

Sept. 25, 1956

C. M. SWEET

2,764,417

ICE SKATE WITH STABILIZING RUNNERS

Filed June 9, 1952

3 Sheets-Sheet 1

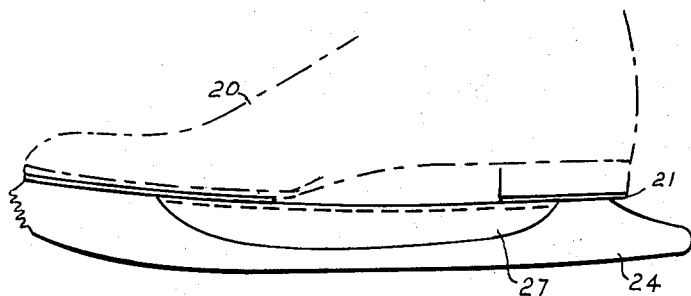


FIG. 1

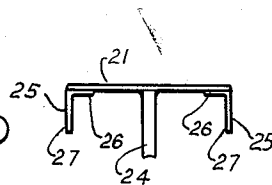


FIG. 3

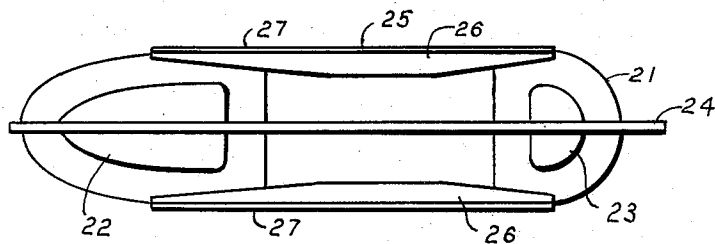


FIG. 2

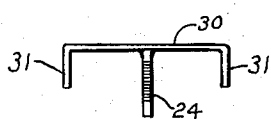


FIG. 4

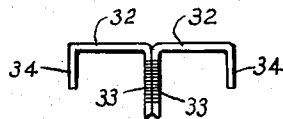


FIG. 5

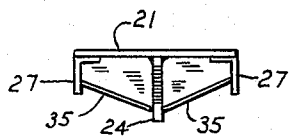


FIG. 6

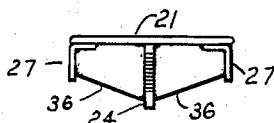


FIG. 7

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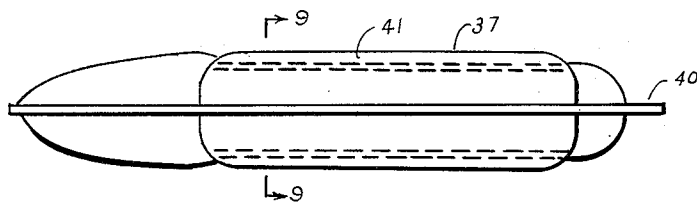


FIG. 8

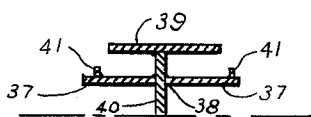


FIG. 9

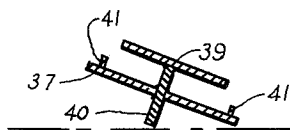


FIG. 10

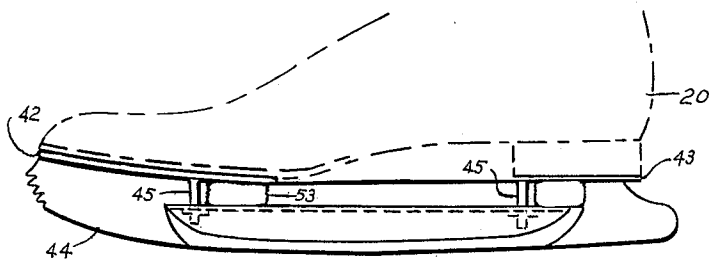


FIG. 11

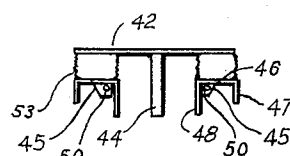


FIG. 13

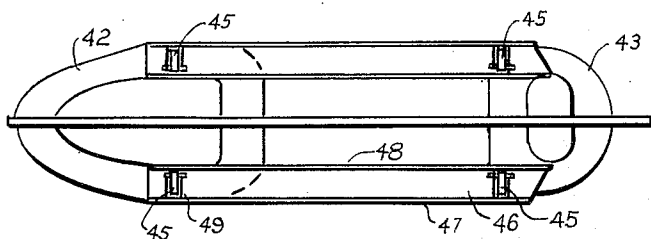


FIG. 12

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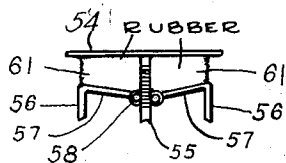


