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(12) # EUROPEAN PATENT APPLICATION

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(54) **Steerable platforms.**

(57) A steerable platform comprises a platform (1) mounted on front and rear ground engaging means (3, 5), at least one ground engaging means being turnable to effect steering of the platform (1). The platform is of sufficient size for a rider to stand freely on it with both feet. A redistribution of the weight of the rider on the platform during travel of the platform tends to cause an angular displacement of one ground engaging means to effect a change in the angle between the front (5) and rear (3) ground engaging means as viewed in a plane parallel to the plane of the platform to effect steering of the platform. The design is such that the redistribution of weight effects transverse tilting of at least one end of the platform and for a given tilt the displaceable ground engaging means tends to be angularly displaced by different amounts for different velocities of travel of the platform.

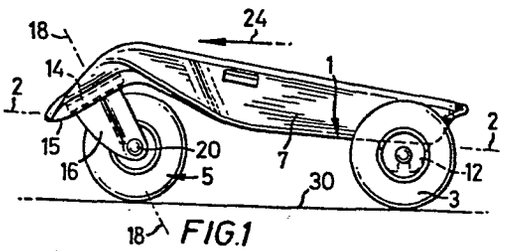

FIG.1

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"Steerable Platforms"

This invention relates to steerable platforms of the kind comprising a platform mounted on front and rear ground engaging means, at least one of the ground engaging means being turnable to effect steering of the platform.

According to the invention there is provided a steerable platform of the above described kind and characterised (a) in that the platform is of sufficient size for a rider to stand freely on it with both feet, and (b) in that a redistribution of the weight of the rider on the platform during travel of the platform tends to cause an angular displacement of at least one ground engaging means to effect a change in the angle between the front and rear ground engaging means as viewed in a plane parallel to the plane of the platform to effect steering of the platform.

The design of the steerable platform may be such that the redistribution of weight effects transverse tilting of an end of the platform and for a given tilt said one ground engaging means tends to be angularly displaced by different amounts for different velocities of travel of the platform. The platform may be twistable to effect said lateral tilting of an end of the platform.

Said ground engaging means may be constrained to pivot relatively to the platform on a fixed axis intersecting the plane of the platform.

Preferably said one ground engaging means has a curved transverse profile so that said redistribution of the weight of the rider tends to cause different portions of said profile to contact the ground.

The ground engaging means may comprise wheels, skis, runners or skates or combinations thereof. The moving force for the platform may be gravity, windpower or engine power. Alternatively the platform may be towed or pushed.

The invention is an improvement on previous steerable platforms in that it offers improved steering ability and better stability when travelling over rough ground.

The invention will now be further described by way of example with reference to the accompanying drawings, in which:-

Figure 1 shows a side view of a first embodiment of steerable platform in accordance with the invention,

Figure 2 shows a plan view of the first embodiment,

Figure 3 shows a side view of a second embodiment of steerable platform in accordance with the invention,

Figure 4 shows an underneath plan view of the second embodiment,

Figure 5 shows a side view of a third embodiment of steerable platform in accordance with the invention, and

Figure 6 shows a cross-section through a detail of the third embodiment on the line VI-VI of Figure 5.

Referring now to Figures 1 and 2, the steerable platform comprises a platform 1 whose general plane is indicated by line 2-2 in Figure 1, and which is supported on rear tyred wheels 3 mounted for rotation on axle 4 and front castor wheel 5.

The platform 1 is advantageously moulded in one piece from plastics material and has upwardly and outwardly sloping sides 6 and 7 which provide foot rests for a rider standing on the platform, A strap 8 is secured at its ends to the platform 1 and provides a steadying support in tension for a rider standing on the platform. An elastic cord 9 is also secured at one end to the platform 1 and has a hoop 10 at its other end for fitting round a rider's wrist or ankle so that if the rider falls off, the platform can not run away from him.

The axle 4 locates in slotted lugs 12 extending downwardly from the rear end of the platform 1. The castor wheel 5 has a mounting plate 14 secured to the undersurface of the nose 15 of platform 1. The wheel carrying yoke 16 is mounted on the plate 14 through a ball-race so that it is freely rotatable about an axis indicated by line 18-18 in Figure 1. The castor wheel 5 is mounted in the yoke 16 to rotate about axis 20. The nose 15 of the platform 1 slopes downwardly so that the axis 18-18 is inclined at a greater angle to the vertical than if the nose 15 and hence the mounting plate 14 extended horizontally. This increased inclination assists in controlling the amplitude

of oscillation of the castor wheel 5 about axis 18-18 when the platform is running over rough ground. However, a satisfactory operation can be achieved with the nose 15 and hence the mounting plate 14 horizontal.

