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(54) **Improved ice or inline skates**

(57) An aid for athletic sports practice, in particular a klapskate. The klapskate is provided with a support which is equipped with a front sole and a heel section for supporting a human foot. A holder connected to the support has an earth surface contact element. The holder is subdivided, in direction of movement, in a foremost part and a rearmost part provided in line with the foremost part. Here, in the proximity of the front sole, the foremost part

is connected to the support so as to be pivotable about at least a first transverse pivot axis, for carrying out a pivotal movement in a common reference plane extending through the support and the holder. Here, the rear-most part is immovably attached to the support in the proximity of the heel section. Relevant details in the left and right skate are preferably of mirror symmetrical design. The aid can also have the form of a klapskate for inline roller skating.

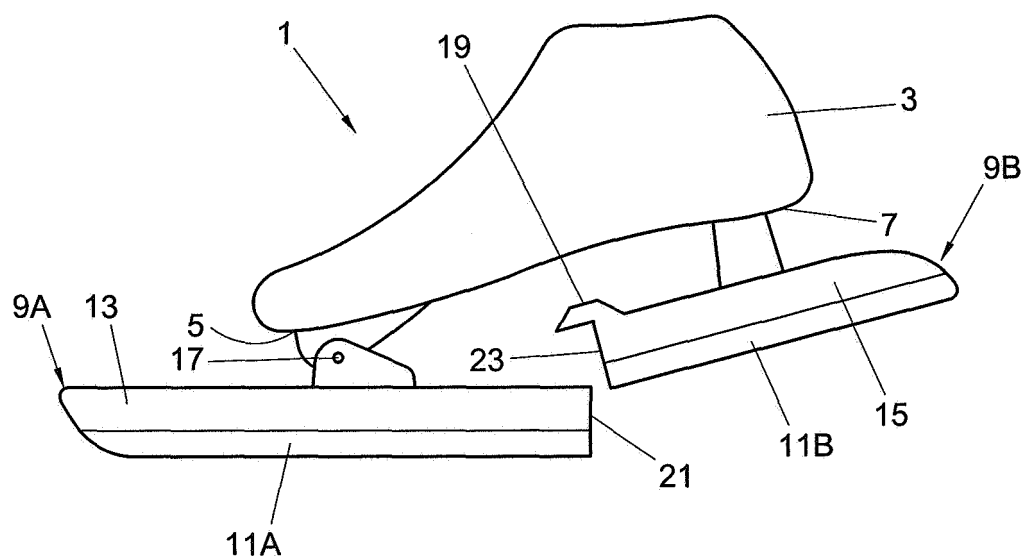


FIG. 2

Description

[0001] The invention relates to an aid to be temporarily fastened to a human leg for practicing athletic sports, such as ice skating, inline skating or skiing. More particularly, the invention relates to an improved klapskate, this being understood to include both ice skates and inline roller skates.

[0002] The principle of the known klapskate has its origin in a German patent publication DE78733 from 1894, while after this, similar skates have been suggested too, as in US 1,789,182. This type of skate, however, has become widely known only after its development from kinesiology for competitive long distance skating. Instead of the blade of a skate being fixedly connected, in a customary manner, at the front and the rear to a shoe, with the klapskate, the skate blade is pivotably attached to the front of the shoe. With the aid of a spring mechanism, the skate blade is held against a point of support at the rear of the shoe. With this, during skating, a better rolling of the foot is obtained, so that the push-off leg of the skater too can be stretched completely before it is lifted from the ice. With this type of skate, indeed, better results have been achieved in the international skating sports. Sometimes mentioned as a drawback of the klapskate is the loss of the possibility of making a "point start", whereby grip is obtained on the ice with the tip of the skate blade. While it may be true that solutions to this drawback have been suggested which temporarily fix the skate blade of the klapskate, these solutions are in part impractical, or even in violation of the regulations for international skating laid down by the ISU, so that they cannot be used in competitive sports. With klapskates of the customary model, the pivotable attachment is located at the front at approximately one third or less of the length of the blade from the tip of the blade. When, with the foot part pivoted up, the point of support at the heel side is inoperative, over two-thirds of the length of the skate blade is to be kept under control by the pivot attachment at the front. This not only sets high standards to the design of the pivot connection, but renders the use of the skate susceptible to wear too. Especially upon push-off, but also in bends, optimum transmission of the force from the skater's heel is very important. To this end, especially a fixed and stable connection to the skate blade is required. The known klapskate cannot always meet these requirements due to, inter alia, wear to the pivot connection or to the heel support. Nonetheless, for optimal use of the force exerted during the skate stroke, the possibility of rolling the foot remains very important. When using racing skates of the Norwegian type, in addition to the need for a better rolling of the foot, the manoeuvrability of these skates designed for speed leaves to be desired. Skates especially designed for manoeuvrability, such as hockey skates or figure skating skates, have considerable shorter blades.

[0003] Accordingly, it is at least an object of the present invention to eliminate or meet at least one of the draw-

backs of the state of the art. More particularly, it is an object of the invention to provide the long distance skates now in use with new properties. In this type of skate, in particular properties in the field of freedom of movement of joints, manoeuvrability and stability were supposedly impossible to combine. It is also an object of the present invention to provide alternative constructions which are easier in manufacture and use and which can furthermore be made relatively advantageously. Alternatively, it is an object of the invention to provide the public with an at least useful choice.

