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54 Skate, more particularly ice-skate for speed skating.

57 Skate, more particularly an ice-skate of the type which is commonly used in speed skating, with which the shoe is supported on the blade holder by means of pedestal means, whereby the pedestal connection between the shoe and the blade holder is such, that the shoe is forwardly tiltable about a transverse axis located adjacent to the sole portion of the shoe.

Skate, more particularly ice-skate for speed skating.

The invention relates to a skate, more particularly an ice-skate of the type which is commonly used in speed skating.

With such a skate the blade is usually held in an oblong tubular holder, which is connected to the sole and heel of the shoe by means of a fore and aft pedestal respectively.

The invention aims at providing an improved skate, so as to create conditions for optimal sliding and push off.

In skating a way of moving is involved, with which the legs are alternately performing a sliding movement followed by a push off movement.

The purpose of the usual cowering position of the skater is to have the reaction force, which is exerted by the ice to the skate, apply onto the blade in an area located behind the centre of the skate so as to reduce the friction between blade and ice to a minimum.

In to-day's skating technique a cowering position is generally considered necessary to produce an effective push off, i.e. a movement with which the blade is pushing off from the ice surface with its entire length.

When skating longer distances it is often difficult to maintain the cowering position until the very end due to muscle fatigue. In such cases the reaction force by the ice onto the skate will tend to apply to an area which is located closer to the forward end of the blade, and as a result of this there will be an increased resistance to sliding, while the push off tends to be carried out predominantly by the tip of the blade and consequently becomes less effective.

The pursued improvement of a skate of the general type above referred to, with which the shoe is supported on the blade holder by means of pedestal means, is achieved in that the pedestal connection between the shoe and the blade holder is such, that the shoe is forwardly tiltable about a transverse axis located adjacent to the sole portion of the shoe.

When using such an ice-skate a change from a cowering position to a rather upstanding and forwardly inclining position (forced by muscle fatigue) will be far less detrimental to the sliding and push off. During push off the skate blade will, under such conditions, lag behind relative to the forwardly tilting shoe and keep translating, i.e. with the blade pushing off from the ice surface along the entire blade length. Generally spoken a substantial improvement of the push off process may thus be expected.

The skate according to the invention permits the foot to be stretched and this contributes to a complete stretching of the push off leg. Important muscle bundles in the upper and lower leg, which have scarcely or not been effective in the usual skating technique, may now be utilized for strengthening the push off. By stretching the foot relative to the pushing leg, the course of the pushing motion will be more natural. The above indicated principle of a skate with a forwardly tiltable shoe may be realized in various practical embodiments. A first embodiment, in which, like the well known skate shoe combination, the forefoot portion of the shoe is fixedly fastened onto a rigid fore pedestal whereas the shoe is flexible, characterized in that the heel portion of the shoe is mounted to be vertically movable relative to the blade holder. In this case the tilting movement of the shoe relative to the blade holder means that the foot is permitted to flex in a natural way in the metatarsophalangeal joint.

In a second embodiment the pedestal is designed, in the area of the sole portion of the shoe, to flex about said transverse axis. In this embodiment a shoe having a rigid sole may be used, since the shoe is permitted to tilt, as a whole, forwardly about said transverse axis. This will contribute to the required transversal rigidity of lateral stability.

In both of these embodiments it is to be preferred to provide said pedestal with means for guiding the heel portion of the shoe relative to said blade holder so as to obtain optimum transversal stability.

Further characteristics of the invention will be hereinafter further explained with reference to the accompanying drawings, in which a number of embodiments are shown.

Fig. 1 represents a side view of an ice-skate according to the invention in a first embodiment, with a shoe having a flexible sole, and in a situation, in which the heel portion of the shoe is locked in a lower (rest) position relative to the blade holder;

Fig. 2 is a perspective view of an enlarged scale of the connection between heel portion and blade holder of the skate according to fig. 1 in the same locked (rest) position;

Fig. 3 represents a side view as shown in fig. 1, but now in a situation in which the heel portion of the shoe, upon unlocking, is elevated relative to the blade holder while the shoe is flexed about a transverse axis located adjacent to the fore foot;

Fig. 4 is a perspective view on an enlarged scale of the heel portion-blade holder connection according to fig. 3 and

Fig. 5 - 9 represent a number of alternative embodiments in which the pedestal may flex or pivot respectively about a transverse axis adjacent to the fore foot portion of the shoe and in which a shoe having a rigid sole may be used.

