(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 043 250**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **81302881.8**

(51) Int. Cl.³: **A 63 C 17/06**

(22) Date of filing: **25.06.81**

(30) Priority: **26.06.80 GB 8020962**
29.12.80 GB 8041331

(43) Date of publication of application:
06.01.82 Bulletin 82/1

(84) Designated Contracting States:
AT BE CH DE FR IT LI LU NL SE

(71) Applicant: **Murry, Lionel Louis**
57 Fitzharris Avenue
Bournemouth Dorset BH9 1BY(GB)

(72) Inventor: **Murry, Lionel Louis**
57 Fitzharris Avenue
Bournemouth Dorset BH9 1BY(GB)

(74) Representative: **Purvis, William Michael Cameron et al,**
D. Young & Co. 9&10 Staple Inn
London WC1V 7RD(GB)

(54) **Skates.**

(57) A wheeled skate having a rigid chassis secured to a boot and having a heel plate (54), a sole plate (55) and a pair of downwardly depending parallel webs (56,57) between which three in-line wheels (12*a*) are mounted. Each wheel (12*a*) is at least half as wide as its diameter and has its floor engaging surface formed by a part of a sphere. The middle wheel is lower than the front and rear wheels by a distance D of 2.5 to 4.5 cm. The rear wheel does not project more than 10 mm behind the rearmost part of the boot, the front wheel does not project forwardly of the boot at all, the middle wheel is spaced a distance A from the rear wheel and a distance B from the front wheel, A + B is at least 70% of the overall length C and $\frac{A - B}{A + B}$ lies in the range 0.06 to 0.09.

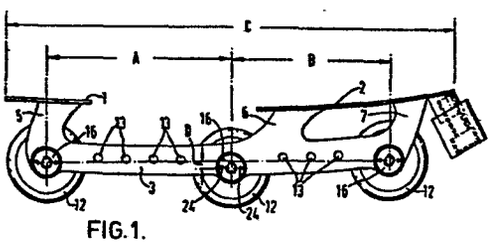


FIG.1.

EP 0 043 250 A1

"SKATES"

The invention relates to skates and particularly to skates of the kind having in each skate, three in-line wheels.

As early as 1867 it was proposed that each skate of a pair of wheeled skates should have three wheels mounted in line. Quite a large number of patent specifications have been published since then relating to similar skates but the proposals for such skates set out therein seem mainly to have been mere paper proposals and there is little evidence of any of such skates being marketed and sold in commercial quantities.

While skates of the kind referred to are at first sight very attractive in that is appears that with such skates a skater could effect jumps and turns of the kind possible on ice skates, they are not a practical proposition unless they include a number of features, mostly know individually from previously published proposals, combined together in a very particular relationship.

According to the invention, there is provided a pair of skates wherein each skate of the pair of skates is formed with a rigid metal chassis comprising separate or combined sole and heel plates secured to a boot and two parallel webs depending downwardly from the sole and heel plates, the skate further comprises three wheels mounted in-line between the two parallel webs, each wheel has a width equal to at least 50% of its diameter and a floor engaging surface which is formed substantially as a part of a sphere, the lowermost part of a middle one of the wheels extends downwardly beyond a line joining the lowermost parts of the front wheel and the rear wheel by between 2.5 and 4.5 cm, the rearmost part of the rear wheel is located not more than 10 mm to the rear of the rearmost part of the boot, the boot extends forwardly to a position forward of the frontmost part of the front wheel, the axis of the middle wheel is spaced a distance A from the axis of the rear wheel and a distance B from the axis of

the front wheel, A + B is equal to at least 70% of the overall length of the boot and $\frac{A - B}{A + B}$ lies within the range 0.06 to 0.09.

The chassis may be formed in a number of different ways but is preferably formed by providing the sole and heel plates, separate or combined, with slots therein and providing the webs as two separate members with tongue portions to be received in the slots, thereby accurately to position the webs with respect to the sole and heel plates before securing of the webs to the sole and heel plates, for example by welding effected from the upper side of the sole and heel plates. Alternatively the chassis may be formed by stamping portions out of a flat metal plate and then bending the flat metal plate along two longitudinally extending bend lines to form the sole and heel plates and the webs integral with one another.

Preferably the lower edge of each of the webs of the pair of webs is cut-away between the locations of apertures therein to receive axles for the wheels such that portions of the lower edge of each web immediately beneath the apertures for the axles project downwardly further than other portions of the lower edge.

Advantageously each web, intermediate the apertures for the axles, is provided with a plurality of further apertures and bumper members, preferably of plastics material, are provided with projections to be received in said further apertures to affix said bumper members to said webs on the outer face thereof, the bumper members being so proportioned and disposed relative to the webs and the sole and heel plates that, upon sidewards tipping of the skate in use, the bumper members will first contact the floor over which the skate is travelling and will thereby prevent portions of the webs or the sole and heel plates engaging the floor in a manner which would damage the floor.

The bumper members can if desired be of elongate form and used to carry display matter, for example the name or trade mark of the manufacturer of the skates.