[0004] To that end, the invention provides an aid for athletic sports practice, in particular a klapskate, provided with a support equipped with a front sole and a heel section for supporting a human foot, and a holder connected to the support, having an earth surface contact element, wherein the holder is provided with a part foremost in direction of movement and a rearmost part provided in line with the foremost part, wherein, in the proximity of the front sole, the foremost part is connected to the support so as to be pivotable about at least one transverse pivot axis, for a pivotal movement in a reference plane extending both through the support and the holder, and wherein the rearmost part is immovably attached to the support in the proximity of the heel section.

[0005] With such an aid or klapskate, it can be advantageous that the pivotal movement of the foremost part takes place between a non-pivoted position and a completely pivoted position so that thus, a sufficient degree of rolling of the foot of a user of the aid can be guaranteed. Then, also, a spring can be utilized, operating between the support and the holder, which can move the foremost part back to the non-pivoted position.

[0006] In general, it is also advantageous when the foremost part in non-pivoted position links up by a rear end with a front end of the rearmost part along a dividing seam in the holder. Here, the dividing seam can be of diagonal design. The dividing seam can further be provided with mutually cooperating tongue and groove sections. More particularly, it can be provided that in the non-pivoted position, in all directions of a normal load, the foremost part, with a rear end engaging a front end of the rearmost part, is immovably connected thereto. Also, guide means can be provided with which the rear end of the foremost part, upon pivoting, is guided with respect to the front end of the rearmost end.

[0007] The pivotability about the transverse pivot axis can be effected at will by a pivot point provided with a pivot pin, or by a flexible, optionally resilient, connection. Also, for the pivotability of the foremost part, a second transverse pivot axis can be utilized which can be placed in the direction of movement in front of the first transverse pivot axis. Then, if desired, the second transverse pivot axis can be activated later in the pivotal movement effected by rolling of the foot than the first pivot. Also, if required, at least one of the first and second transverse pivot axes can be directed so as to be at an inclination with respect to the reference plane.

[0008] In general, it may be useful to have the position of the foremost part in the non-pivoted position be determined more precisely by a stop means. Here, the stop means too can be designed to be at least partly resilient and elastic. Also, a locking means can be provided, with which the pivotal movement of the foremost part in the non-pivoted position can be blocked, at least temporarily. The locking means can then be designed as a sliding part, which can simultaneously enclose the foremost and rearmost part of the holder. If desired, the locking means may be unlocked electromagnetically. Also, with the aid of magnetic attraction, the position of the foremost part, in the non-pivoted position of this foremost part, can be defined more precisely. Alternatively, it is also possible to even exert a slight take off pressure when rolling the foot, by means of two repelling magnet poles. With this, also, the effect of friction can be reduced.

[0009] It is customary with this sort of aid to have the front sole and the heel section form part of footwear enclosing the foot of a user.

[0010] A suitable earth surface contact element can be formed by a skate blade. This can be manufactured from steel, provided or not provided with a coating, from sintered metal or even from ceramic material. Alternatively, the earth surface contact element can be formed by a wheel system for in line skates. This is a branch of sport in its own right but can also serve for maintaining the fitness of an athlete in periods of ice shortage.

[0011] The invention further relates to a combination designed as a pair of skates having, in each case, an aid of the type described hereinabove designed as left and right skate, wherein details relevant thereto in the right and the left skate are designed to be mirror symmetrical.

[0012] Presently, the invention will be described in further detail on the basis of the appended drawings. In the drawings:

Figs. 1 and 2 are side views of a klapskate according to the invention in the skating position and the forward pivoted position, respectively;

Figs. 3 and 4 are side views of an alternative embodiment for a klapskate according to the invention in the same positions as in Figs. 1 and 2;

Figs. 5, 6, 7 and 8 are alternative designs of the dividing seam, according to the cross sections D-D in, inter alia, Figs. 1 and 3;

Figs. 9 and 10 are side views of another alternative embodiment of a klapskate according to the invention in the same positions as in Figs. 1 and 2;

Figs. 11 and 12 are side views of another alternative embodiment of a klapskate according to the invention in the positions of Figs. 1 and 2; and

Figs. 13 and 14 are side views of an inline roller skate, according to the principle of the invention, to which also a magnetically supported closing movement variant is added.

[0013] Fig. 1 shows, in side view, a klapskate 1 for

athletic sports practice. In Fig. 1, the klapskate 1 is in the normal skating position. The skate 1 has a support 3, schematically represented here as footwear enclosing the foot of a user. The support 3 is provided with a front sole 5 and a heel section 7. A holder 9 connected to the support 3 has an element for contact with the earth's surface, such as a skate blade 11. The holder 9 consists of a foremost part 13 and a rearmost part 15 lying in line therewith. The foremost part 13 is pivotable about a pivot pin 17 which extends in transverse direction with respect to an imaginary reference plane which extends through the support 3 and the holder 9. Upon pivoting, as shown in Fig. 2, the foremost part 13 remains substantially in this reference plane. The rearmost part 15 is immovably attached to the heel section 7 of the support 3.