FIG. 14

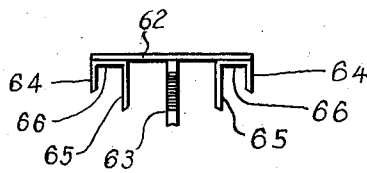


FIG. 15

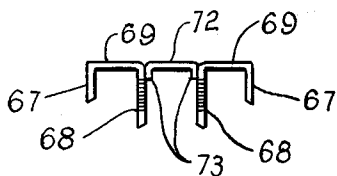


FIG. 16

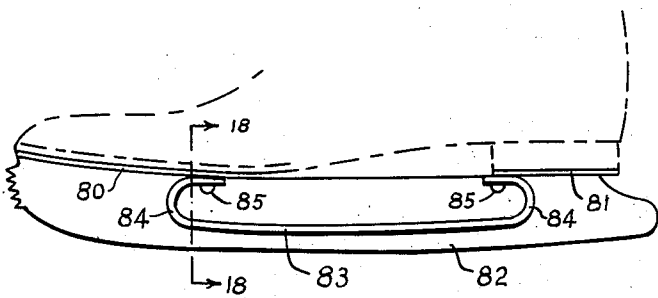


FIG. 17

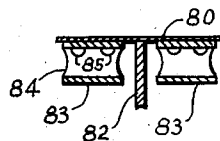


FIG. 18

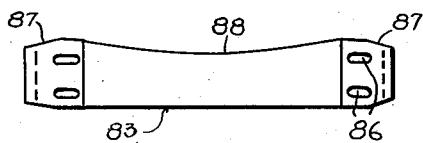


FIG. 19

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## ICE SKATE WITH STABILIZING RUNNERS

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Application June 9, 1952, Serial No. 292,441

15 Claims. (Cl. 280—11.12)

This invention relates to improvements in ice skates. The principal object of the invention is to provide ice skates having multiple blades, the outermost of which is upwardly offset from an inner blade whereby to permit the skate to tilt on curves while still providing multiple point support for the skater's ankle.

Another object of the invention is to provide multiple blade skate structure having webs extending transversely between the blades of the skate whereby to transversely span any cracks in the ice which might otherwise receive a skate blade and throw the skater.

A further object of the invention is to dispose a de-icing elastomer filler block between the blades of multi-blade skates to prevent the entrance of and to automatically resiliently eject packed snow and ice from the space between the blades.

A still further object of the invention is to provide resilient means for resisting the tilting of the skate to one side as may be caused by weak ankles, the resilient means increasing in tilt resistance as the tilting increases, to give support to weak ankles.

The principal embodiment of the invention consists in a skate having an inner centrally disposed blade and an outer blade near the outer margin of the foot and which is upwardly offset from the inner blade. In normal skating the inner blade only is used. However, in negotiating turns, or when the skater's ankles become fatigued, both inner and outer blades may be engaged with the ice to provide firm multi-point support for the skater's ankles. The multi-blade skates disclosed are particularly advantageous in negotiating turns where centrifugal force is added to the force of gravity and imposes extra ankle strain.

Other objects and advantages of the invention will become apparent from an examination of the following disclosure in which:

Fig. 1 is a side elevation of a shoe skate embodying the invention.

Fig. 2 is a plan view of the inverted skate of Fig. 1.

Fig. 3 is an end elevation of the skate of Fig. 2, the shoe being removed.

Figs. 4 and 5 are end elevations of modified embodiments of the skate blades shown in Figs. 1-3.

Fig. 6 is an end elevation of a still further modification of the skate blades in which the inner and outer blades are connected by a rigid transverse web.

Fig. 7 is an end elevation of another modification of the skate blades in which the space between the inner and outer blades is substantially filled by a de-icing elastomer filler.

Fig. 8 is a plan view of a still further modification of the inverted skate in which the outer blades comprise a transverse plate rigidly connected at right angles to the central blade.

Fig. 9 is a cross section taken along the line 9-9 of Fig. 8.

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Fig. 10 is a view showing the skate of Fig. 9 tipped to one side to engage the outer blade with the ice.

Fig. 11 is a side elevation of a shoe skate embodying a still further modification of the invention.