As best seen in Figure 2 the rotation of the castor wheel 5 about the axis 18-18 can be adjustably damped by wedge-shaped brake block 20 which locates between wall 21 and the yoke 16. Adjustment of the brake block 20 is effected by adjusting screw 22 to increase or decrease the damping.

The direction of travel for the wheeled platform of Figures 1 and 2 is indicated by arrow 24 (Figure 1). It will be seen that the centre of rotation of the rotational mounting of the yoke 16 on the mounting plate is forward of the ground contacting point of the castor wheel 5.

A rider to steer may tilt the nose 15 to one side. This exerts a force on yoke 16 to rotate with a steering effect as the action of the yoke 16 rotating to the opposite side to said tilted side will be to allow the nose 15 to move closer to the ground surface. Gravity is acting to encourage the nose 15 to move nearer the ground. Centripetal force acts to counter this steering effect, the centripetal force is dependent upon the platform's velocity and hence also is the resultant ste effect. Hence if the forward end of the platform is tilted laterally the yoke 16 of the castor wheel 5 will tend to rotate i the mounting plate to steer the trolley in the direction of the lower side of the trolley. Such tilting is brought about

by a rider redistributing his weight on the platform. For example if he shifts his weight to the side 6 as indicated by arrow 32 the trolley will steer along a curve in the direction indicated by arrow 34. In this embodiment the tilting of the platform 1 is brought about by twisting it since the wheels 3 remain in contact with the ground at all times so that the rear end of the platform can not tilt. The plastics material of the platform can be selected to have the required twisting characteristics.

Referring now to Figures 3 and 4, this shows a second practical embodiment of the invention and at the same time shows a number of different features each of which could be used individually in a steerable platform construction in accordance with the invention.

The direction of movement of the platform 1 is again indicated by arrow 24. The front ground support 40 comprises a wheel 41 whose axle 42 is pivotally connected to link arms 43 and 44 the direction of the pivotal axis being indicated by line 45-45. The link arms 43 and 44 are also pivotally connected to the underside of the platform 1, the direction of the pivotal axis being indicated by line 46-46. The action of these link arms 43 and 44 is the same as that of the yoke 16 of the first embodiment in that tilting of the forward end of the platform 1 causes a steering movement of the wheel 41 to cause the platform to turn towards the lower side of the platform 1.

The rear wheel assembly 50 is mounted on an arm 51 which locates at its upper end in a bearing bush 52 so that the arm rotates on axis 54-54 to cause the wheel assembly 50 to turn. The steering effect of the wheel assembly 50 when the weight distribution on the platform 1 changes to tilt the platform 1 accentuates that of the wheel 40 since they turn in opposite directions.

The tyre on the wheel 40 has a curved profile as seen in cross-section as has the tyre on the castor wheel 5 shown in Figure 1. Hence the wheels 5 and 40 can readily take up the required lean-over or slant when the platform is tilted. However, the wheel 50 has two spaced wheel members 55 and 56 with square profiled tyres so that they can not readily lean over. Therefore the arm 51 is pivotally mounted on axis 57-57 to the connecting shaft 58 between the two wheels so that this can lean over relatively to the connecting shaft 58. The need for the wheel assembly 50 to lean over is therefore removed, since the equivalent movement is taken up at the pivotal mounting 57. An alternative wheel assembly 50 would be to have a single wheel which would have a curved profile, as seen in cross-section and whose rotational axis would be rigidly attached to arm 51. The joint at the pivotal mounting may be biased using resilient material and may be made from a flexible material. An alternative would be to make the material of the tyres of the wheels so soft that it could deform to allow the wheel members to lean over.

It will be appreciated that a further construction

of wheeled platform can be produced by the use of the arrangement of wheel 40 of the second embodiment at the front and the rear two-wheeled arrangement of the first embodiment at the rear. Still further constructions can be produced by using the arrangement of wheel assembly 50 at the front of the first embodiment or using tow of the wheel asemblies 50, one at the front and one at the back of the platform 1 with the wheel assemblies 50 outboard of the bushes 52 at both ends.

The rear wheel arrangements in any of the embodiments may be a single wheel which may have a wider tread than the front wheels.