[0014] Fig. 2 shows the foremost part 13 with an associated part of the holder 9A and part of the ice blade 11A in a forward pivoted position of the klapskate 1. In this position, the foremost part of the ice blade 11A will remain in contact with the ice surface. In Fig. 2, the rearmost part 15, which is fixedly attached to the heel section 7, has moved with a rearmost part 11B of the ice blade away from the ice. Thus, it is achieved, inter alia, that during rolling of the foot of the skater, force can still be exerted on the ice with the foremost part 13 of the skate, but the load of the pivot bearing 17 is considerably lower while in this position, also, greater manoeuvrability is obtained. For a good alignment of the foremost and rearmost ice blades 11A, 11B, it may be desirable to provide a stop 19. Further, between the support 3 or the front sole 5 and the foremost part 13 of the holder 9, a spring may operate for returning the foremost part to the non-pivoted position. This spring (not shown but conventional) can return the foremost part 13 to the position of Fig. 1, after the skate 1 has been lifted in its entirety from the ice from the position in Fig. 2. These springs, which are standard in klapskates, are known to the skilled person and can be formed by hairpin springs about the pivot point 17 but also by draw springs which for instance draw a rear end 21 of the foremost part 13 towards the front sole 5. Often, such draw springs can be hooked in at will at a number of places so that an adjustable spring tension is obtained. In closed position (Fig. 1) the rear end 21 of the foremost part 13 links up with a front end 23 of the rearmost part 15 and then forms a dividing seam 25 in the holder 9.

[0015] The Figs. 3 and 4, in which for a better understanding, as much as possible, the same reference numerals will be used, show a variant wherein the dividing seam 25 runs no longer straight but according to a radius. The radius of the dividing seam 25 has the pivot 17 as center point. As a result, the rear end 21 and the front end 23 of the dividing seam 25 keep running next to each other during pivoting (Fig. 4). This situation can be advantageously used when a suitable dividing seam design of Figs. 5 - 8 is utilized.

[0016] Figs. 5, 6, 7 and 8 show, schematically and as top plan view, a number of alternative cross sections

along the lines D-D in Fig. 1 and Fig. 3. These cross sections also find application in Figs. 9 and 11 which will be explained in further detail in the following. When, with the embodiment of Fig. 3 and 4, instead of the straight design according to Fig. 5, one of the contours according to Figs. 6, 7 or 8 is used, then, the front end 23 of the rearmost part 15 is guided over at least an important part of the pivoting path with respect to the rear end 21 of the foremost part 13. In this specific combination however, it is of importance that no significant friction can occur between the pivoting foremost part and the fixed rearmost part. It may also be necessary with the design according to Figs. 3 and 4 to dimension the dividing seam to be somewhat wide, so that there is no risk of ice, snow or dirt hindering the pivotability.

[0017] Fig. 6 shows a so-called tongue and groove variant wherein a tongue 27 engages a groove 29. An undesired lateral movement can thus be completely precluded and the forces on the pivot 17 can also be restrained. A similar effect can be achieved with the pointed variant according to Fig. 7 or the round variant according to Fig. 8. This design can find application in the embodiment according to Fig. 1 and 2 too, but in that case has effect only in the non-pivoted position (according to Fig. 1). It goes without saying that in the skating position, it is of the utmost importance that the alignment of the skate blades be good and immovable for achieving peak performances.

[0018] In Figs. 9 and 10, a further alternative variant of the klapskate according to the invention is shown, wherein the dividing seam 25 is designed diagonally in vertical direction, in a manner such that this dividing seam is positioned further forward at the side than at the bottom. With such a diagonal design of the dividing seam, a stop becomes superfluous because the closing position is defined by the dividing seam itself. For the design of the front and rear surfaces 21, 23 of the dividing seam, once more, one of the alternatives from Figs. 5, 6, 7, or 8 respectively can be utilized.

[0019] Figs. 11 and 12 show yet another variant with a diagonal dividing seam 25. Here, the dividing seam has a stepped shape. This is a suitable embodiment when the support 3 is to be kept free from reactive forces such as they could be formed in a diagonal dividing seam according to Figs. 9 and 10. Here too, the cross section D-D can use one of the designs from Figs. 5 - 8.

[0020] In the described embodiments, the pivot connection between the foremost part 13 and the front sole 5 is represented as a pivot connection with a pivot pin 17 as transverse pivot axis. It will be clear to the skilled person that to this end, also, a pivot connection from flexible, optionally resilient material can be used. It is also possible to use more than one pivot axis. For a more detailed description of such multi-axial systems, reference is made to the descriptions in NL1003205, NL 1008647, US 6,082,744 and/or NL 1011985.

[0021] For the angle the transverse pivot axis makes with the reference plane through the support 3 and the

holder 9, also, a set up directed at an inclination can be chosen which takes the angle at which the human leg moves during skating into account. A more detailed description of this can be found in, inter alia, NL1014462 and/or NL1014318.

[0022] When starting the skating movement, it can sometimes be desired to lock the foremost part 13 with respect to the rearmost part 15 in the non-pivoted position. Thereto, a simple manually-operable locking means can be provided which is designed as a sliding part that can simultaneously comprise adjacent parts of the foremost and rearmost part. More complex systems too can be eligible as locking, and examples thereof are described in NL 8500483, NL1001618, NL1007725, NL 1008109 and/or NL1008898. Figs. 13 and 14 are schematic side views of an inline roller skate, wherein the earth surface contact element is formed by a wheel system. Instead of a skate blade, here, on the foremost and rearmost part 13, 15 of the support, a system of wheels 30A, 30B, 30C and 30D is provided. In the example there are four, but there can also be more than four.