Fig. 12 is a plan view of the inverted skate of Fig. 11.

Fig. 13 is an end view of the skate of Figs. 11 and 12, the shoe being removed.

Fig. 14 is an end elevation of a modification of the skate blades shown in Figs. 11-13.

Figs. 15 and 16 are end elevations of still further modifications of the invention.

Fig. 17 is a side elevation of a still further modification of the invention.

Fig. 18 is a cross section along the line 18-18 of Fig. 17, the shoe being removed.

Fig. 19 is a top view of the auxiliary blade only of the skate shown in Fig. 17.

The invention concerns blades which support the shoe 20 shown in the various embodiments of the invention. In the embodiment of Figs. 1-3 and 6 and 7 the shoe 20 is mounted upon a base plate 21 which may be cut away interiorly as shown at 22 and 23 in Fig. 2. A medial central blade 24 is provided, which is conventional except that this blade is desirably made of less height than is standard practice in order to lower the center of gravity of the skate. To the outer margins of the base plate 21 are welded outer blades comprising the angle members indicated generally as 25. Angle members 25 have horizontal legs 26 and a blade portion 27 extending downwardly from said plate and in parallel relationship to the central blade 24. As best shown in Figs. 1 and 3 the sharpened edges of the outer blades 27 are upwardly offset from the sharpened edge of central blade 24. Thus the outer blades are normally out of contact with the ice except when the skate is tipped in one direction or the other, as when the skater negotiates a turn or relaxes fatigued ankles. Thereupon the skater's weight is firmly supported by the central blade 24 and one or the other of outer blades 27.

The modifications of Figs. 4 and 5 are fundamentally the same as the embodiment just described. In the embodiment of Fig. 4, however, the base plate 30 is integrally provided with down turned margins 31 which comprise the outer blades. The central blade 24 is welded to the base plate as in the embodiment of Fig. 3. In the embodiment of Fig. 5 the blade structure comprises laterally adjacent downwardly open channels having web portions 32 disposed in a common base plane and downwardly extending marginal flanges 33 and 34. The flanges 33 are welded in face relationship and together constitute the central blade of the skate. Flanges 34 are shorter than the central flanges 33 and constitute upwardly offset outer blades.

In the embodiment shown in Fig. 6 the central blade 24 and the laterally offset blades 27 are connected by one or more transverse webs 35 which intersect the respective blades somewhat above their ice engaging edges. These transverse webs provide a safety feature and are adapted to span a crack in the ice which might otherwise receive the central blade 24 so deeply as to upset the skater. As indicated the lower edges of the webs are desirably rounded in their fore and aft configuration.

In the embodiment of Fig. 7 the spaces between the outer blades 27 and the center blade 24 are substantially filled by a de-icing elastomer such as the sponge rubber blocks 36. The filler block prevents loose snow and ice from packing between the blades and thereby interfering with engagement of the blades with the ice. Moreover, any snow which tends to pack between the blades, for example when walking on the hard packed snow at the edge of the rink, will be resiliently ejected by the rubber

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sponge as soon as the skater's foot is lifted from the snow surface.

Figs. 8-10 illustrate a modified skate in which the base plate has a perpendicular blade 40 welded thereto, the central blade being provided with paired transverse blades 37 which extend laterally therefrom to parallel the base plate 39. Blades 37 have sharpened outboard edges which are upwardly offset from the sharpened edge of the central blade 40. The blades 37 are desirably welded to the central blade 40 as shown at 38. As best shown in Fig. 10 the outer or outboard edges of the respective blades 37 cooperate with the central blade 40 to provide two points of support for the skater when he negotiates a turn or tips his foot in one direction or the other, as in relieving ankle strain. The blades 37 may be optionally provided with upstanding ribs 41 to re-enforce the blades.

In Figs. 11-13 a further modification of the invention is illustrated. In this embodiment the ball and heel base plates 42 and 43 are provided with the conventional central blade 44. As best shown in Fig. 12, however, guide lugs or plates 45 depend from the undersurface of plates 42. These guide lugs guide auxiliary blades which, in the embodiment shown in Fig. 13, comprise downwardly open channels having a connecting web 46, a short outboard blade flange 47 and a long inboard blade flange 48. The connecting web is provided with transverse slots 49 to receive the guide lug 45. The guide lugs are provided with cross pins 50 to limit downward movement of the auxiliary blades on the guide lugs. Resilient cushions 53 are disposed between the base plates 42 and 43 and the webs 46 of the auxiliary blade channels to bias these blades toward engagement of the web with the cross pin 50. As shown in Figs. 11 and 12 both ball and heel base plates 42 and 43 are provided with guide lugs and resilient cushions 53.