Preferably a bolt or stud to form an axle for a wheel of the skate has at least one screw threaded end portion and has a head and co-operates with a nut or co-operates with two nuts, each of the head,

the nut or the nuts comprising an inner cylindrical portion of a diameter greater than the diameter of the stud or bolt, an outer disc portion with a diameter greater than that of said cylindrical portion and an axial extent as small as possible and engagement means in or on said disc portion whereby said disc portion can be engaged by a tool to rotate it or to prevent it from rotating.

The inner cylindrical portions advantageously engage in said apertures in the webs of the skate, which said apertures are of a size to accept said cylindrical portions with minimum clearance and the disc portions engage the outer faces of the webs to restrict inward movement towards one another of the head and the nut or the two nuts engaged in the apertures in the webs.

Thus each axle can be secured to extend between the pair of webs and mount one of the wheels for rotation with a minimum external lateral projection beyond the webs of the head of the bolt, a nut engaged thereon or two nuts engaged on a stud.

Advantageously a wheel for a skate comprises a core member formed as a central generally tubular portion through which a respective axle passes and having in its end portions counter-bores of a greater diameter than the bore of the tubular portion, which counter-bores can receive bearings, and a tyre of a urethane material engaged over the core member. The core member may have a circumferentially projecting rib at a mid portion in its length.

Both core member and the tyre can be formed of a urethane material with the core member formed of a harder urethane material than the tyre and with the tyre bonded to the core member.

Preferably the rib has transversely extending apertures therein, which apertures are filled by the material of the tyre to lock the tyre in position with respect to the core member.

By suitably choosing the outside diameter of the rib, the resilience of the wheel when under load can be controlled, that is to say a smaller diameter rib will give a relatively large resilience and a large diameter rib will give a relatively small resilience. Preferably a distance piece extends between the inner races of the bearings engaged in the counter-bores, the distance piece being

tubular and surrounding the axle.

One or more of the wheels, particularly the middle wheel of each skate, may be formed in two equal halves with the plane of the joint between the two halves extending perpendicular to the axis of rotation. Such a wheel can assist a skater to rotate about a vertical axis without moving over a floor. If desired the abutting faces of the two halves of the wheel can be faced with a low friction material or a shim of low friction material may be located therebetween.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a side view of a first embodiment of a skate according to the invention;

Figure 2 is an underneath plan view corresponding to Figure 1;

Figure 3 is a sectional view on line III-III of Figure 2;

Figure 4 is a side view of one of a pair of webs;

Figure 5 is a corresponding plan view;

Figure 6 is a plan view of a heel plate of a deck;

Figure 7 is a plan view of a sole plate of a deck;

Figure 8 is an elevation of an axle bolt;

Figure 9 is an end view of the axle bolt of Figure 8;

Figure 10 is a sectional view through a nut for the axle bolt of Figures 8 and 9;

Figure 11 is an end view corresponding to Figure 10;

Figure 12 is a sectional view through a wheel for a skate according to the invention;

Figure 13 is an end view corresponding to Figure 12;

Figure 14 is a sectional view of a distance piece for the wheel of Figures 12 and 13;

Figure 15 shows another embodiment of an axle for a skate together with screw nuts to co-operate therewith;

Figure 16 is a side view of a second embodiment of a skate according to the invention;

Figure 17 is a sectional view taken on line XVII-XVII of Figure 16;

Figure 18 is a plan view corresponding to Figure 16; and

Figure 19 is a plan view of a blank from which the chassis of Figures 16, 17 and 18 is formed, shown before bending thereof.

Referring to the drawings and firstly to Figures 1 to 7, a skate has a heel plate 1, a sole plate 2 and a pair of parallel webs 3 and 4 all of steel. With reference to Figures 4 to 7, it can be seen that each web 3 or 4 comprises an elongate lower portion and three upwardly projecting portions 5, 6 and 7, the portions 5, 6 and 7 each having at their upper end a respective tongue 8 to be engaged in a respective slot 9 in the sole plate 2 or slot 10 in the heel plate 1. After engagement of the tongues 8 in the slots 9 and 10 the tongues 8 are welded to the sole plate 2 or heel plate 1 from above the respective plate. Each web 3 or 4 has three apertures 11 to receive wheel axles such that wheels 12, three in-line, can be secured between the webs 3 and 4. Portions of each web 3 or 4 immediately beneath the apertures 11 extend downwardly below the level to which the remainder of the web extends. In between the rear aperture 11 and the middle aperture 11 are four further apertures 13 and in between the middle aperture 11 and the front aperture 11 are three further apertures 13. Each further aperture 13 can receive the head 13a of a projection from a bumper formed either as a generally hemispherical button 13b or as an elongate strip 13c shown only in Figure 5 and formed of a plastics material. The bumpers 13b or 13c are held onto the outer face of the web 3 or the web 4 by the heads 13a and project from the outer face of the web 3 or the web 4 so that if in use the skate is tipped over sideways, the plastics bumpers will abut the floor and will prevent the steel portions of the skate from engaging the floor and damaging it. The bumper strips where they extend at their ends beyond the further apertures 13, can have said ends tapering in thickness, i.e. the dimension by which they extend outwardly from the respective web 3 or 4.

