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(54) Anti-reverse sliding motion mechanism

(57) The present invention provides for an anti-reverse sliding motion mechanism which comprises a pair of carriers (1) having a plurality of movable sliding plates (13) disposed therein. As each carrier (1) carrying the plurality of sliding plates (13) subject to a thrust in opposite direction, the sliding plates (13) extend and move to be in perpendicular to the carrier (1), thereby producing an anti-thrust resistance force which serves as a opposite force for moving forward. When the carrier (1) is subject to a forward pushing force, the anti-reverse sliding plates move to present a horizontal smooth surface which serves as a sliding surface. By the alternating action of the pair of carriers, a forward driving force is obtained as a result of the combination of anti-reverse and sliding actions.

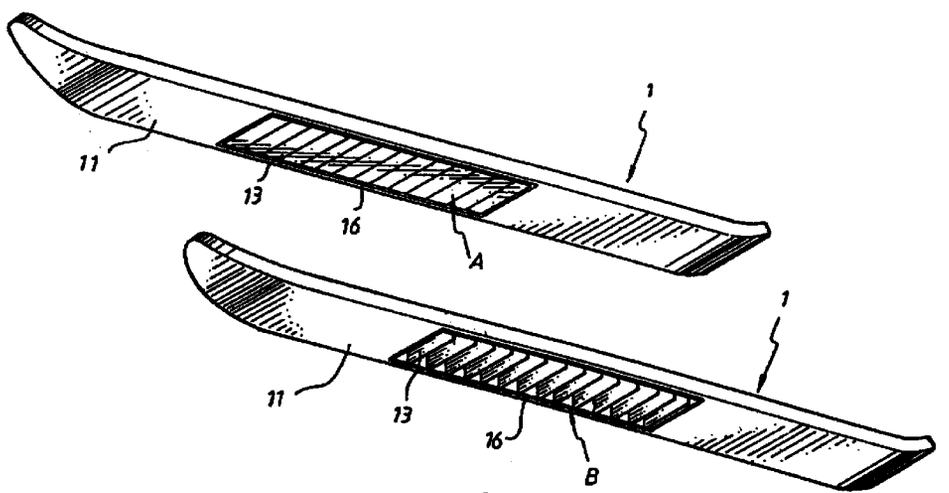

fig. 3

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Description

BACKGROUND OF THE INVENTION

The subject invention is related to an anti-reverse sliding mechanism which comprises a pair of carriers having a plurality of movable anti-reverse sliding plates disposed therein. The anti-reverse sliding plates may move to a sliding position or an anti-reverse position. As the pair of carriers are effected to move in alternation, an anti-reverse action will be produced, and said action will convert to a forward sliding force.

It is known that in almost all forward motions, for example rowing, skiing, running, and walking, a reaction force for moving forward is obtained by applying a force on an acting surface (or object) in opposite direction. In some other sports, such as in skating, a driving force to move forward is obtained due to the center of gravity of the skater's body which inclines forward and the alternating actions of the skates. In rowing, skiing, running and walking, oars, ski sticks, and legs are used respectively to apply forces backward to obtain the reaction forces needed to move forward. In skating, the driving force to move forward is obtained by means of the gradient of a slope, or the sliding effect resulted from the actions between the skater's forwardly inclining body weight and the ground surface.

The two types of motions mentioned above are not entirely different from or opposed to each other. They may operate in combination under some circumstances. For example, in the case of skiing (see Figure 2), ski sticks are used to provide a thrust force acting in opposite direction. But the center of gravity of the skier's body which is inclined forward or the gradient of the slope on which sliding takes place provides the driving force to move forward. In the case of skating (see Figure 1), to overcome the static friction, the kinetic energy to initiate motion is provided by the serrated portions of the front ends of the ice skates or the rubber blocks in front of the roller skates. Once the forward moving force is obtained, it is only necessary to keep the center of gravity of the body facing toward a particular direction and to move the pair of ice skates or roller skates alternately to maintain the motion.

The motions mentioned above are normally a result of the combination of forward sliding and anti-reverse actions. However, for sliding motion over snow or grass, ski sticks are still needed as tools for pushing forward. Moreover, sliding over the snow or grass normally involves the gradient effect in which potential energy is converted into kinetic energy. Therefore, after one slides down a slope, it is rather difficult for him to climb up the slope because the skis or roller skates he wore are so smooth that no holding force against the ground can be produced.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an anti-reverse sliding mechanism which mitigates the above drawback. The mechanism comprises a pair of carriers having a plurality of movable anti-reverse sliding plates disposed therein. The sliding plates serve as a low friction sliding medium as they move to a forward sliding position. As the sliding plates move to an anti-reverse position, a reaction force which may convert to a forward driving force may be obtained.

Another object of the present invention is to provide a sliding carrier which may be used to walk up a slope.

These and other objects, advantages and features of the present invention will be more fully understood and appreciated by reference to the written specification.

BRIEF DESCRIPTION OF THE DRAWINGS

Further understanding of this invention will become more apparent after referring to the following specification and attached drawings in which:

Fig. 1 is a view showing a conventional sport of skating;

Fig. 2 is a view showing another conventional sport of skiing;

Fig. 3 is a perspective view of an embodiment according to the present invention; Fig. 4 is a cross-sectional view showing the plurality of anti-reverse sliding plates in accordance with the present invention in a forward sliding position;

Fig. 5 is a cross-sectional view showing the plurality of anti-reverse sliding plates in accordance with the present invention in an anti-reverse position;

Fig. 6 is a perspective view of another embodiment according to the present invention;

Fig. 7 is a cross-sectional view showing the anti-reverse sliding plate of the embodiment shown in Fig. 6 in the forward sliding position;

Fig. 8 is a cross-sectional view showing the anti-reverse sliding plate of the embodiment shown in Fig. 6 in the anti-reverse position;

Fig. 9 is a perspective view of a further embodiment according to the present invention; and

Fig. 10 is a perspective view illustrating the internal structure of the embodiment shown in Fig. 9.

