ABSTRACT: A ski-simulating device which includes an inclined base having a platform mounted for rotation thereon. A pair of foot pedals are tiltably mounted on the platform about an axis parallel to their lengths, and situated with the axis of rotation of the platform located within the area defined by and between the pedals (so the center of gravity of the person standing thereon is distributed generally over said axis). Preferably spring means urge the pedals against being tilted inward toward one another. They also can be independently slidable in the lengthwise direction to allow either foot to advance slightly beyond the other to simulate the parallel ski technique, and/or angularly movable with respect to each other to allow "stemming."
This application is a continuation of application Ser. No. 494,380 filed Oct. 11, 1965 now abandoned. The present invention relates to apparatus for exercising, training, and coordinating body movements. In particular, the device concerns simulated ski apparatus for training and developing body movements and skill in ski techniques.

The desirability of employing ski-simulating apparatus in exercising and in teaching skiing has long been recognized; see for example Ravoire U.S. Pat. No. 2,573,808, granted Nov. 6, 1951. A number of training devices have been suggested in the prior art, some of which are illustrated in U.S. Pat. No. 2,657,055, granted Oct. 27, 1953, the Ravoire patent aforesaid, and, more recently, Palmer et al. U.S. Pat. No. 3,021,137 granted Feb. 13, 1962. Other exerciser devices on which a person stands and performs various body movements have also been described which do not concern, and which are not particularly useful or helpful in, developing proficiency in skiing; see, for example, Swisher U.S. Pat. No. 3,107,914, granted Oct. 22, 1963, and Conn et al. U.S. Pat. No. 3,134,591 granted May 26, 1964.

The prior art has numerous drawbacks in providing a realistic ski simulator exercising apparatus. While numerous of prior art generally concern an apparatus having a platform on which the feet are positioned and which rotates either on a level or on an incline (to simulate the slope of a ski hill), it is incomplete in the necessary and important body movements. Unless proficiency is simultaneously developed in foot or ski position, including the movements in "edge control" (i.e. tilting the feet and skis with respect to their longitudinal direction), ostensible skill acquired in body balance and rotational movements can be deceiving, and may not in fact be present when attempted under actual skiing conditions. As in many physical exercises involving coordination in body movement, the ability to perform one movement may diminish or disappear when attempted simultaneously and in coordination with others.

Also as I am aware, no one heretofore has provided a mechanically simple, and safe, ski simulator exercise device wherein a person can simultaneously practice the necessary and important movements, in skiing, of foot (ski) position, including "edge" control, provided by the coordinated movements of knees, feet, and ankles (an important aspect of all techniques of skiing), and body rotation and balance, all at the same time and at various degrees of simulated inclination or slope.

The present invention provides such a novel apparatus on which nearly every type of ski technique can be employed, and in which foot position and edge control can be practiced and perfected along with developing balance during the rotational movements involved in making proper turns on skis.

The manner in which these and other advantages accrue from the present invention will be apparent from the description which follows, taken in conjunction with the appended drawings showing an illustrative preferred apparatus, wherein like reference characters refer to corresponding parts in the several views, and in which:

FIG. 1 is a view in perspective of a preferred embodiment wherein skiing by the parallel technique is simulated;

FIG. 2 is a plan or top view of the apparatus or device of FIG. 1;

FIG. 3 is a side view of the device of FIG. 1;

FIG. 4 is a plan view of a modified device wherein skiing by techniques involving "stemming" or "snow plowing" is simulated;

FIG. 5 is an exploded view in perspective of the device of FIG. 4, useful also in appreciating certain aspects or parts in the embodiment shown in FIGS. 1—3;

FIG. 6 is a side view of an alternative pedal mounting assembly; and

FIG. 7 is a section view taken along the lines 7—7 of FIG. 6.