[0023] Also, to this embodiment, a magnetically-supported closing movement variant is added. Instead of springs, such as a hairpin spring or a draw spring, for returning the foremost part 13 to the non-pivoted position, also, magnetic fields can be used for moving the foremost skate part back to its initial position. With the improved klapskate according to the invention, the pivotable foremost part 13 is virtually in balance. This means that the pivot axis 17 is in the proximity of the center of gravity of the foremost part 13. As a result, under the influence of gravity, the pivoted position thereof will position itself substantially parallel to the earth's surface. It is therefore not required that over the entire path of the pivotal movement a force is exerted for returning the foremost part 13 to its non-pivoted position. On the front sole part of the support 3, a first magnet 31 is provided and on a part of the foremost part 13 lying in front of the pivot 17, a second magnet 33 is provided. The poles of the first and second magnet 31, 33 are oriented such that they repel each other, so that from the extreme pivoted position of the foremost part 13, a decreasing returning force is exerted. Alternatively, or in combination with the first and second magnets 31, 33, a third magnet 35 can be provided in line with the rearmost dividing seam surface 23 of the rearmost part 15. A fourth magnet 37 is then provided on a part of the foremost part 13 lying behind the pivot axis 17. The third and the fourth magnets 35, 37 have their poles such that they attract each other with increasing force. It can thus be achieved that closing forces on the pivotable foremost part are exerted only in the proximity of the extreme pivoted positions and are not exerted over a part of the pivot path important to the rolling of the foot. The use of magnets in the embodiment according to Figs. 13 and 14 is optional as to the inline roller skate variant and can be utilized with the same advantage with each of the ice skate variants as discussed hereinabove.

[0024] It is assumed that the construction and the op-

eration of the present invention clearly appear from the preceding description. The invention is not limited to any embodiment described herein, and, within the reach of the skilled person, variations are possible which are understood to lie within the scope of protection. Also, all kinematic inversions are to be understood to fall within the scope of protection of the present invention. Expressions such as "consisting of", when used in this description or the accompanying claims, should not be understood to be an exhaustive enumeration, but rather to have an inclusive meaning. Terms such as "means for ..." should be read as "component formed for..." or "element constructed for ..." and are to be understood to also include all equivalents for the described configurations. The use of terms such as: "critical", "advantageous", "desired" etc. is not intended to limit the invention. Furthermore, also properties that are not specifically or expressly described or claimed in the configuration according to the present invention can be comprised without departing from the scope of protection.

Claims

1. An aid for athletic sports practice, in particular a klap-skate, provided with a support equipped with a front sole and a heel section for supporting a human foot, and a holder connected to the support, having an earth surface contact element, wherein the holder is provided with a part foremost in the direction of movement and a rearmost part provided in line with the foremost part, wherein, in the proximity of the front sole, the foremost part is connected to the support so as to be pivotable about at least a first transverse pivot axis, for a pivotal movement in a common reference plane extending through the support and the holder and wherein the rearmost part is immovably attached to the support in the proximity of the heel section.
2. An aid according to claim 1, wherein the pivotal movement of the foremost part takes place between a non-pivoted position and a completely pivoted position and is thus designed to guarantee a sufficient degree of rolling of the foot for a user of the aid.
3. An aid according to claim 2, wherein a spring operative between the support and the holder can move the foremost part back to the non-pivoted position.
4. An aid according to claim 1 or 2, wherein the foremost part in non-pivoted position links up by a rear end with a front end of the rearmost part along a dividing seam in the holder.
5. An aid according to claim 4, wherein the dividing seam is designed diagonally in vertical direction.
6. An aid according to claim 4 or 5, wherein the dividing seam is provided in transverse direction with mutually cooperating tongue and groove means.
7. An aid according to any one of the preceding claims, wherein, in the non-pivoted position, in all directions of a normal load, the foremost part, with a rear end engaging a front end of the rearmost part, is immovably connected thereto.
8. An aid according to any one of claims 1 - 7, wherein the pivotability about the transverse pivot axis is effected by one of a pivot point provided with a pivot pin and a flexible, optionally resilient, connection.
9. An aid according to any one of claims 2 - 8, wherein for the pivotability of the front part, use is made of a second transverse pivot axis which is placed in the direction of movement in front of the first transverse pivot axis.
10. An aid according to claim 9, wherein the second transverse pivot axis is activated later in the pivotal movement effected by the rolling of the foot than the first pivot axis.
11. An aid according to any one of the preceding claims, wherein the non-pivoted position is defined by a stop which is optionally at least partly, resiliently elastically designed and/or provided with magnetic means, which are operative between the foremost part and the stop.
12. An aid according to any one of the preceding claims, wherein the front sole and the heel section form part of footwear enclosing the foot of a user.
13. An aid according to any one of the preceding claims, provided with a locking means, with which the pivotal movement of the foremost part in non-pivoted position can be blocked, at least temporarily.
14. An aid according to any one of claims 1 - 20, wherein the earth surface contact element is formed by a skate blade.
15. A combination of aids according to any one of the preceding claims designed as a pair of skates having, in each case, an aid according to any one of the preceding claims designed as a left and a right skate, wherein details relevant thereto in the left and right skate are of mirror symmetrical design.