Referring now to Figures 5 and 6, in the embodiment shown the front and rear ground engaging means comprises runners 61 and 62, the rear runner 62 being fixed and the front runner 61 being mounted on a yoke arm 63 which is integral with the platform 1 and which is designed so that it flexes about line 64-64 which thus constitutes a pivotal axis for the runner 61. Thus a pivoting arrangement equivalent to that of the yoke 16 of the castor wheel 5 on its mounting plate 14 is provided. The runner 61 is pivotally mounted at 66 to the lower end of the arm 63 and has the preferred cross-section shown in Figure 6 in which its running surface is formed as a series of steps to provide a good grip on icy snow.

The single rear runner 62 may be replaced by two parallel runners or if desired by a single wheel or two wheels.

The front runner 61 may be replaced by one of the wheel assemblies.

The front runner 61 may replace the wheels 5, 40 and 50 in the first and second embodiments and in the further arrangements described previously using the different features of the second embodiment. Also the rear wheel or wheels of the various embodiments described may be replaced by a single runner 62 or a pair of such runners disposed parallel to each other.

Also the arm 51 and bush 52 constituting the mounting arrangement of the second embodiment may be replaced by a rod member which twists about its longitudinal axis in the manner of a torsion rod to achieve the same effect.

The runners 61 and 62 of the embodiment shown in Figure 5 may be replaced by a single runner having a front portion connecting with a rear portion through a central flexible portion enabling a change in the angle between the front and rear portions to effect steering of the platform.

In all the above embodiments, by making adjustments in the relevant arrangement to the angle at which the pivotal axis of the yoke or arm is set or the length of the mounting arms for the ground engaging means, the length of the yoke and the diameter of the wheels, the amount the ground engaging means turns for a given tilt or twist of the platform may be altered.

Where the adjustment has been altered more than a certain amount the platform will steer in the opposite way to the direction in which the platform has been tilted or twisted. A

steerable platform maybe constructed to respond in this manner if desired. By adjusting the front or rear assembly only and using springs or resilient material to bias the steering mechanisms where necessary the platform may then be steered dependant upon the distribution of the riders weight fore and aft rather than by its distribution side to side.

In addition, springs or resilient material may be incorporated in the steering mechanisms to bias the steering or to dampen the movement of the wheel axes or to form the pivots or rotational mountings.

CLAIMS.

1. A steerable platform of the kind comprising a platform mounted upon front and rear ground engaging means, characterised (a) in that the platform is of sufficient size for a rider to stand freely on it with both feet, and (b) in that a redistribution of the weight of the rider on the platform during travel of the platform tends to cause an angular displacement of at least one ground engaging means to effect a change in the angle between the front and rear ground engaging means as viewed in a plane parallel to the plane of the platform to effect steering of the platform.

2. A steerable platform according to Claim 1, wherein said weight redistribution causes transverse tilting of the platform and wherein for a given tilt, said one ground engaging means tends to be angularly displaced by different amounts for different velocities of travel of the platform.

3. A steerable platform according to Claim 2, wherein said one ground engaging means is constrained to pivot relatively to the platform on a fixed axis intersecting the plane of the platform.

4. A steerable platform according to Claim 2 or 3 wherein said one ground engaging means has a curved transverse profile so that said redistribution of the weight of the rider tends to cause different portions of said profile to contact the ground.

5. A steerable platform according to any of Claims 2 to 4 wherein said platform is twistable relative to the other of said ground engaing means to effect said transverse tilting.

6. A steerable platform according to any of Claims 2 to 5 wherein said platform has upwardly sloping sides providing footrests for the rider.

7. A steerable platform according to any of Claims 2 to 6 wherein resilient or frictional damping means are provided for damping said angular displacement of the ground engaging means.

8. A steerable platform according to any of Claims 2 to 7 wherein said pivotal movement is effected by the flexing of an arm mounting said one ground engaging means to the platform.

9. A steerable platform according to any of Claims 2 to 8 wherein said pivotal movement is effected by the twisting of a rod member mounting said one ground engaging means to the platform.