Referring now to FIGS. 1—3 of the drawings, a continuous tubular framework 10 consists of opposed L-shaped sides having horizontal legs 11 and vertical legs 12, respectively joined at their outward ends by crossmember 13 and support bar 14. Support on the frame is inclined base 15, held at its lower end to crossmember 13 by clamp 16, and at its upper end by bolts 17 which pass through vertical legs 12. Wingnuts 18 hold the legs tightly against the base.

A generally rectangular platform 19 is mounted on the base 15 about its rotary axis A, through bolt 20. Interposed between the rotary platform 19 and the upper surface of base 15 is a bearing washer (or washers) 21, to reduce friction therebetween as the platform rotates.

Affixed to the platform are two sets of upwardly extending mounting brackets 22 and 23 and 22' and 23', in which are disposed shafts 24 and 24', respectively. Situated above these shafts are left and right elongate foot pedals 26 and 26', which are respectively supported on the shafts through downwardly extending brackets 28 and 28' and 30 and 30' affixed on the underside of the pedals 26 and 26' near the ends thereof and between brackets 22 and 23 and 22' and 23'.

The downwardly extending brackets 28 and 28' are positioned near the heel ends 29 of their respective pedals 26 and 26', while the toe end brackets 30 and 30' are positioned slightly more centrally of the pedals, the resulting distance between brackets 28 and 30 (and 28' and 30') being less than the distance between brackets 22 and 23 (and 22' and 23'). Compression springs 31 are journaled on shafts 24 and 24' between brackets 22 and 28, and 22' and 28', respectively, and are normally urging the pedals to a rearward position with brackets 30 and 30' against brackets 28 and 28', but allowing the pedals to slide forwardly against springs 31 when forces are appropriately applied. Additionally, the pedals tilt by rotation about the shafts 24 and 24' on axes parallel to the lengthwise direction of said pedals.

Coiled compression springs 32 and 32' are disposed generally midway between the ends of foot pedals 26 and 26', but offset laterally from the centers of said pedals. These compression springs are fastened to the underside of the pedals, and serve yieldably to urge the pedals against pressure exerted by the feet tending to tilt the pedals inwardly (i.e. toward one another).

To assist in holding the feet in place, an upwardly extending side plate 34 extends along the outer edge, and toe plate 36 along the toe end of each pedal 26 and 26', also, for the same general purpose, the upper surfaces of the pedals are provided with resilient treads 38, or other antislip surfacing.

 Stops 40 are mounted on inclined base 15 slightly below (downhill of) rotatable platform 19. In order that platform 19 will clear these stops during rotation thereof, the forward corners 41 (adjacent pedal toe plates 36) are bevelled, as shown. As the platform rotates through an angle slightly more than 90° in either direction from the central (or downhill) position shown in FIGS. 1 and 2, the rearward corners 42 come to bear against one or the other of the stops 40, as indicated in the positions of the platform 14 shown by broken lines in FIG. 2. The platform accordingly can rotate through an angle somewhat greater than 180°.

In use, my ski simulator operates as follows: The platform 19 is first preferably positioned with footrests 26 and 26' extending perpendicularly with respect to the direction of inclination of the base 15, this direction corresponding with the line of "traverse" on a ski hill, and being also the direction in which skis normally are placed at the outset. For example, the platform is rotated counterclockwise from the position shown by full lines in FIG. 2, so that the right foot pedal 26' represents the "downhill" pedal. The trainer then grasps the standard 38 with his left hand, and steps with the right foot on the lower pedal 26', applying pressure on the instep, i.e. toward the inside of the pedal, so as to tilt the same against the engaging 32' more or less to a horizontal plane. Generally at the same time the left foot is placed on pedal 26 which generally maintains itself in more or less of a horizontal plane, due to the combined action of spring 32' and the natural tendency to turn the left foot and ankle to the outside. This position simu-
lates standing on skis in the position of traverse with the skis "edged" into the hill.