The nordic type ice-skate shown in fig. 1 - 4 comprises a tubular holder 1, in which the blade 2 is held. The holder 1 carries a sole supporting pedestal 3 of the usual type and a heel supporting member 4 of a special construction. The heel supporting member 4 mainly consists of a knee lever member assembly, one (upper) lever 5 of which is pivotally connected to a heel plate 6 on the shoe 7 and the other (lower) lever 8 of which is pivotally mounted on the holder 2. The pivot axes which extend transversely to the holder 2 are indicated at A, B and C.

In the (rest) position shown in fig. 1 and 2 the heel portion of the shoe 7 is taking its lowermost position relative to the holder 2. In this position the levers 5 and 8 of the knee lever are folded together under the action of a spring 9. Moreover the heel portion of the shoe is blocked and locked in this lowermost position relative to the holder 2 by means of a blocking lever 10 pivoting about the pivot A and a locking lever 11 cooperating with the lever 10 and pivoting about pivot C.

Fig. 1 and 2 show the blocking lever 10 in the blocking position, i.e. in the position in which a projecting edge 10a of the lever 10 (vide fig. 4) engages an edge 5a (vide fig. 4) of the lever 5. The blocking lever 10 is held in the blocking position shown, against the action of spring 12, by the locking 11, which is urged by a spring 13 to engage the free end portion of the blocking lever 10.

In the blocked and locked position of fig. 1 and 2 the skate permits skating in the usual manner. At any time, e.g. upon having made a start in a competition, the blocking may be released by pulling the locking lever 11 upwardly against the action of spring 13. For this purpose a pull cord 14 is attached to a projecting lip 15 of the locking lever 15. This will cause the blocking lever 10 to be pulled from the blocking position under the action of spring 12, after which the knee lever assembly may freely extend and retract in dependency of the skating position taken by the skater. The shoe 7 having a flexible sole is thereby flexing about a transverse axis going through the metatarsophalangeal joint of the foot. The maximum deflection of the heel portion relative to the holder is determined by the extended position of the knee lever.

In the embodiment of fig. 5 and 6 the sole supporting pedestal 3' is formed by a plate-like connecting member 16, which is elastically flexible in one direction only, viz. about an axis 21 perpendicular to the holder 1. The connecting plate 16 has its lower edge clamped between two connecting lugs 17 on the holder 1 and has its upper edge held between two projecting flanges 18 of a fastening plate 19 attached to the sole of the shoe.

Fig. 5 shows the shoe skate combination in a position in which the heel portion 20 of the shoe is lifted to a certain extent relative to the abutment end of the heel supporting pedestal 4' as a result of a forward tilting movement of the shoe about an axis 21 directed transversely with respect to the holder 1 and located at the sole supporting pedestal 3'. Such a tilting movement may take place, while the skate is in the sliding or push off phase, as a result of a tilting moment being exerted by the foot of a skater who is taking (due to fatigue) a rather forwardly inclining position.

The connecting plate 16 may be pretensioned to an extent that under normal skating conditions - with the skater in a cowering position - the shoe 7 will be pressed with its heel portion 20 onto the heel supporting pedestal 4'.

The embodiment of fig. 6 corresponds, as far as the fore portion of the shoe skate combination is concerned, with that of fig. 5. The difference between the two embodiments relates to the aft portion. In the embodiment of fig. 6 the aft support pedestal 4" is designed as a vertical guide for a guide arm 22 fastened to the heel 20 of the shoe and carrying a guide pin 22a. The lower terminal edge 23a of the guiding slot 23 constitutes a lower limit stop for the shoe 7 relative to the holder 1.

In the embodiment of fig. 7 the sole supporting pedestal 3" consists of two parts 24 and 25 which are fastened to the shoe sole and to the holder 1 respectively and may pivot one relative to the other about the transverse axis 21. The two flanges of the sole supporting pedestal 24 are extended rearwardly so as to form guide ribs 26, which are connected to the heel portion of the shoe and the rearward end portions of which are guided on both sides along the aft supporting pedestal 27.

In the embodiment of fig. 8, showing a modification of that of fig. 7, the sole support pedestal 24' is designed as a single web 28 extending rearwardly and then bending upwardly along the heel of the shoe. The upwardly extending rear portion 29 has a guiding slot 30 for a guide pin 31 on the aft support pedestal 32.