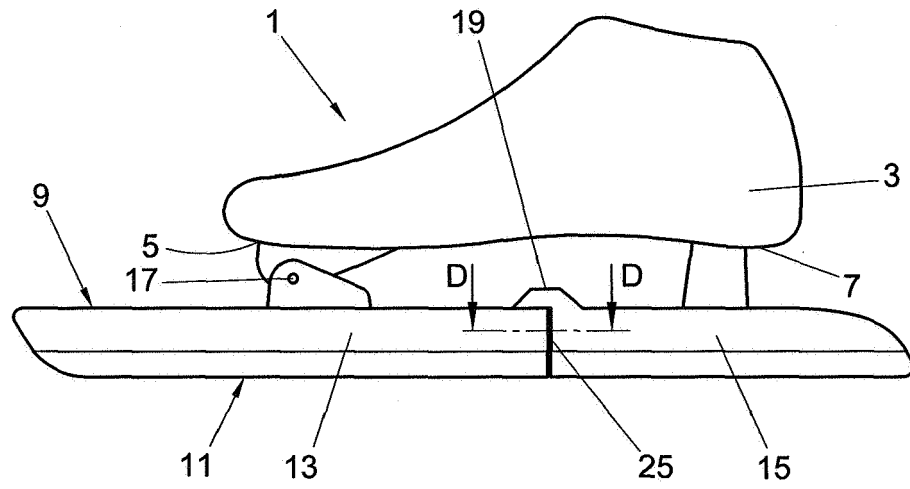


FIG. 1

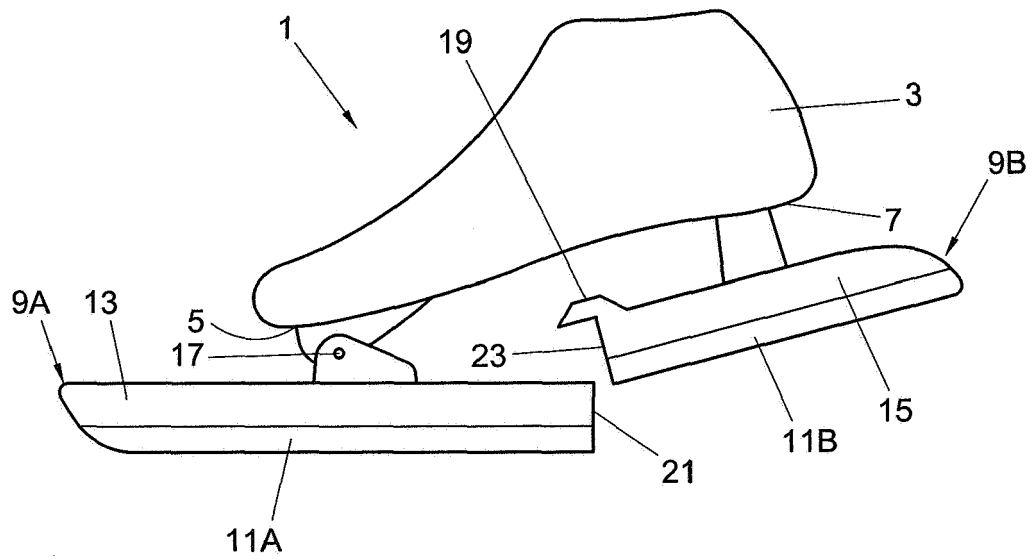


FIG. 2

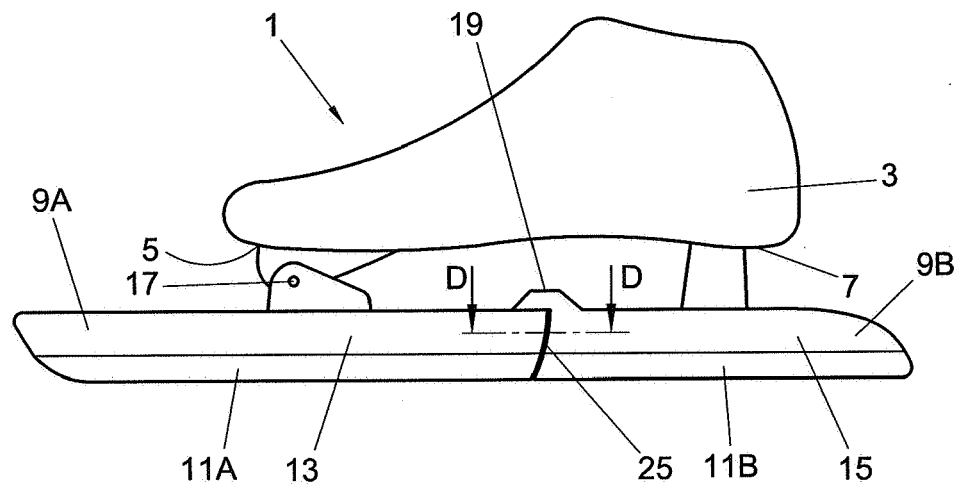


FIG. 3

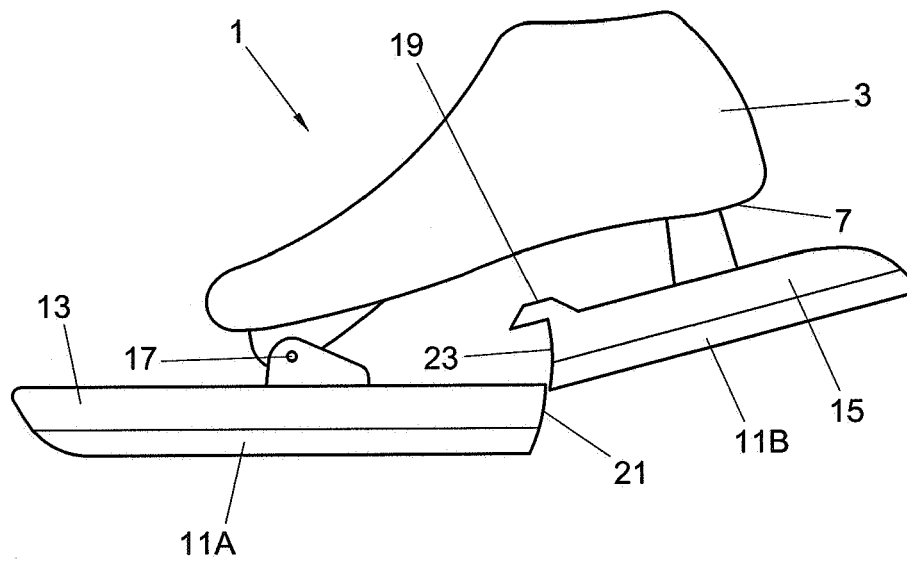