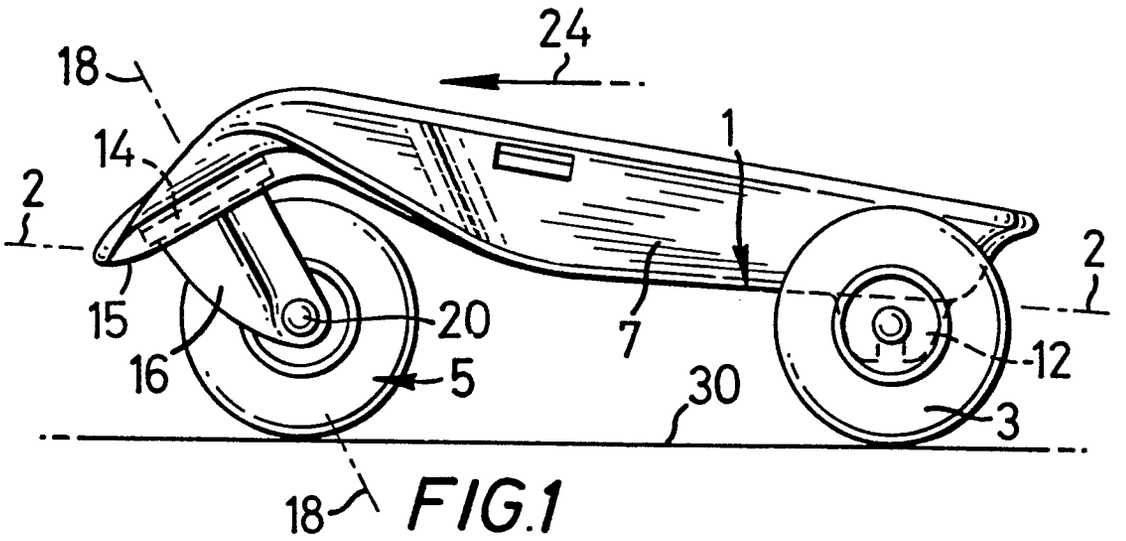
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FIG.1

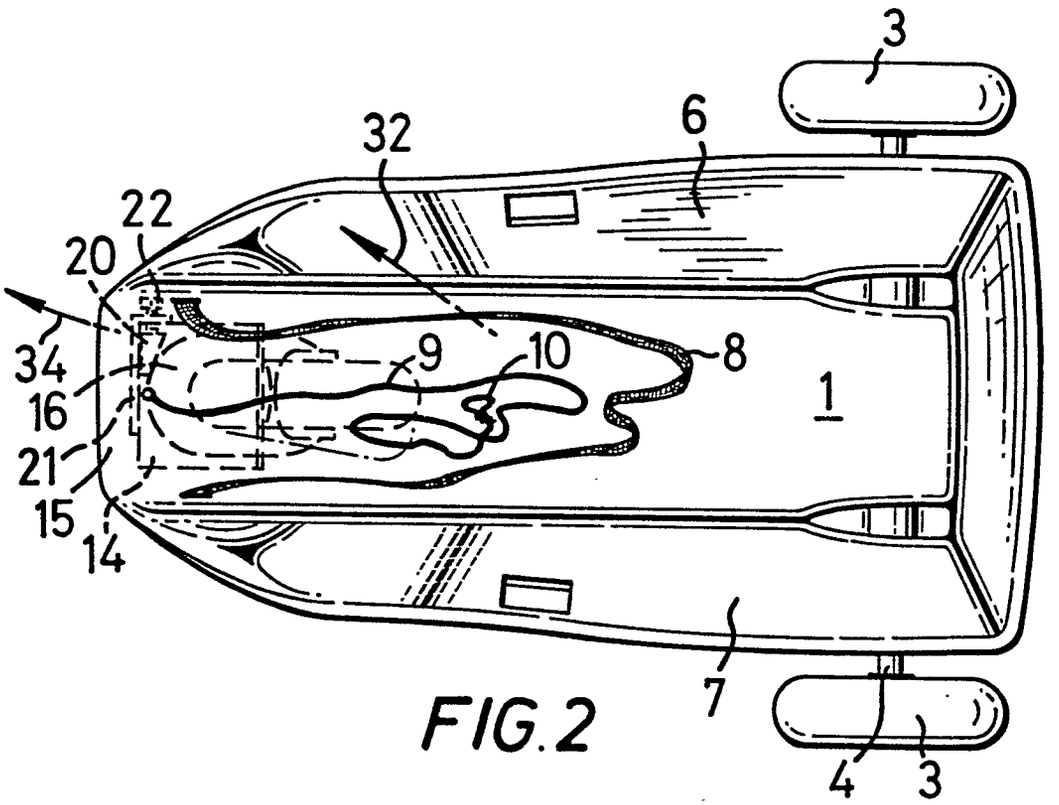
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FIG.2

