges projecting downwardly therefrom spaced outwardly from the sides of the ski. Preferably these foot plates pivot intermediate their ends through a limited range under control of the skier, and afford a means to initiate turns on a hard snow surface. As a further feature these foot plates may be locked in a neutral or straight-ahead position by means associated therewith on the ski, enabling the ski to be used in a more conventional manner.

Additional features reside in the novel hand guidance and stabilizing means comprising a hand held cross bar joined at its ends by rods extending downwardly to the tips of the skis to form a U-shaped yoke or bridle having three rigid elements with pivotal interconnections between the elements and with the ski tips. The pivotal connections between the elements permit relative motion therebetween through a limited range, primarily for the purpose of augmenting the steering control afforded through use of the pivoted foot plates. However an experienced skier using the new type of ski can achieve sufficient proficiency for most applications without use of the hand control bridle, which is therefore preferably removable from the skis when it is not needed.

These and other features, objects and advantages of the invention will become more fully evident from the following description thereof by reference to the accompanying drawings illustrating the preferred embodiment.

FIGURE 1 is a perspective view of the improved skis and hand control bridle mounted thereon.

FIGURE 2 is an enlarged perspective view showing the foot plate and the mounting thereof on a ski, with parts broken away for convenience in illustration.

FIGURE 3 is a perspective view showing a suitable bridle-connecting arrangement with means for holding up the bridle conveniently when the skier is using a tow rope.

FIGURES 4, 5, 6 and 7 are a series of plan views illustrating a typical turning maneuver with the combined use of the pivoted foot plates and the hand control bridle, according to one technique.

Referring to the drawings, the elongated and relatively narrow skis **10**, of identical construction, each comprise an elongated metal runner strip **12** and an overlying wood strip **14** joined thereto continuously along the length thereof. Preferably both are of the same, uniform width. Typically these skis are four or five feet long and about one and one-half inches wide. The metal runner strip **12** may be of aluminum alloy or other light-weight metal and the overlying stiffener wooden strip is preferably of oak or other tough and resilient wood capable of stiffening the ski without adding excessively to its weight.

Intermediate the ends of the skis are mounted foot plates **16** of a length sufficient to accommodate conventional or other suitable bindings, and of a width which materially exceeds the width of the individual skis. Typically these foot plates will be of the order of eighteen inches long, more or less, and of a width of approximately five or six inches, more than sufficient to accommodate the width of a boot sole. In the illustration, simple bindings are shown as comprising the heel cups **18** and the toe straps **20**; however it will be recognized that safety bindings, cable bindings, or any other suitable bindings may also be used if desired.

These inverted-channel-shaped foot plates are preferably of sheet steel of the order of 0.125" thick, having sufficient stiffness and temper to retain its form and shape, and each such foot plate comprises a flat upper plate section **16*a*** and downwardly projecting side flanges **16*b*** which are of substantially uniform width throughout their length, except for the forward portion thereof which is turned upwardly at **16*b'*** as the runner of a sled. These runner flanges have lower edges which lie substantially in the bottom surface plane of the skis **10** or preferably, lie slightly below that plane so as to bite into the snow surface for purposes of control. If desired the plates may be stiffened by suitable reinforcing where the flanges join the plate proper or channel web, so that on side slipping bending or buckling is more stoutly resisted.

According to one of the unique features of the invention these plates are mounted on the skis by means of pivotal connections **22** preferably located approximately centrally of the plates to permit the plates to pivot freely on a vertical axis. Stop pins **24** project downwardly from the plate section **16*a*** to limit the angle of swing to a value of the order of between 20° and 30°, more or less. The angle of swing is limited however at a point which will preclude contact between the side of the ski and the rear upright edge of either runner flange **16*b*** in the extreme positions of tilt, so that space is afforded therebetween for the free passage of snow during forward movement.

Still another feature is the provision of an antipivot locking device **26** which in this case comprises the slide bolt **26*a*** having a control knob **26*b*** and guided in the fitting **26*c*** mounted on the top of the ski forwardly of the foot plate **16**. The bolt is adapted to enter a loop

26*d* mounted centrally at the forward edge of the foot plate so as to hold the latter against swinging on its pivot. This it does with the runner flanges **16***b* disposed parallel to the length of the ski. When the bolt unit **26** is locked in place the foot plates with their runners are effectively integral with the skis and the equipment is used much in the manner of conventional skis.