FIG. 4

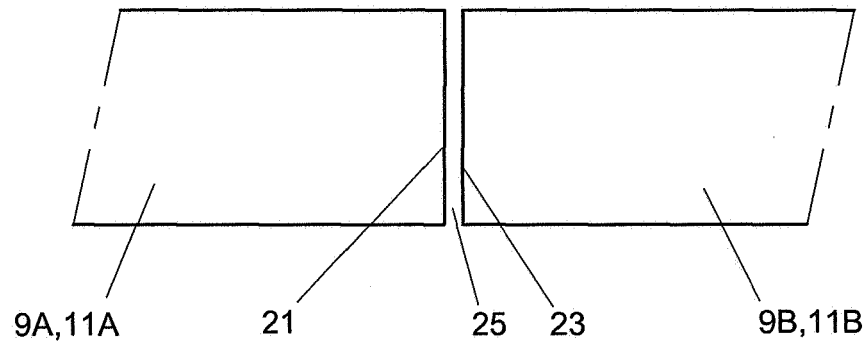


FIG. 5

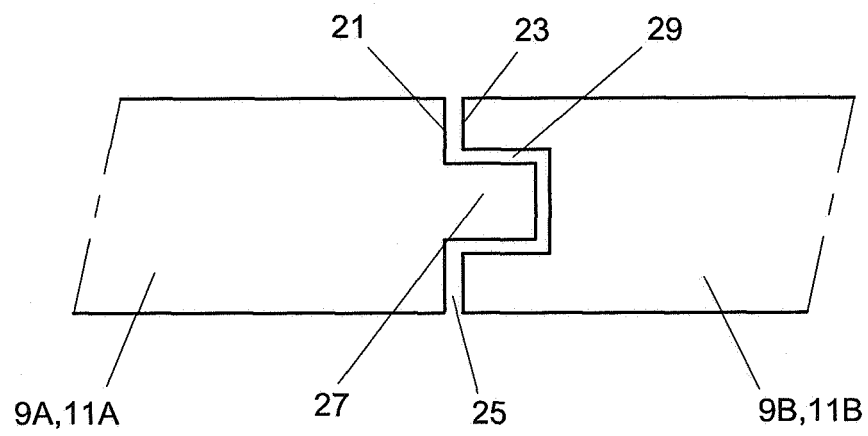


FIG. 6

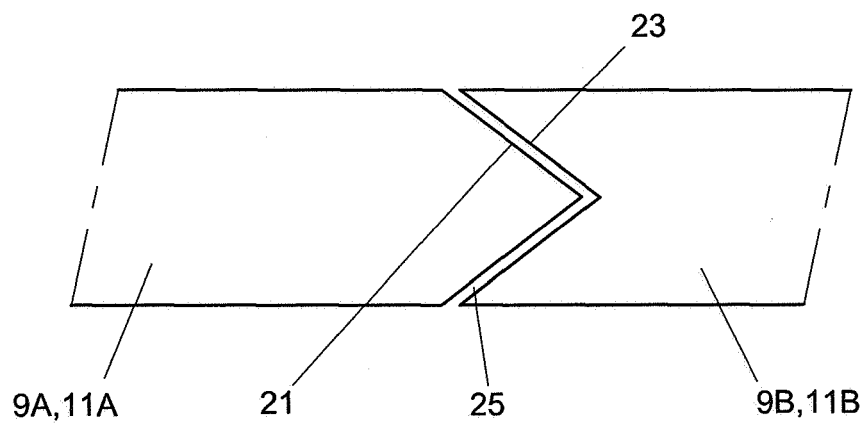


FIG. 7

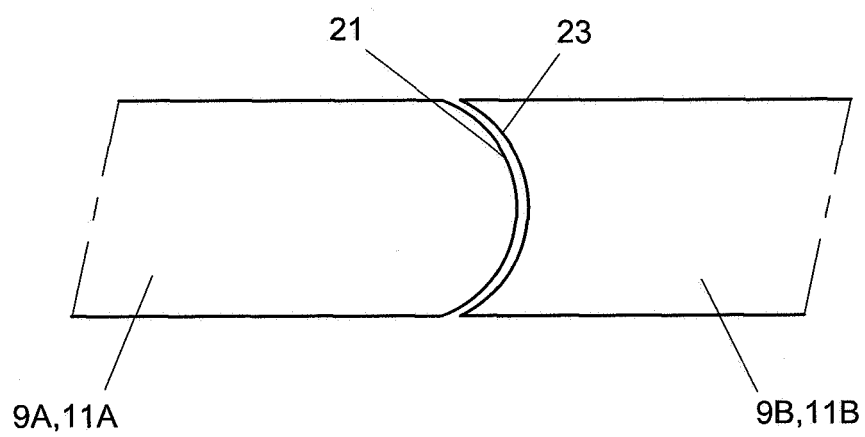