While supporting himself with the aid of the support bar 14 of frame 10, and with the weight distributed primarily on the "downhill" pedal 26, the center of gravity of the trainee will be distributed generally over the pedals and will be assumed whereby he can slowly release his hands from the standard and no movement will take place. However, upon rotation of the body such as occurs in recognized ski-turning techniques, the body and feet of the trainee will rotate toward the "downhill" position. In early stages the trainee does this by lightly pushing on support bar 14 with the left hand, while holding on with this hand to steady himself. When correctly performed, the pedals will "uneedle" and tilt toward the parallel with respect to the slope of base 15 as the direction of inclination or "fall line" of the base is approached. At this point the left hand is released and the trainee reaches back with the right hand to grasp the support bar, and pulls slightly thereon. As rotation continues, when correctly performed, the pedals "edge" or tilt to a horizontal plane "into the hill," with the weight shifting to the new "downhill" footrest, and with the right (uphill) pedal 26' pushing against its spring 31 to a position forward of left pedal 26.

As proficiency is achieved, turning movements can be achieved without necessity for the trainee to support himself with the support bar 14, simply by employing proper rotational movements, proper edging and positioning of the foot pedals, combined with proper body balance.

In any attitude, or angle, the rotatable platform 19 can assume a stationary position as the center of gravity of the trainee becomes generally aligned with the axis. It is apparent that to operate my device, many of the muscles actually employed in skiing must be used and coordinated. Thus, my device is highly useful as a conditioner, as well as a training device.

In the device shown in FIGS. 4 and 5, the pedals not only can be tilted and pushed forwardly and rearwardly, but also can be approved angularly with respect to one another by use of heel thrust in simulating "stemming" of the skis, as occurs in stem turns and "snow plowing." Thus, inclined base 60, supported on side members 61, is provided with a rotatable platform 62 pivotably mounted on bearing washers 64 about shaft 66. Alternatively in this embodiment, the rotation of the platform 62 is restricted by follower 68, extending downwardly from platform 62 into arcuate guide slot 70 in the base.

A pair of upwardly extending brackets 71 and 72 and 71' and 72' are mounted on platform 62, brackets 72 and 72' being wide and having laterally extending arcuate slots. To the underside of foot pedals 73 and 73' are respectively mounted downwardly extending forward brackets 74 and 74' and rear brackets 76 and 76'. Shaft 77 extends through the brackets 71, 72, 74, and 76, and shaft 77' extends through brackets 71', 72', 74', and 76'.

Rotatable bearing wheels 78 and 78' are mounted on shafts 77 and 77' between the rear brackets (72 and 76, and 72' and 76'). Said wheels assume the load exerted on the pedals, which otherwise would be carried by the rear brackets. Thus, the shafts 77 and 77' can move by pivoting about forward brackets 74 and 74' and sliding within the slots of the rear brackets 76 and 76', rolling as they do so on the bearing wheels 78 and 78'. As they move, of course, pedals 73 and 73' are carried with them.

Springs 79 are journaled on the shafts 77 and 77' between foot brackets 71 and 74, and 71' and 74'. Said springs urge the pedals to their rearward positions. Also, foot pedals 73 and 73' have compression tilt springs 80 and 80' affixed to the respective undersurfaces thereof midway between their ends, offset laterally inwardly with respect to shafts 73 and 73'. Being thus affixed, the springs travel with the pedals as they are moved.

It will thus be seen that, upon application of heel thrust in a lateral direction by the trainee, foot pedals 73 and 73' will move angularly with respect to one another, rolling on wheels 78 and 78', and pivoting about brackets 71 and 71'. Stemming thereby occurs.

This embodiment otherwise operates as described in connection with FIGS. 1-3. However, in some respects a greater degree of proficiency is required in simulating the parallel technique since the foot pedals will be allowed to diverge from the parallel unless kept in the proper position by the trainee.

It will be apparent that variations can be visualized without departing from the spirit of the present invention. For example, where desired, the base can be so constructed on the supporting frame so that the angles or angle of inclination thereof is adjustable. And where desired, compression springs can be located on each side, rather than just on the inside, of each of the foot pedals 26 and 26'.