By reason of this structure negotiation of a curve or tipping of the foot will cause the auxiliary blades 47 and 48 to compress the resilient rubber mountings 53 which will yield in such a manner to permit the auxiliary blades to tilt and engage both blade flanges 47 and 48 with the ice. During normal skating blade flanges 48 are held in only light pressure contact with the ice. However, as the skater tips his foot the pressure of the cushion increases to provide positive multi-point support for the skater's ankle.

In the embodiment of Fig. 14 base plate 54 is provided with a central blade 55 welded thereto. At a point upwardly offset from the bottom edge of the blade 55 are pivoted on pintles 58 the web portions 57 of auxiliary blades 56. Blades 56 are free to pivot in an arc respecting the sharpened edge of center blade 55. Here again resiliently yieldable cushions 61 are disposed between the base plate 54 and the webs 57 of the auxiliary plates 56. These resiliently bias the blades 56 into ice engaging contact but permit the skate to tilt to negotiate a curve without unbalancing the skater.

In Fig. 15 a further modification of the invention is shown in which a base plate 62 is provided with a central blade 63 welded thereto, outer blades 64 and intermediate blades 65. Blades 64 and 65 desirably comprise legs of unequal length of a downwardly open channel having a web 66 welded to the undersurface of the base plate 62. The edges of blades 64 and 65 are desirably progressively upwardly offset from the edge of blade 63 so that all blades at one side of the skate have their edges disposed in an inclined common plane including the edge of central blade 63.

In the embodiment of Fig. 16 a four bladed skate is shown. The outer blades 67 and the inner blades 68 comprise the unequal downward extending flanges of downwardly open channels including connecting webs 69. These channels are interconnected by an intervening bridge plate 72 having downturned flanges 73 welded to corresponding faces of the flanges 68. Flanges 68 comprise the inner blades of the skate and flanges 67 comprise the outer blades of the skate. In this skate the skater is at all times supported by two blades, even when in an up-

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right position. When the foot is tilted or a curve negotiated the outer and inner blades 68 and 67 cooperate to provide multiple point support for the skater.

The embodiment of the invention shown in Figs. 17-19 incorporates an auxiliary blade adapted to flex to crack off ice which may form thereon. The skate comprises forward and rear base plates 80 and 81 provided along their medial center line with a main skate blade 82. Laterally and upwardly offset at each side of the main blade are auxiliary blades 83. Blades 83 comprise relatively broad flat strips of spring steel having their ends reversely curved at 84 and mounted to the base plates 80 and 81 by means of rivets 85 or the like. The holes 86 which receive the rivets through the blades 83 are desirably slotted to reduce bending strains in the blades. As the skater negotiates a turn, or otherwise tilts the skate, the outer edge of the auxiliary blade 83 at the low side of the skate contacts the ice to provide added support for the skater's ankle. As the spring blades 83 are inherently resilient they will flex to provide yielding support for the ankle and, on flexing, will crack off any ice formed thereon. To insure flexing at all portions of the blade it may be narrowed near its riveted mounting as indicated at 87. Flexing at the mid point of the blade may also be promoted by reducing its width as indicated at 88.

It will be noted from the drawings of the several embodiments employing a central blade and outer marginal blades that the latter are located close to the outer edge of the shoe but not beyond the sole. This lateral spacing of the outer blades from the central blade prevents injury to the ankle of the skater since it reduces the angular tilt necessary to effect contact of either outer blade with the ice and also prevents the center of gravity or weight exerted by the foot from forcing a tilt of the skate beyond the point where the outer blade engages the ice.

By making the central or skating blade lower than the conventional blade the possible angle of tilt is also reduced and the center of gravity or of weight exerted by the foot is kept near to the center blade at all times.

In skating, the central blade alone engages the ice during straight ahead operation. On curves, where weak ankles are more apt to permit tilting of the foot, the skates of the present invention provide the extra blade contact that supports the foot. In this respect the present invention differs substantially from former two-bladed skates in which both blades normally contact the ice in straight runs. On curves such blades compel an unnatural bending of the ankles. Where the two blades of former construction are too close together there is danger of overturning the ankle by tilting of the foot on either blade.

Where the outer blades are resiliently supported the blade edges may be nearer to the ice without interfering with normal skating movements. Where the outer blades are rigidly supported it is advisable to have their blade edges raised substantially above the horizontal plane of the central blade edge in order to provide freedom for skating movements and a limited tilting of the skate as on curves.