With reference to Fig. 3, there is shown a sliding carrier 1 similar to a ski. The bottom of the carrier 1 presents a smooth surface 11. The smooth surface 11 includes a frame 16 at the center thereof. A plurality of anti-reverse sliding plates 13 linked to one another are disposed within the frame 16. The anti-reverse sliding plates can move as a unit to a horizontal position to present a sliding surface (A). In this way, a smooth surface is formed at the bottom of each carrier 1 as a result of the combination of the sliding surface (A) and the

smooth surface 11 (see Fig. 4). Moreover, the sliding plates can be swung as a unit to a vertical position. In this orientation, each of the sliding plates which stands vertically protrudes beyond the smooth surface 11 so that an anti-thrust surface (B) is formed underneath the sliding carrier 1 (see Fig. 5).

As shown in Figs. 4 and 5, the anti-reverse sliding plates 13 are disposed within the rectangular frame 16 which is provided within a slot 17 of the sliding carrier 1. The slot 17 is provided with a plurality of discharge openings 12 which are corresponding in number to the anti-reverse sliding plates. The discharge openings 12 penetrate through the top of the sliding carrier 1 so that snow, soil, water, etc. entering the slot 17 through the bottom of the sliding carrier 1 can be expelled through the discharge openings 12.

Fig. 6 shows a second embodiment in accordance with the present invention. This embodiment is different from that of Fig. 3 in that a foot retainer 10 in which the feet of an user may be placed is further provided on the sliding carrier. Figs. 7 and 8 are cross-sectional views illustrating the internal structure of a portion of the embodiment in details. In the drawings, it is seen that the foot retainer 10 is provided on a force applying lever 18. One end of the lever 18 is pivotally connected to a connecting rod 14 by means of pivot points 19 and 20. As one foot of the user steps backward, the anti-reverse sliding plates will swing to a vertical position from its original horizontal position. In other words, the original sliding surface (A) turns into the anti-thrust surface (B). As the stepping force is acted on by the resisting force resulted from the actions between the anti-thrust surface (B) and the ground (snow surface, ice surface or grass), a forward driving force will be provided for the other foot of the user. Subsequently, as the other foot slides forward, the anti-reverse sliding plates 13 will turn to its horizontal position to present the sliding face (A). Since the sliding surface (A) will produce a sliding effect of minimal friction with the ground, the foot of the user can slide forward, resulting in the forward movement of the body. Then the foot that steps backward can slide forward with the foot lifting off or touching on the ground. The anti-reverse sliding plates 13 swing to present the sliding surface (A) due to changes in the directions of the reaction forces. At this moment, the foot provides the reaction force for anti-thrust since it has been moved to the back, and the direction of reaction force has been changed.

As a result of the motions mentioned above, the anti-reverse sliding plates 13 at the bottom of the sliding carrier 1 may turn to present the sliding surface (A) or the thrust surface (B) in accordance with the changes in directions of reaction forces. In this way, the smooth surface will interact with the engaging surface under the action of sliding friction to produce effective, forward driving force. It is, however, apparent that there will be no change in action under the following two conditions. Firstly, on a continuous running slope, the gravitational acceleration will cause the user with the sliding carriers to slide down the slope continuously, and thus the anti-reverse sliding plates will remain unchanged in the state of presenting the sliding surface. Secondly, on a slope that runs up continuously, as one walks up the slope, the unit of anti-reverse sliding plates will act as a thrust surface as it engages the ground and provide the thrust force for the user to walk up the slope.

Each of the anti-reverse sliding plates 13 can be linked to one another by a link so that the plates may act as a unit and move uniformly. As shown in Figs. 4 and 5, an elongated connecting rod 14 is used to link each of the plates 13 at the top thereof. Consequently, as an external force is applied on the plates 13, all the plates 13 will move in unison to the horizontal or vertical positions to present the sliding or thrust surfaces (A), (B) respectively.

Besides, each of the anti-reverse sliding plate 13 is pivotally connected to the frame 16. Preferably, the pivot 15 is positioned adjacent to the smooth surface 11 so that as the anti-reverse sliding plates move to present the sliding surface (A), there will be no difference in height between the sliding surface and the smooth surface (11).

During motion over the ground, in particular the snow, due to the swinging action of the anti-reverse sliding plates 13, lumps of snow are often scraped up and deposited within the slot 17. The discharge openings 12 are thus provided to expel the lumps of snow or debris so as to reduce the resistance to the motion of the anti-reverse sliding plates 13.

Figs. 9 and 10 show another modified embodiment of the present invention. In the embodiment, a plurality of guide fins 3 are provided at the bottom of the sliding carrier. The guide fins are disposed parallel to the sliding direction and project slightly beyond the bottom of the carrier so as to prevent the carrier from sliding sideways.

While the invention has been described with respect to certain preferred embodiments, it is not intended to limit the scope of the invention thereby, but solely by the claims appended hereto.

Claims

1. An anti-reverse sliding device in which low friction sliding effect is obtained by the interaction between sliding and engaging frictions, comprising:

   a pair of sliding carriers having a sliding surface each;

   a rectangular frame located at the bottom of the sliding surface of each carrier;

   a plurality of anti-reverse sliding plates arranged parallel and pivotally connected to one another; said anti-reverse sliding plates are disposed within the rectangular frame and arranged to be capable of moving to a state of presenting a smooth surface which is in parallel to the movement direction of the sliding carrier and to another state of presenting an anti-thrust surface which is per-

pendicular to the movement direction of the sliding carrier,

wherein the smooth surface is flush with the sliding surface of the sliding carrier, and the anti-reverse sliding plates in the state of presenting the anti-thrust surface project slightly beyond the sliding surface of the sliding carrier.