FIG. 8

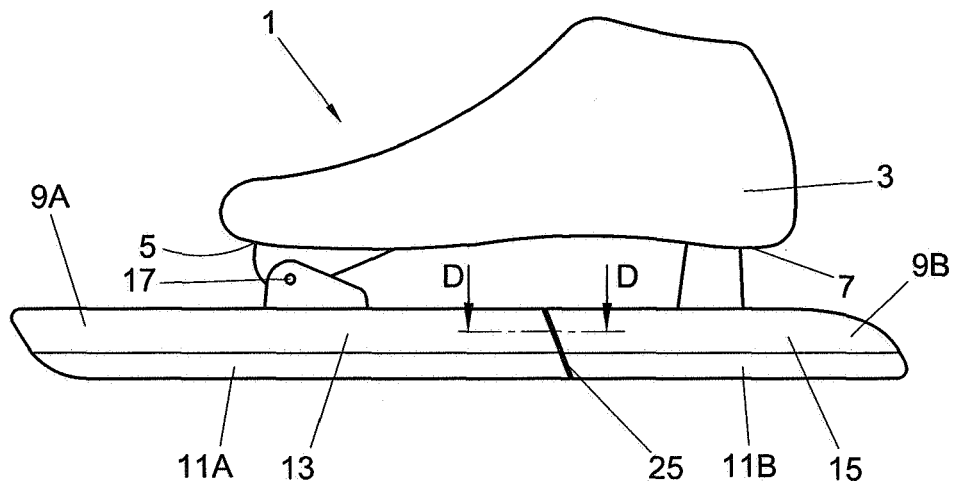


FIG. 9

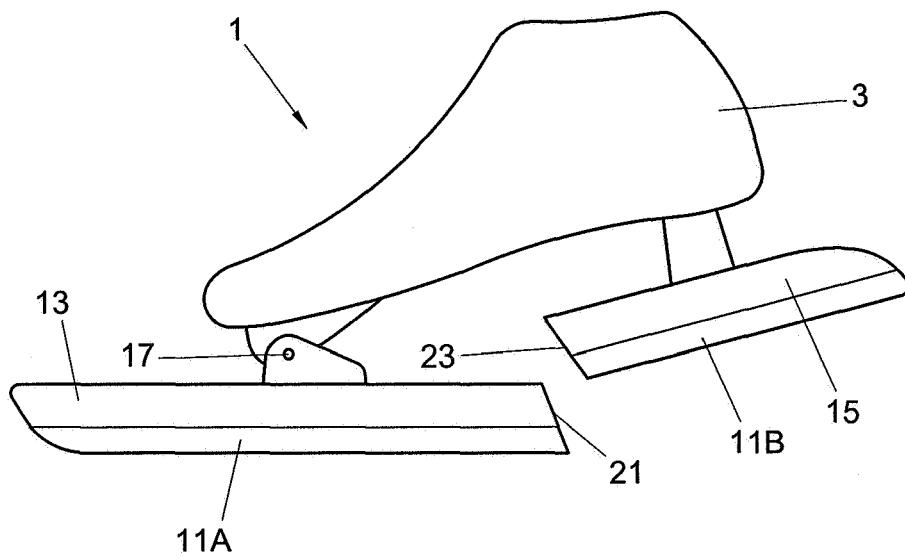


FIG. 10

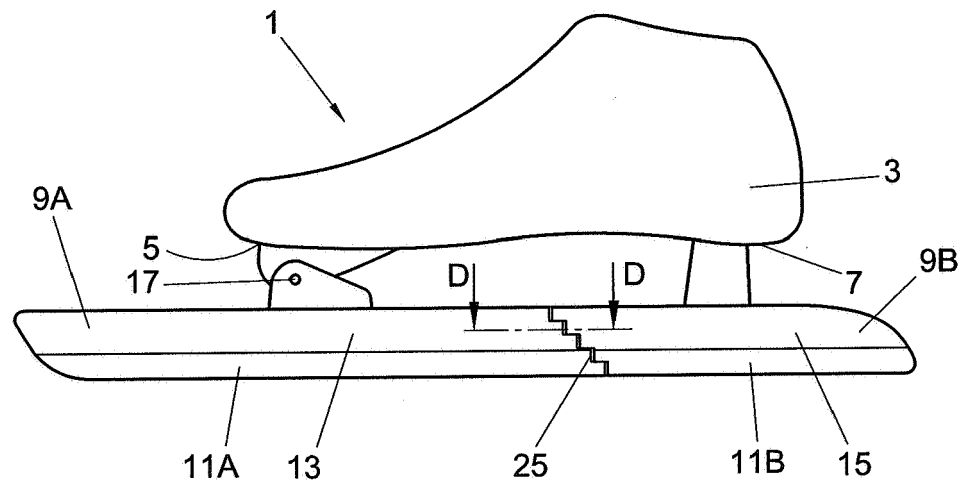


FIG. 11

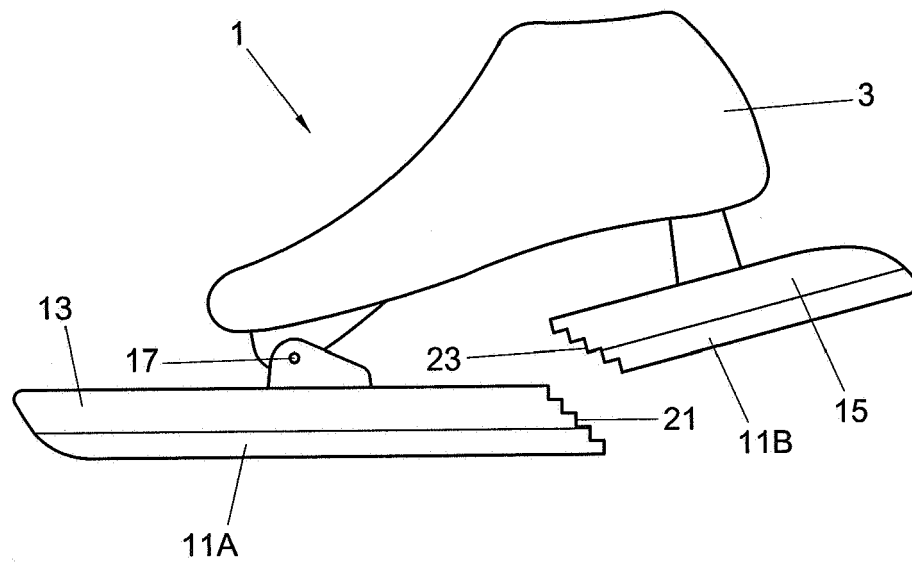