Alternatively, as shown in FIGS. 6 and 7, the pedals can be positioned so as to simulate conditions encountered in edging of the skis without employing tilting springs. In such embodiment, upwardly extending brackets 90 and 91 mounted upon the rotary platform extend higher than corresponding brackets 22 and 22', 23 and 23' (previously described), with brackets 92 and 93 attached to the pedal 94 being short and upwardly extending. Thereby the pedal is slung below the shafts 95 and 96, two of which are employed at the front and rear of the pedal, rigidly cantilevered from brackets 92 and 93, and rotatably extending through brackets 90 and 91.

Spring 97, interposed between brackets 90 and 92 about shaft 95, urges the pedal 94 rearwardly. A study of the vector forces demonstrates that when slung in the foregoing fashion, forces must be applied at the inside and outside lateral edges of the pedal to tilt it, without need of compression tilt springs.

It is not necessary that the rotatable platform be fixedly mounted on a base. It can be mounted in an elongate tortuous guide slot in a very large incline base, such as a long table whereby the trainee actually can move on the platform in a downhill direction while simulating ski turns. Or, alternatively, the platform can be mounted on rollers or casters, and thus move freely on surfaces such as inclined hills, and the like.

Having described my invention, it is to be understood that I do not intend to be limited by the illustrative structures shown herein, but only by the specification taken as a whole, including the appended claims.

I claim:
1. A ski apparatus comprising a platform, rotatably mounted on a base in a plane inclined to the horizontal, a pair of opposed elongated foot pedals, each tiltably mounted on, affixed to and directly carried entirely by said platform about an axis parallel to the lengthwise direction thereof, the axes of said pedals lying in a plane parallel to said inclined plane, the axis of rotation of said platform being parallel to the axes of said pedals and being located within the area defined by and between said pedals and substantially at the center of gravity of a person standing on said pedals.
2. A ski simulator apparatus comprising an inclined base, a platform mounted for rotation on and in a plane parallel to that of said inclined base, a pair of opposed elongate pedals, each tiltably mounted on said platform about an axis parallel to the lengthwise direction thereof, said pedals being independently slidable in said lengthwise direction, and spring means interposed between each pedal and the platform, laterally offset with respect to said axis toward the opposite pedal, said springs urging the pedals against being tilted inwardly toward one another.
3. A ski simulator apparatus comprising an inclined base, a platform mounted for rotation on and in a plane parallel to that of said inclined base, a pair of opposed elongate pedals, each tiltably mounted on said platform about an axis parallel to the lengthwise direction thereof, said pedals being independently slidable in said lengthwise direction, and spring means interposed between each pedal and the platform, laterally offset with respect to said axis toward the opposite pedal, said springs urging the pedals against being tilted inwardly toward one another, said pedals also being independently angularly movable with respect to each other.
4. A ski simulator apparatus comprising a platform rotatable in an inclined plane, two pair of opposed spaced upwardly extending brackets mounted on said platform, a support shaft extending through and between the brackets of each pair, each of said shafts having a foot pedal supported thereon through a pair of downwardly extending brackets mounted on the underside of the pedal and journaled on said shaft between said upwardly extending brackets, the distance between said downwardly extending brackets being less than the distance between said upwardly extending brackets whereby said foot pedals can independently slide forwardly and rearwardly on said shafts, spring means urging said pedals to a rearward position, a tilt spring affixed to the underside of each pedal offset from its support shaft laterally toward the other pedal, said tilt springs resisting inward tilting of said pedals on said shafts.

5. The apparatus of claim 4 wherein the downwardly extending brackets mounted adjacent the rear of the pedals are laterally slotted to permit the support shafts independently to slide therein angularly with respect to each other.

6. The apparatus of claim 1, wherein the foot pedals are disposed beneath the axes about which they are tiltably mounted.