2. The anti-reverse sliding device according to Claim 1, wherein a plurality of discharge openings corresponding to the anti-reverse sliding plates are provided at the top of the sliding carrier so as to provide exits for the debris scraped up by the anti-reverse sliding plates.

3. The anti-reverse sliding device according to Claim 1, wherein the plurality of anti-reverse sliding plates are pivotally connected to one another by means of a connecting rod to perform a uniform swinging movement.

4. The anti-reverse sliding device according to Claim 1, wherein a foot retainer and a force applying lever being pivotally connected to the anti-reverse sliding plates so that the plates are capable of being moved by the user at will by varying the inclination of the force applying lever.

5. The anti-reverse sliding device according to Claim 1, wherein a plurality of guide fins being provided at the bottom of the sliding carrier, the guide fins being parallel to the sliding direction of the carrier and project beyond the bottom of the carrier so as to prevent the carrier from sliding sideways.

6. A new anti-reverse sliding device substantially as described herein.

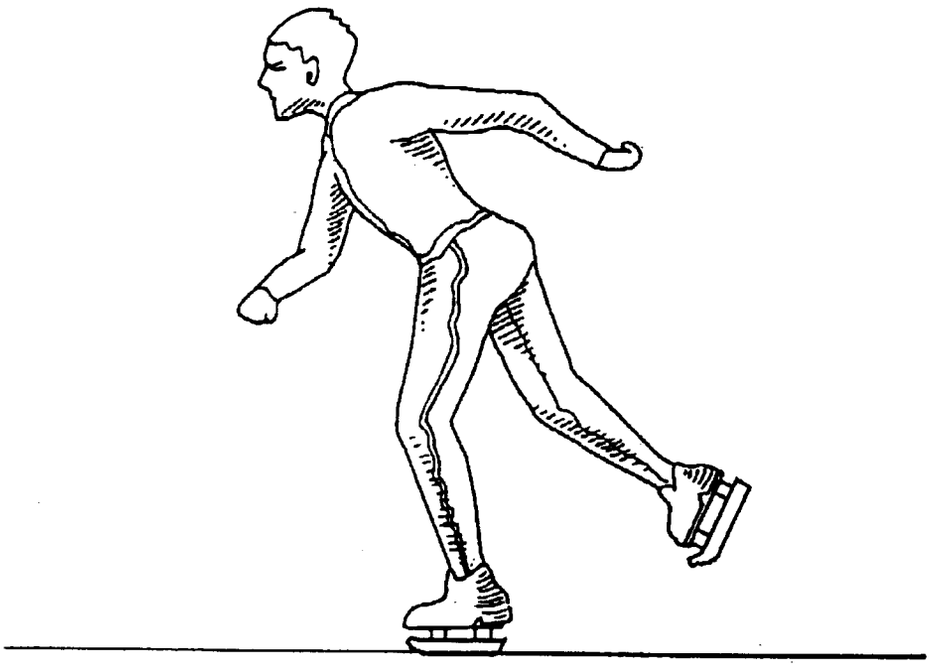

Fig. 1

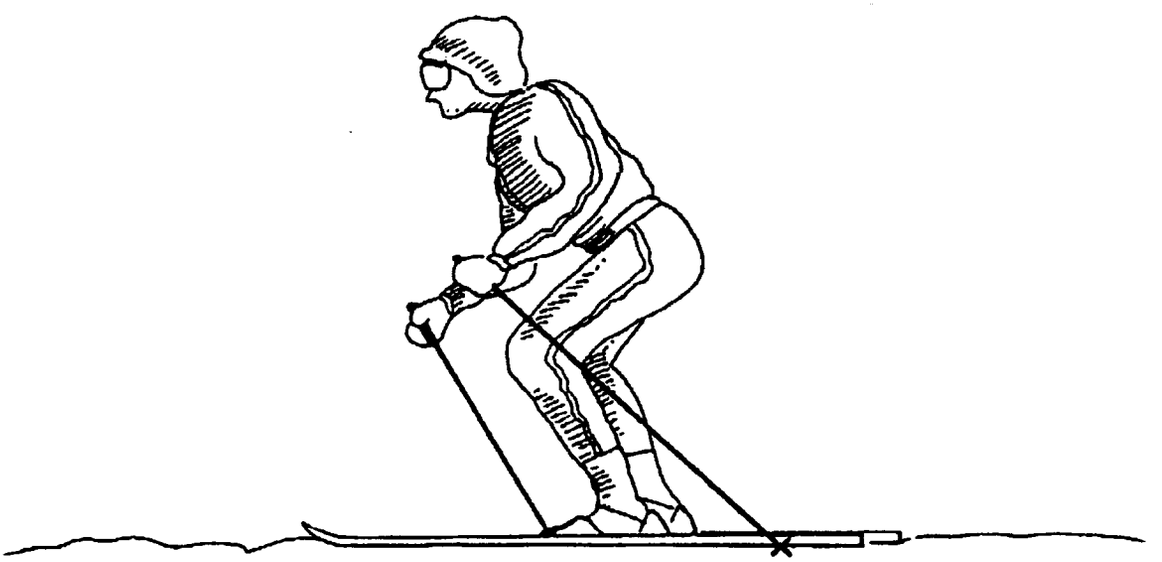