The angle of tilt at which the outer blade supports the ankle against further tilting as shown by the illustrations in the drawings varies from about 18° to about 27° from the vertical. These angles of tilt appear to be best for the average skater. Professional skaters may desire a somewhat greater angle of tilt but still much less than former skates. In conventional skates a tilt angle in excess of 45° is generally possible before the outer edge of the shoe engages the ice.

With skates of the present invention the outer blades function to protect the shoe against scraping the ice and to prevent slippage and accidents of the kind caused when shoes of conventional skates scrape the ice.

As shown in the drawing the height of the central blade is generally less than half the width of the shoe. This keeps the center of gravity or the weight forces exerted by the foot nearer to the vertical plane of the center

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blade edge at all times and greatly reduces the strain upon the ankles.

Various embodiments of the invention may be employed within the scope of the accompanying claims which distinctly set forth the subject matter presently contemplated as the invention.

I claim:

1. An ice skate having a foot plate, an inner blade and outer blades on opposite sides of said blade, said inner blade having a rigid mounting to said foot plate and said outer blades having a resilient mounting to said foot plate and means for guiding said outer blades for movement toward and away from said foot plate.

2. The device of claim 1 wherein said guide means comprises guide members depending from said foot plate and substantially parallel to said inner blade, said outer blades having slidable connection with said guide members whereby said outer blades move in substantially rectilinear paths and said members absorb lateral thrust of said blades when these are moved against the bias of their resilient mountings.

3. The device of claim 1 wherein said outer blades comprise angle members having a blade portion substantially parallel to said inner blade and a transverse web portion having pivotal connection to said central blade, said resilient mounting comprising an elastomer between said transverse portion and said foot plate.

4. The device of claim 2 in which each said outer blade comprises a downwardly open channel having a web with a transverse slot with which said guide member is slidably engaged, said downwardly open channel having blade flanges of unequal extent, the shorter blade being outermost.

5. An ice skate comprising a shoe, a skate structure including a foot plate supporting the shoe and a central skating blade depending from said foot plate and extending along the longitudinal center line thereof, said central skating blade being of a maximum height less than half the maximum width of the shoe, and outer auxiliary blades carried by said skate structure and disposed on each side of said central skating blade with the operative edges thereof substantially parallel to the lower edge of said central blade, each said outer blade being near to the outer margin of the corresponding side of the shoe and having its edge beneath the level of the foot plate and substantially above the horizontal plane of the central blade edge to provide for limited tilting of the skate and engagement of two blades with the ice as when stopping or exerting a side thrust.

6. The construction of claim 5 in which the distance between the outer blades and the central blade approximates the maximum height of the center blade and the angle of possible tilt for the skate from the vertical when the operative edges of the central blade and one of the outer blades simultaneously engage the ice is substantially less than 45° and of the order of about 20°.

7. The construction of claim 5 in which resilient means are provided to support the outer blade edges for limited vertical movement and which means biases the outer blade edges downwardly toward the horizontal plane of the central blade edge.

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8. The construction of claim 5 in which means are provided between the blades to prevent ice packs which may interfere with skating.

9. The construction of claim 5 in which resilient means are disposed between the blades to prevent ice packs which may interfere with skating.

10. The construction of claim 5 in which the blades are separately secured to the foot plate.

11. The construction of claim 5 in which the outer blades comprise a horizontal plate extending at right angles to said central blade and disposed midway in the height of the central blade.

12. The construction of claim 5 in which the central skating blade comprises a pair of closely spaced runners, and the outer blades serve to prevent overturning of the ankles when the skate tilts on one of the runners.

13. The construction of claim 5 in which the outer blades are in the form of runners constructed of spring steel and providing resilient support against tilting of the skate beyond a predetermined angle.

14. The construction of claim 5 in which each outer blade comprises an inverted channel member secured to the foot plate and having its flanges constituting a pair of runners with the lower edges thereof disposed substantially in a common plane with the edge of said central blade, said common plane being at an angle of less than 45° from the horizontal plane of the edge of said central plane.

15. An ice skate having a foot plate, a center blade connected to the foot plate along its longitudinal center line, outer blades connected to the edge margins of the foot plate and extending for the major portion of the length of the foot plate, said outer blades having sharpened edges upwardly offset from the sharpened edge of the center blade, and a resilient elastomer de-icing block disposed in the space between said center and outer blades and substantially filling the same to resiliently exclude snow and slush from between said blades.

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