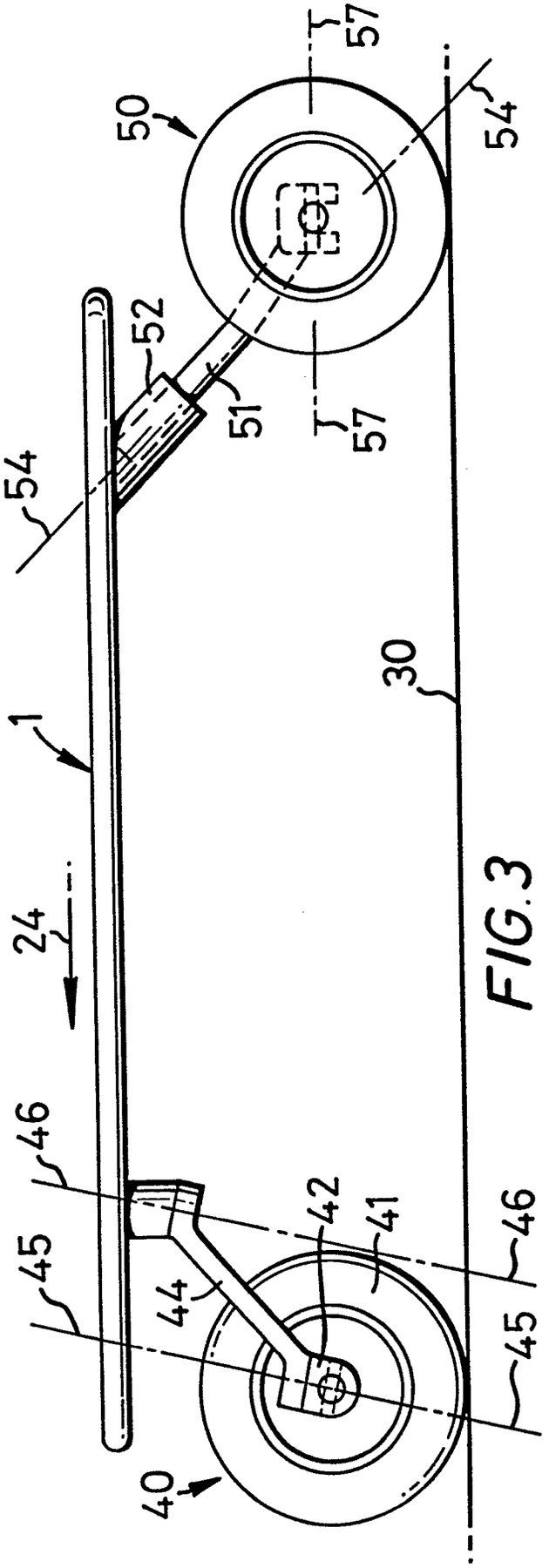
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FIG.3

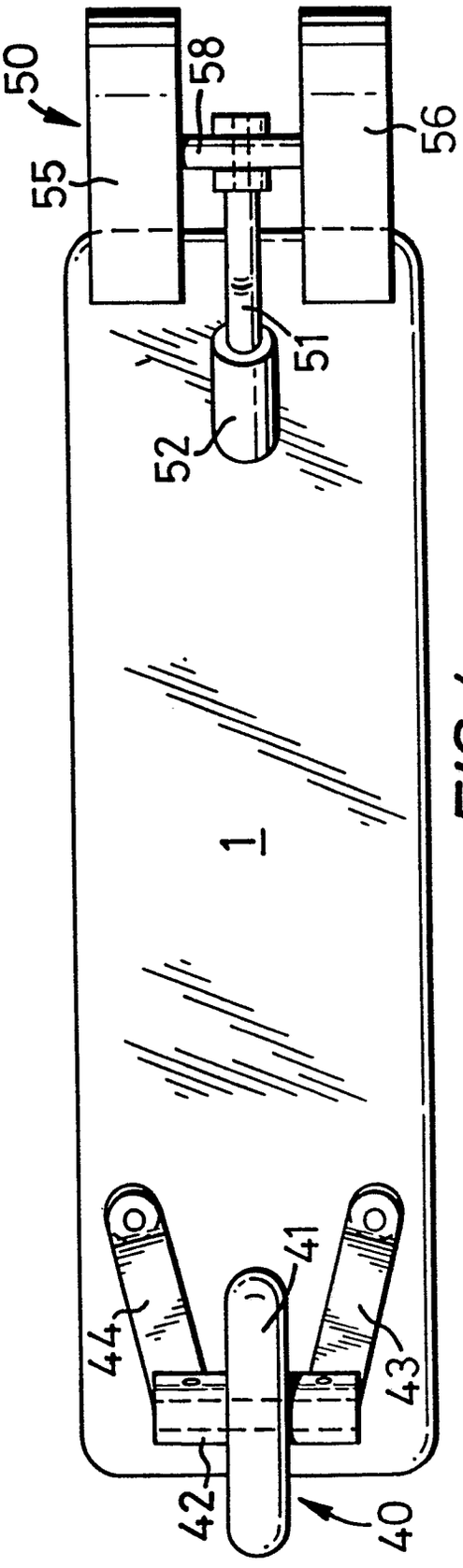
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FIG.4