Fig. 2

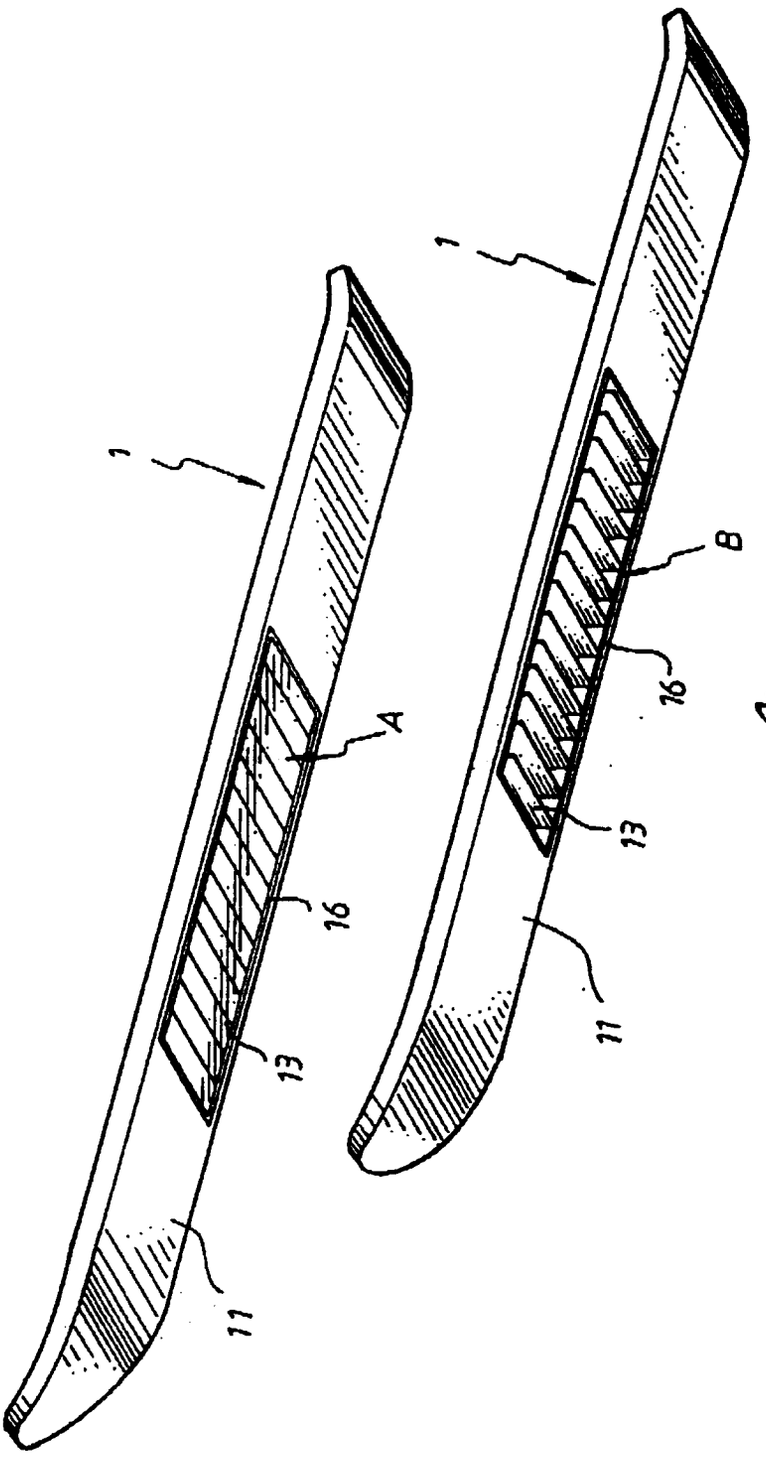

Fig. 3

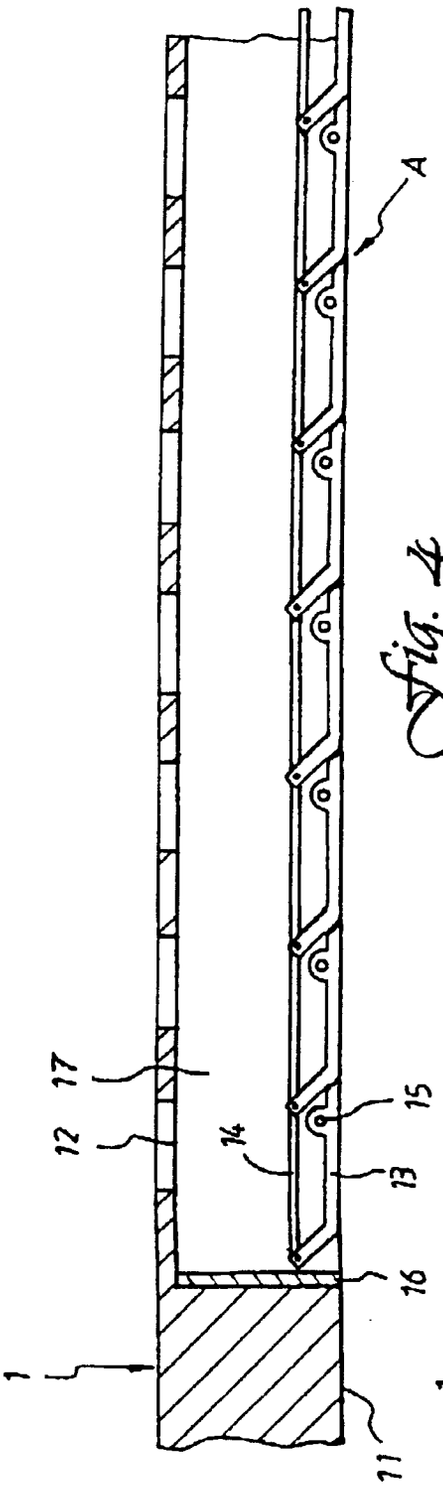

Fig. 4

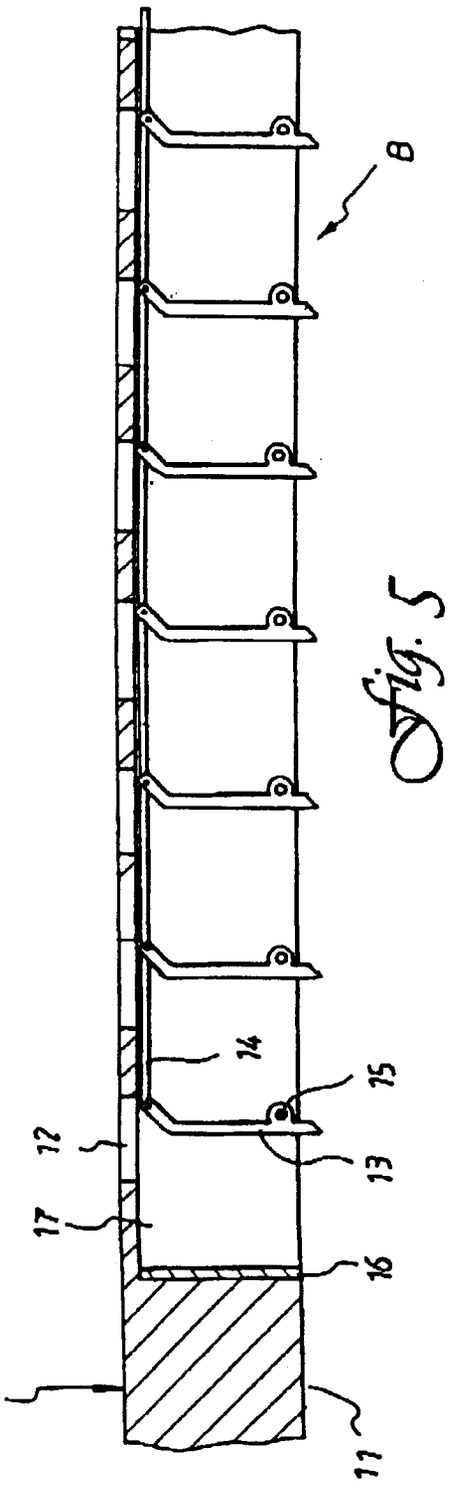

Fig. 5

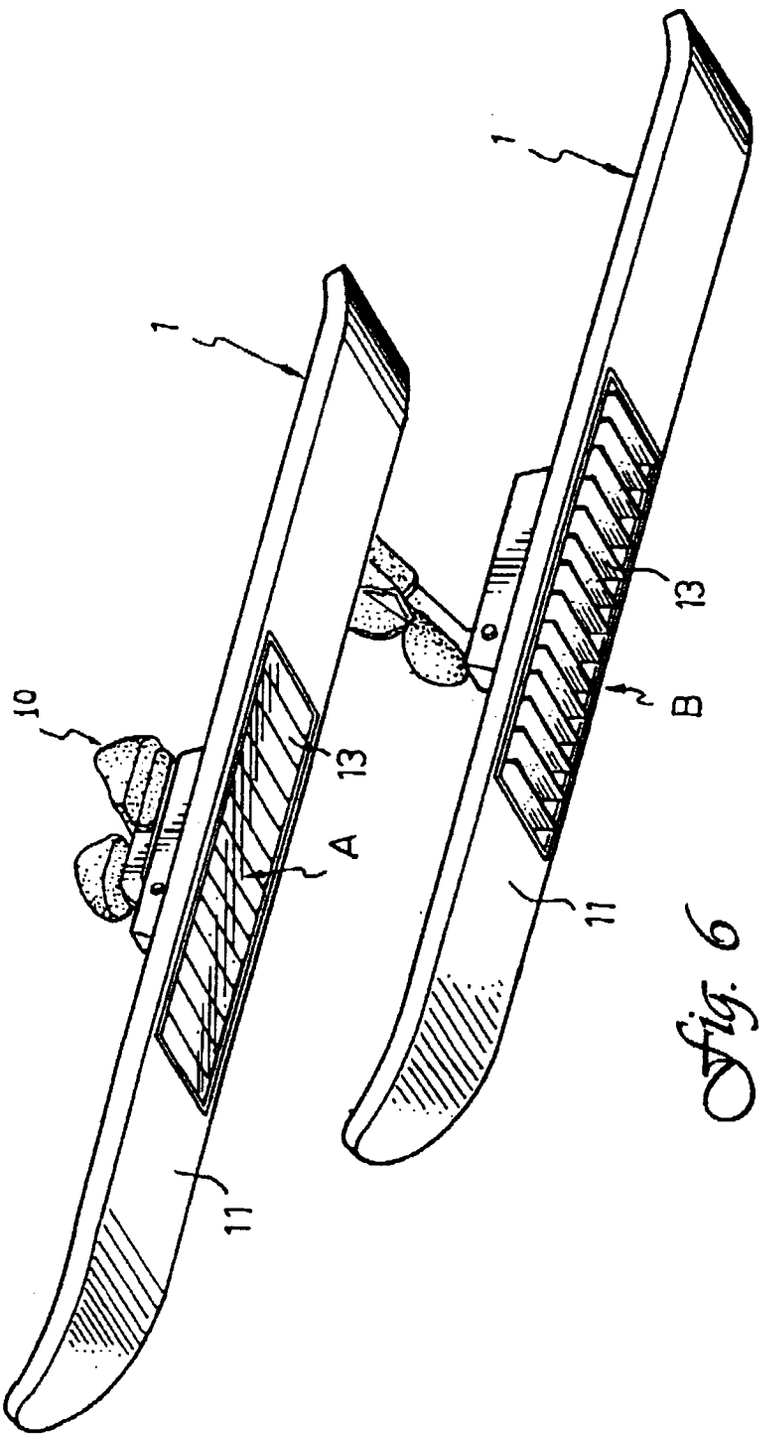

Fig. 6

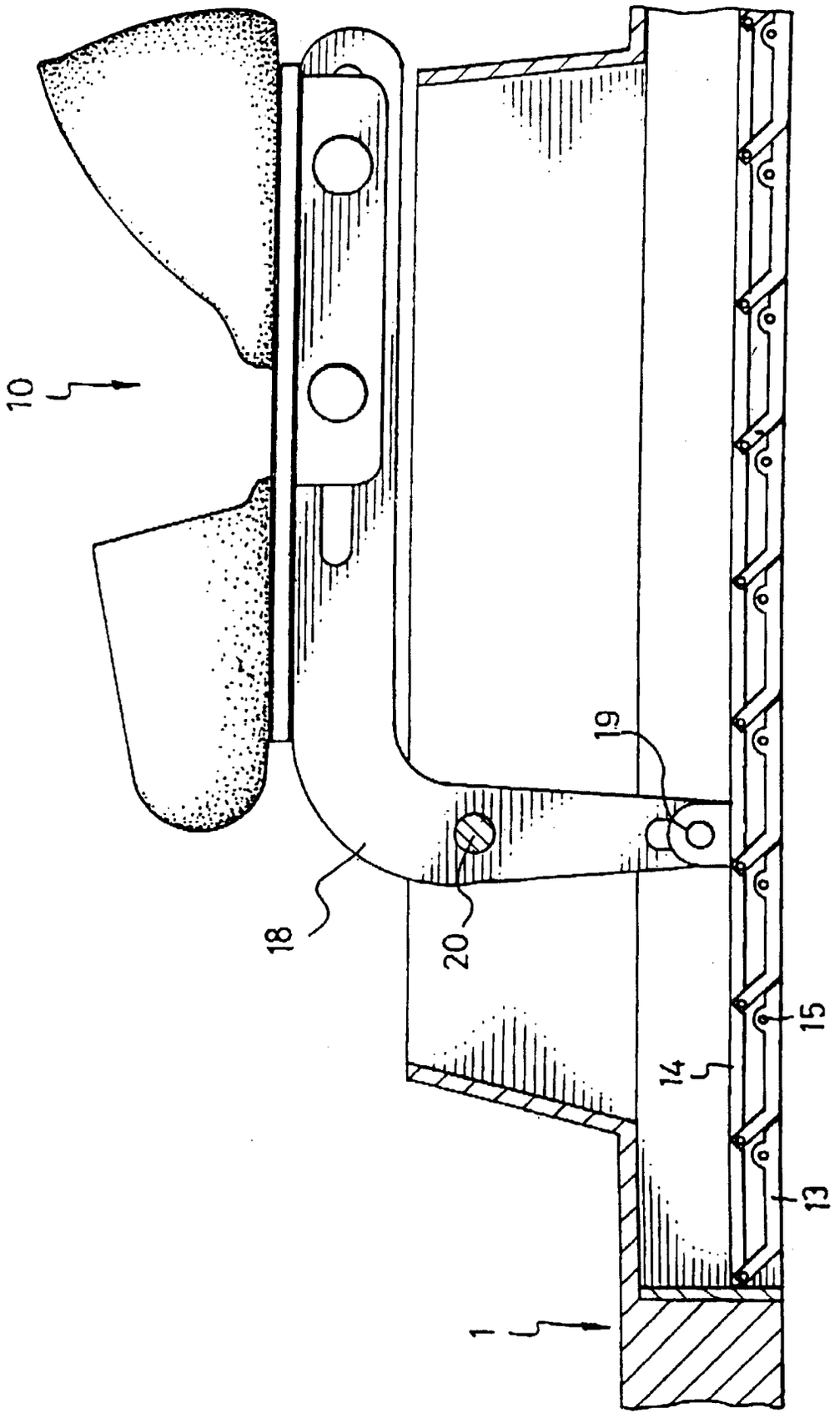

Fig. 7

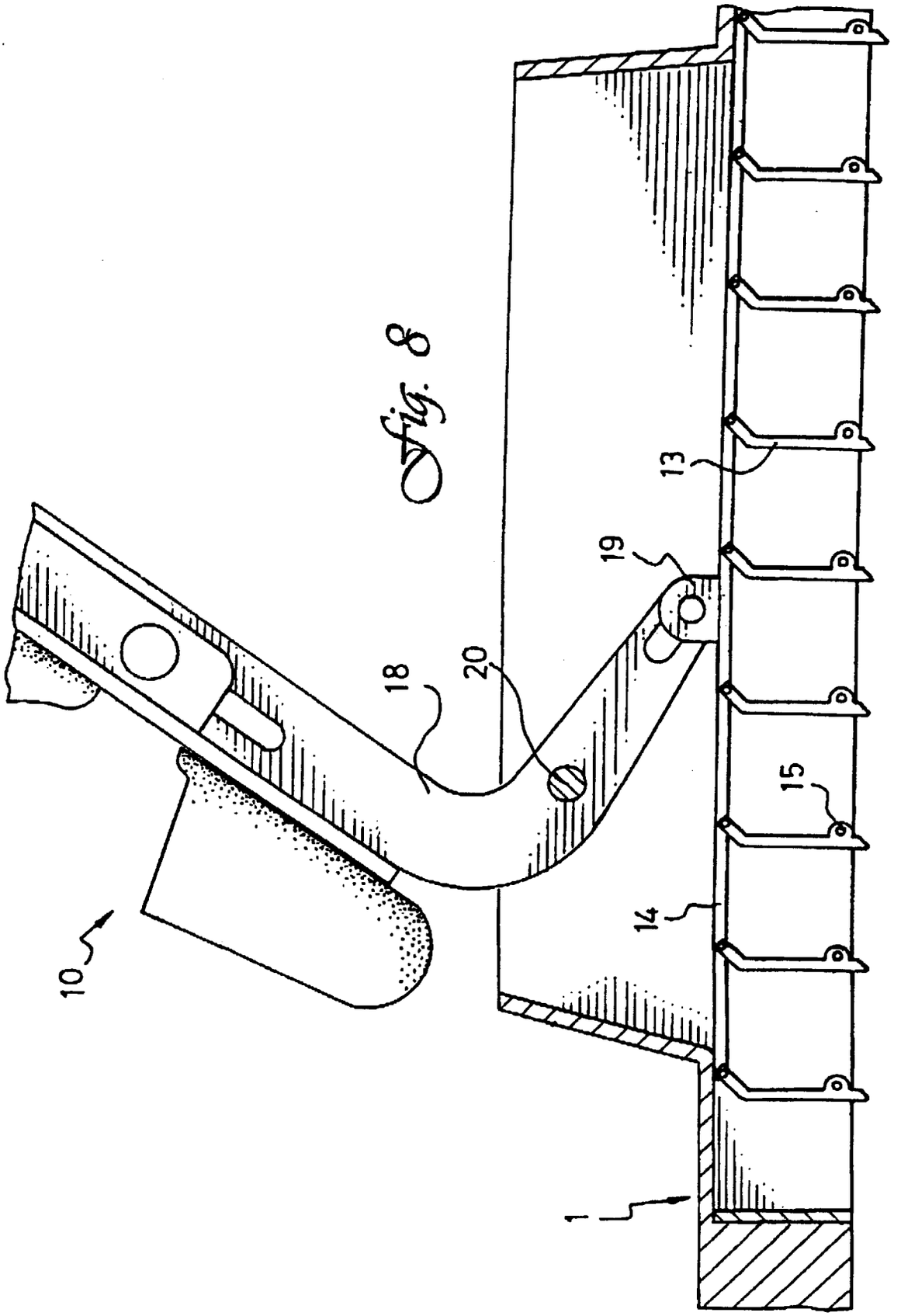

Fig. 8

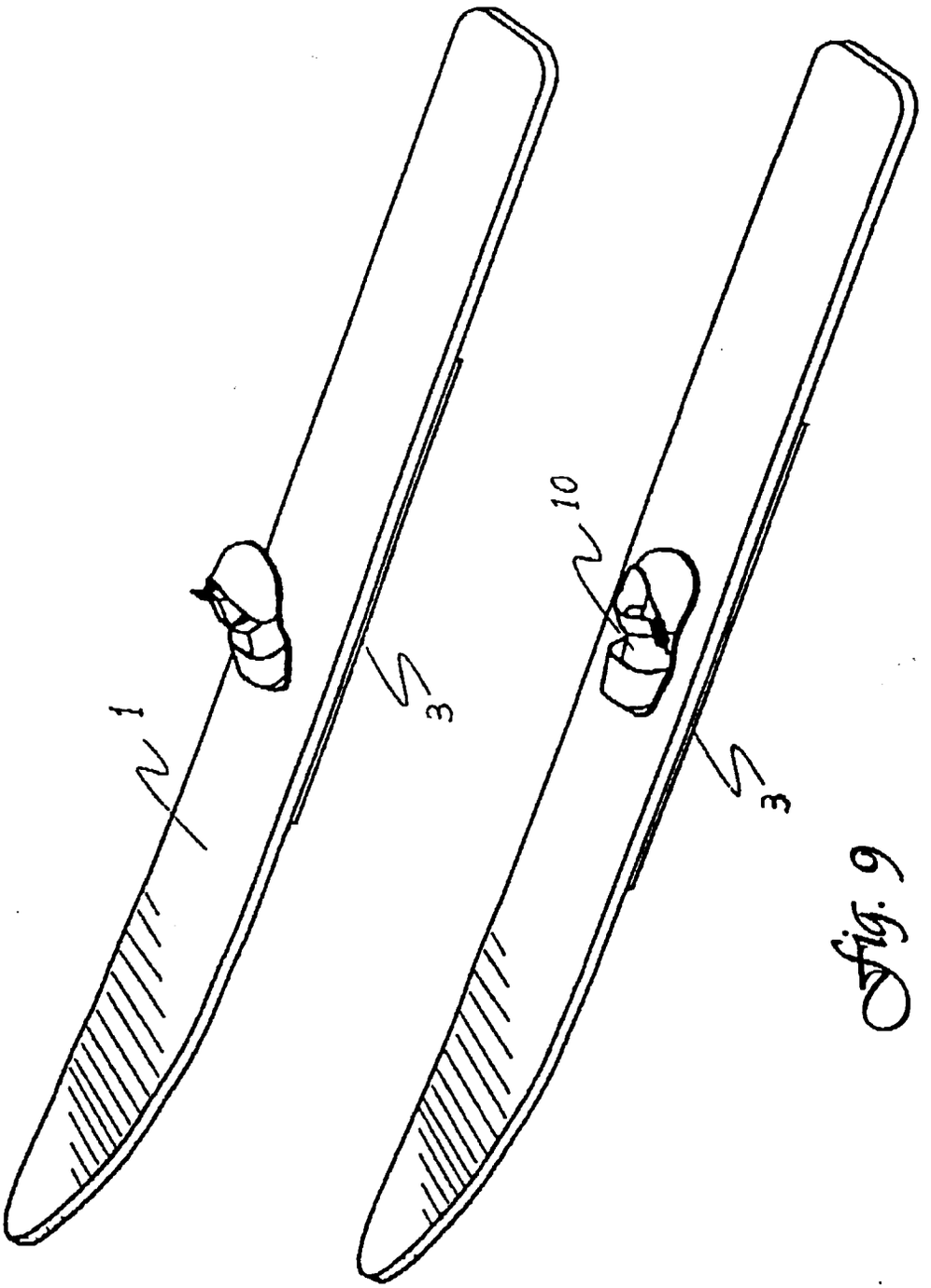

Fig. 6

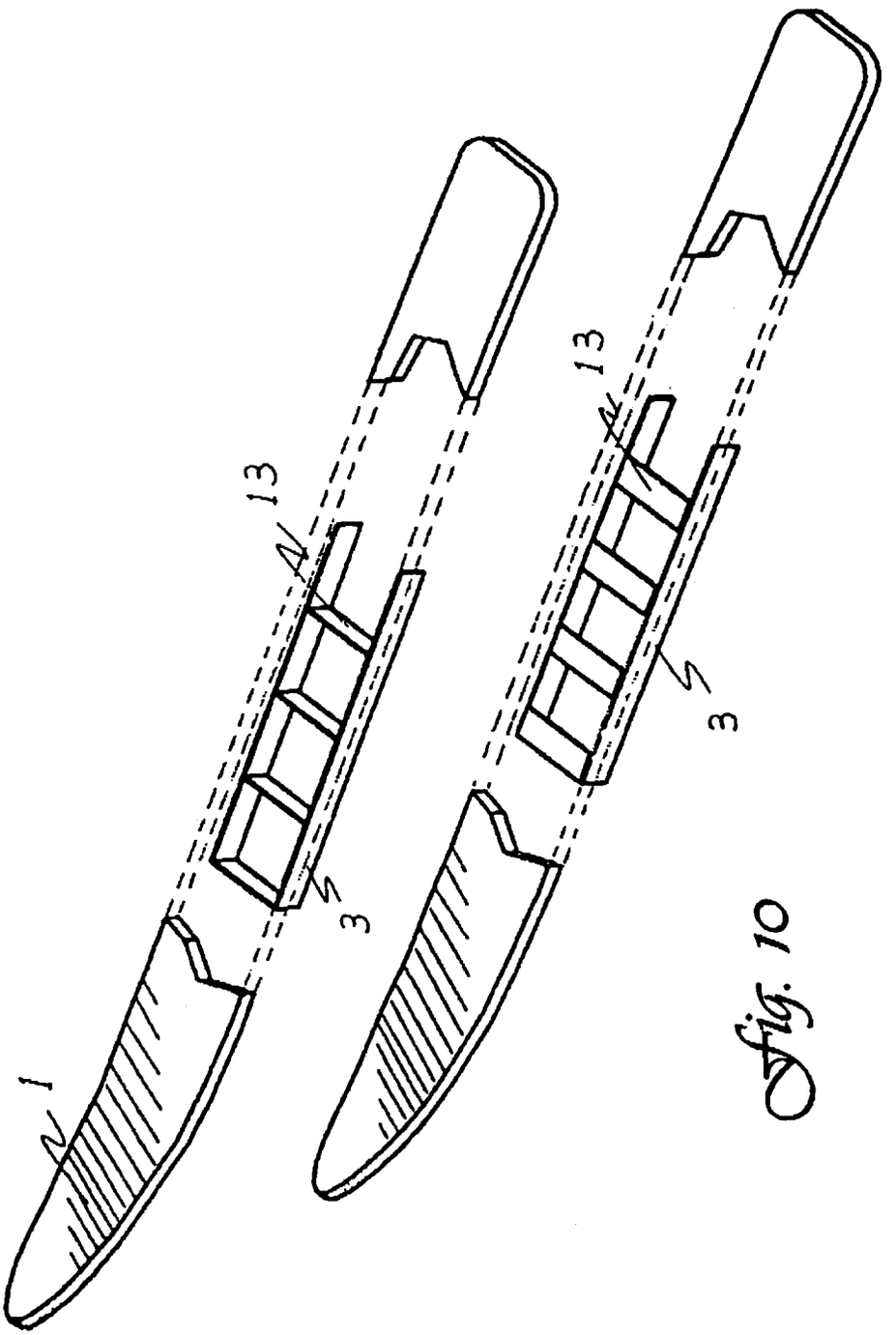

Fig. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 1304

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR-A-2 646 092 (SALOMON) * page 5, line 6 - page 6, line 3 * * page 7, line 22 - page 8, line 6; figures 1,5 *	1,3	A63C7/00
A	FR-A-2 556 975 (TMC) * page 4, line 7 - line 21; figures 1,2 *	1,4	
A	US-A-2 302 478 (SNOW) * page 1, column 2, line 1 - line 5; figure 5 *	1,2	
A	CH-A-218 388 (MARKUS ET AL.) * page 1, line 42 - page 3, line 63; figures 1-4 *	1-3	
A	DE-A-31 26 068 (SPÄTH) * page 7, line 1 - page 8, line 7; figures 5,6 *	1,3,4	
A	DE-A-33 03 093 (SESAMAT ANSTALT, SCHAAN, LI) * page 10, line 12 - line 24; figures 3-5 *	1,4,5	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	9 June 1995	Monne, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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