The invention further comprises an auxiliary steering control or training apparatus in the form of a hand-held bar **30**, the ends of which are connected by the elongated rigid rods **32** to the tips of the respective skis. The connection between each such rod **32** and the bar **30** comprises an eye or loop **32***a* on the rod, and annular stops or ribs **30***a* and **30***b* on the bar. The inside diameter of the eye **32***a* slightly exceeds the outside diameter of the cross bar or rod **30**, so that limited universal pivoting of each element relative to the other is permitted by the joint.

The lower ends of the control rods **32** are coupled to the ski tips by rigidly mounting an anchor eye **34** on each ski tip, with the plane of the eye disposed lengthwise of the ski, and by providing conventional couplings **36** on the lower ends of the control rods as shown. These couplings include C-shaped heads **36***a* which are normally closed by a spring-returned slide bolt **36***b*. This slide bolt can be retracted by means of the finger knob **36***c* in order to open the head to detach it from the eye **34**. Thus, by means of these connectors the bars **32** may be rotated or swung in any direction relative to the skis, through a limited range, and may be easily disconnected therefrom when desired.

An arm strap **38**, with a wrist-encircling loop **38***a*, provides a means to connect the cross bar **30** to the arm of the skier so that the bridle does not drop when the skier's hands are occupied in holding on to a tow rope T.

Under normal use of these skis with the control bridle **30**, **32** the bridle will be held in the manner indicated in FIGURE 1 (and FIGURE 4), with the skis normally parallel to each other with no longitudinal offset between them. This will be the position when skiing in a straight line down a uniform slope. However, the freedoms of relative motion between the individual skis and the control bridle **30**, **32** and the freedom of relative motion between the parts of the control bridle, permit the skis to be moved in relation to each other in any of the various possible angular senses as well as in the sense of relative displacement or offset, vertically, longitudinally, or laterally. When it is desired to execute a simple turn the first step normally is for the skier to swing his foot plates in the desired direction of turn, as indicated in FIGURE 5. Initially the skis may or may not be turned appreciably and there will usually be no change in the relative position of a hand-held control bridle. However the runner flanges **16***b* biting into the snow will commence to have an effect on the direction of motion. The resulting change of direction may be augmented and expedited by twisting the control bridle as shown by the arrows in FIGURE 5, so as to urge the forward ends of the skis in the same sense of turn and toward alignment more nearly with the new direction of motion. Of course turning torque may also be applied to the skis toward the new direction of travel through use of the feet, with the foot plates at their limited positions of swing in relation to the skis. When the turn is nearly executed the skis and foot plates typically appear as in FIGURE 7. In this position it is assumed that the skier is moving in the desired new direction of travel and that the foot plates are still turned slightly. Now the skier, moving in the correct direction, swings the foot plates reversely, as shown by the arrows in FIGURE 7, in order to realign them with the skis. In effect, therefore, the foot plates are usually turned initially more than is necessary to effect a correction of the direction of travel and then are restored to the neutral or straight-ahead position when the skis themselves have become aligned with the desired new direction of travel.

Using the skis without the towing bridle involves principally the action described wherein the foot plates are used to initiate the turn and to urge the skis in the new direction of travel, whereupon when that result is accomplished the foot plates are restored to the straight-ahead position.

It can be appreciated that control and stability dictates limiting the freedom of angular motion of the foot plates relative to the skis. In fact, some skiers prefer to use the skis with the bolt mechanism **26** in the locked position, holding the foot plates stationary. The foot plates are locked stationarily in neutral position by most all skiers when the skis are being used on a tow or to move uphill or across country.

These and other aspects of the invention will be recognized by those skilled in the art on the basis of the foregoing disclosure of the presently preferred embodiment.

I claim as my invention:

1. Hard-snow ski apparatus comprising a pair of skis individually comprising an elongated and relatively narrow ski body of substantially uniform width, an elongated foot plate wider than the ski body and of a length representing a small fraction of the length thereof, said foot plate having elongated down-turned flanges on opposite sides thereof with lower edges formed as runners of a thickness representing a small fraction of the width of the ski body, said foot plate being mounted on top of the ski body intermediate the ends thereof with the flange runners extending generally parallel thereto spaced outwardly from respectively opposite sides of the ski body, and steering bridle means comprising a pair of upright elongated rods connected at their lower ends to the ski tips and cross-connected at their upper ends to the ends of a handle bar, respectively.

2. The ski defined in claim 1, wherein the foot plate is mounted to pivot about a vertical axis on the ski body at a location intermediate the sides and ends of the foot plate, and the respective connections between the rods and the ski tips and handle bar are pivotal connections permitting limited universal swinging of the rods in relation to the members to which they are connected.

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