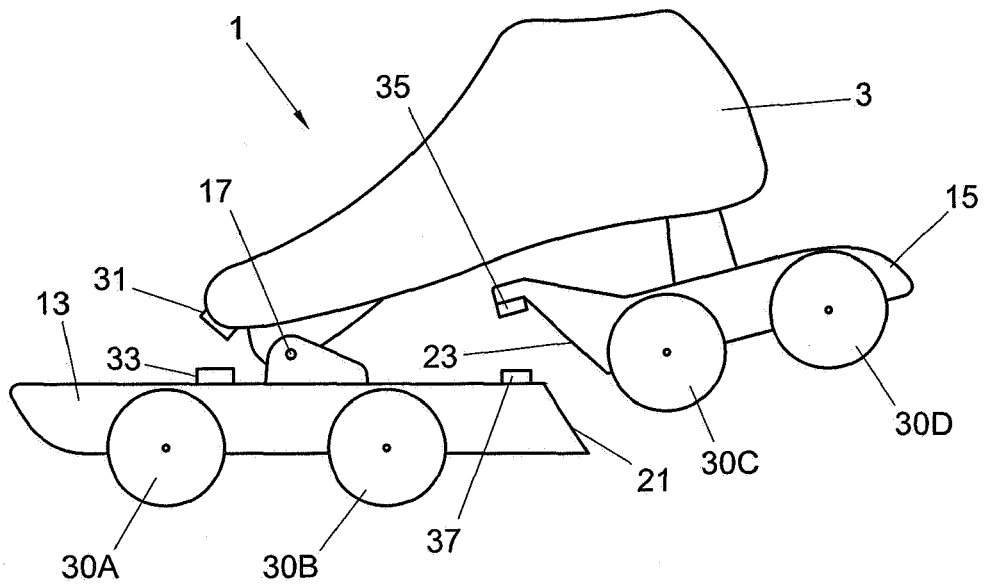
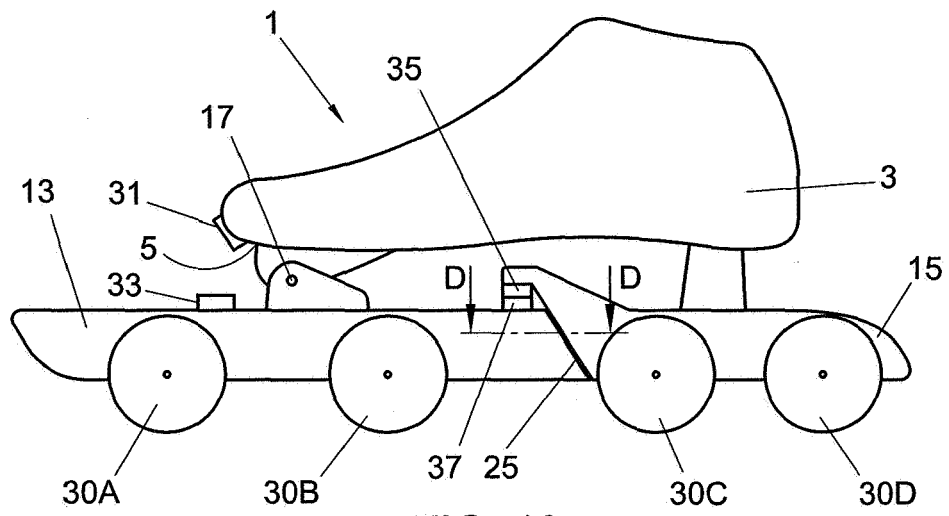


FIG. 12



REFERENCES CITED IN THE DESCRIPTION

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