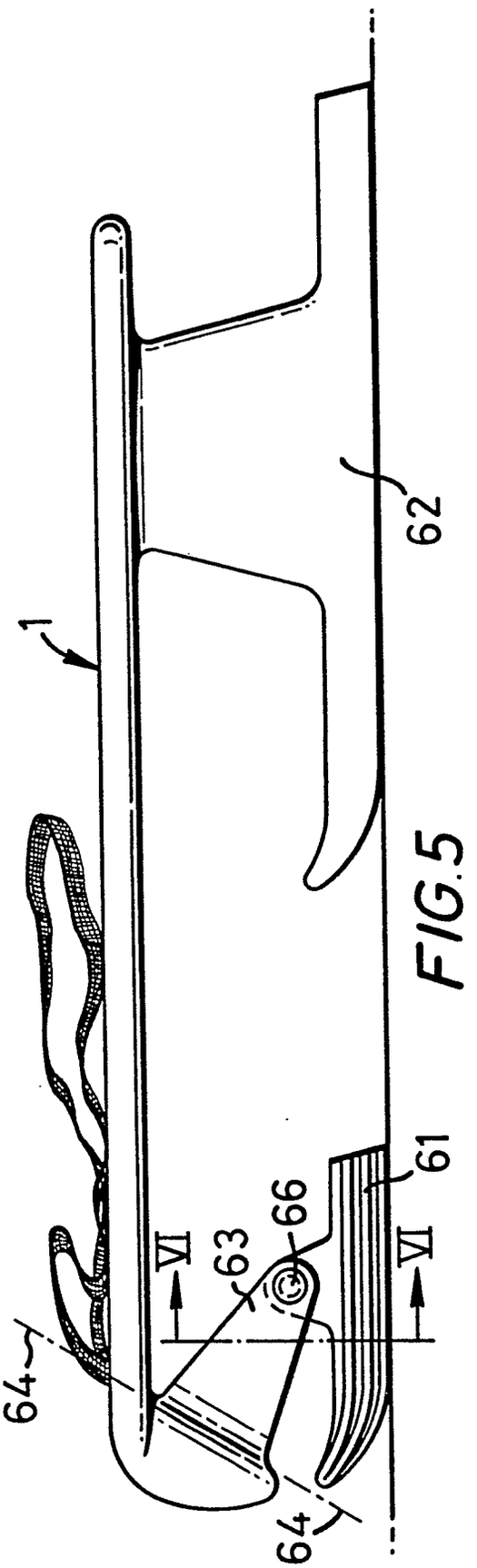

FIG.5

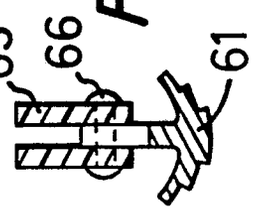

FIG.6

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EUROPEAN SEARCH REPORT

0064360

Application number

EP 82 30 2037

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. ³)
X	US-A-3 995 873 (PANTZAR) *The whole document* ---	1,2,3, 5,7,9	A 63 C 17/00
X	US-A-3 795 409 (CUDMORE) *Column 1, lines 31-51; figures* ---	1,2,5, 6	
X	US-A-4 196 916 (SCHORR) *Abstract; figures* ---	1,2,5, 6	
X	US-A-4 152 001 (CHRISTIANSON) *Column 1, line 33 - column 2, line 3; figures* ---	1,2,5	
A	GB-A- 250 190 (KUSTNER) *Figures 3-5* ---	4,7	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	US-A-4 116 455 (DOTSON, SMITH) ---		A 63 C
A	US-A-4 235 448 (THOMAS) -----		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-08-1982	SCHLESIER K.G.W.P.

CATEGORY OF CITED DOCUMENTS

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