In the modified embodiment of fig. 9 a pedestal 25" is used extending from the fore end to the rear and consisting of two parallel flanges 33 extending from the holder 1 upwardly and being integrally formed therewith. Behind the heel of the shoe the flanges 33 have been raised to form a guiding support 34. The shoe 7 has a web 28' similar to the web 28 of fig. 8, which fits between the two flanges 33 and is pivotally connected to the latter about the axis 21 adjacent the fore foot end. The rearwardly projecting portion 35 of the web 28' may move up and down in the space between the legs of the guide support 34. The edge portion 33a of the flanges 33 constitutes a lower limit stop for the shoe relative to the holder 1.

In the embodiments of fig. 6 - 9 a spring, not shown in the drawings, may be used to keep the shoe under a certain pretension in its lowermost position relative to the holder.

It will be apparent that while the invention has been described with regard to ice skates for speed skating similar effects may be obtained when applying the principles of this invention with other types of skates, including roller skates.

Claims

1. Skate, more particularly an ice-skate of the type which is commonly used in speed skating, with which the shoe is supported on the blade holder by means of pedestal means, characterized in that the pedestal connection between the shoe and the blade holder is such, that the shoe is forwardly tiltable relative to the blade holder about a transverse axis located adjacent to the sole portion of the shoe.
2. Skate according to claim 1, with which the forefoot portion of the flexible shoe is secured to a rigid fore pedestal (3), characterized in that the heel portion of the shoe is mounted to be vertically movable relative to the blade holder (1).
3. Skate according to claim 1, characterized in that the pedestal (3'; 3"; 24,25; 24',25'; 25",28') is designed, in the area adjacent to the sole portion of the shoe, to flex or pivot respectively about the transverse axis (21).
4. Skate according to claim 3, characterized in that the pedestal comprises a sole support shaped as a connecting body (3'), which is elastically flexible in a plane perpendicular to the transverse axis (21) but for the rest is rigid and which is in slightly pretensioned condition, the heel portion of the shoe being pressed, under the influence of the pretension of the connecting body (3'), into an abutting position relative to a heel support (4',4") on the holder.
5. Skate according to claim 3, characterized in that the pedestal, adjacent to the sole portion, consists of two parts (24,25; 24',25'; 25",28') connected to the blade holder (1) and the shoesole respectively, which parts are pivotable about the transverse axis (21) with respect to each other.
6. Skate according to claim 5, characterized in that the pivot connection or flexible connection adjacent to the sole portion is pretensioned to an extent that the heel portion is

normally held, with the intermediary of the lower stop limit (26,27; 31; 33a), at a minimum distance above the blade holder (1).

7. Skate according to claims 1-6, characterized in that the pedestal comprises means (4; 22,23,22a; 26,27; 29-31; 34,35) to guide the heel portion relative to the blade holder (1).

8. Skate according to claim 7, characterized in that the guiding means are constituted by a knee-lever like heel support (4), the levers (5 and 8) of which, pivotably connected to the blade holder (1) and the shoe heel respectively, are movable against spring action (9) from a folded position (fig. 1,2) to a more stretched position (fig. 3,4).

9. Skate according to claim 8, characterized in that the levers (5 and 8) of the knee lever member (4) are designed to be locked in the folded position by means (fig. 1,2) of a locking lever (11), which is adapted to be brought into a inoperative position against spring action (13).

10. Skate according to claim 9, characterized in that the locking lever (11) is mounted in the fastening pivot (C) of one lever (5) and cooperates with a blocking lever (10) mounted in the fastening pivot (A) of the other lever (8), the arrangement being such that the blocking lever (10) is

adapted to enter into its operative position, against spring action (12), into blocking engagement with the one lever - (5) and is locked in this position by the locking lever (11).

5 11. Skate according to claim 7, characterized in that the guiding means comprise a bracket (27; 32; 34) which extends upwardly from the heel portion of the blade holder - (1) and is in slidable engaging contact with a guide element (26; 29; 35) extending from the shoe heel portion.

10 12. Skate according to claim 11, characterized in that the guiding bracket (27; 32; 34) extends along the back side of the shoe heel portion.

15 13. Skate according to claim 3 and 12, characterized in that the guiding bracket (34) is integrally formed with the pedestal portion (25") which is secured to the blade holder (1) adjacent to the sole portion.

20 14. Skate according to claim 13, characterized in that the guiding element (28; 35) extending from the shoe heel portion is integral with the support part which is secured adjacent to the shoe sole portion and constitutes a wel - (28') extending below the shoe and slightly projecting (at 25 35) at the back side.

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