Figure 3 shows that the wheels 12 are each mounted on a respective axle comprising a bolt with a head 14 and a threaded free end 15 engaged in a nut 16. Ball or roller bearings 17 are engaged in counter-bored end portions of a bore 18 of the wheel, are spaced

apart by a tubular distance piece 19 and at their outer ends have their inner races bearing against the inner end faces of a cylindrical portion 20 of the head 14 or a cylindrical portion 21 of the nut 16. The head 14 and the nut 16 each have an outer disc-like portion 22, 23 respectively to bear against the outer face of the respective web 3 or 4 with the cylindrical portion 20 or 21 a close clearance fit in the respective aperture 11. Diametrically opposite bores 24 are provided in each end face of the head or nut 16 whereby a tool with a pair of projections thereon can be engaged with the head 13 or nut 16 to rotate it or to prevent it from being rotated.

Further details of the bolt with its head 14 and the nut 16 are shown in Figures 8 to 11.

Instead of the bores 24 a transverse groove could be provided in which a conventional screwdriver could be engaged.

Figures 12 and 13 show that a wheel 12a may comprise an inner core member 25 having a bore 26 at its mid portion, counterbores 27 and 28 at its ends and a circumferentially extending rib 29 around its mid portion. A tyre 30 is provided around the core member 25. The core member 25 and tyre 30 can both be formed of a urethane material such that the tyre 30 can be bonded to the core member 25 to prevent relative movement therebetween. Thus, upon forming of the tyre 30 on the previously formed core member 25, the material at the surface of the core member 25 to which the tyre is applied, melts and fuses with the tyre material. It is not however essential that the core member 25 and tyre 30 bond together and other materials than urethane may be used, for example glass filled nylon.

The extent by which the circumferentially extending rib 29 extends radially can be varied to suit the use for which the wheel is intended, that is to say by having only a short radial projection for the rib 29, the wheel can have a considerable portion of the tyre 30 covering the radially outer face of the rib 29 to give a relatively resilient wheel or by increasing the radial extent of the rib 29 to that shown in Figure 12 or even completely to the tread surface of the tyre 30, the resilience of the wheel can be reduced thereby assisting high speed skating. If the radial extent of the rib 29 is

sufficiently large, transverse bores 35, that is to say extending parallel to the axis of rotation of the wheel, may be provided in the rib 29. Upon moulding of the tyre 30, the material of the tyre will fill the transverse bores 35 to hold the two side portions of the tyre together. With such a construction, bonding of the tyre 30 to the core member 25 may not be required.

The tubular distance piece 19 for the wheel 12 of Figure 3, or the wheel 12a of Figures 12 and 13 is shown in Figure 14.

A further embodiment of an axle is shown in Figure 15 comprising a stud 31 with a screw threaded socket 32 in each end and a pair of screw nuts 33 each having a head 34 with only a small axial extent. The stud 31 is of a length equal to the distance between the outer faces of the webs 3 and 4 and the apertures in the webs 3 or 4 to receive the axle 31 are of a size to receive the axle 31 with minimum clearance. The heads of the screw nuts 33 bear against the outer faces of the webs 3 and 4. Apertures of the kind shown at 24 in Figures 1, 9 and 11 are provided in the outer faces of the heads 34 of the screw nuts 33 and washers (not shown) are provided between the inner faces of the webs 3 and 4 and the bearings for the wheels.

Table X shows the dimensions in millimetres of the distance A between the axis of the rear axle and the axis of the middle axle, the distance B between the axis of the middle axle and the axis of the front axle, the overall length C from the back of the heel plate 1 to the front of the sole plate 2 and the distance D by which the axis of the middle axle is spaced below a line joining the axes of the front and rear axles. It further shows the sum of A and B, the difference between A and B, the resultant of $\frac{A - B}{A + B}$ and also A + B expressed as a percentage of C for each of seven different sizes of chassis for different sizes of boot.

The dimension between the inner faces of the webs 3 and 4 is preferably 39 mm. Each wheel preferably has a width of 36 mm, the outside diameter of the core 25, neglecting the rib 29, is 25 mm and the outside diameter of the wheel is either 55 mm or 61 mm. The outside diameter of the rib 29 is preferably 45 mm or less leaving at least 8 mm thickness of tyre 30 thereover for the 61 mm diameter

wheel and 5 mm thickness of tyre for the 55 mm diameter wheel. The material used for moulding the tyre 30 will vary according to the particular application intended for the wheel but for the hardest wheels preferably has a Shore hardness of 85. The distance D is preferably 3 mm.

Referring to Figures 8 to 11, the head 14 of the bolt and the nut 16 each have a maximum diameter of 18 mm, the portion 22 is of 1 mm thickness, the portion 20 has an axial length of 4 mm and a diameter of 12 mm and the bolt has an overall length of 45 mm.

Referring to Figures 16 to 19, and firstly to Figure 19, a blank 51 is shown as stamped from a planar steel plate. Subsequent to stamping out the plate 51, the plate is bent along two parallel bend lines indicated at 52 and 53 to form the shape shown in Figures 16 to 18, that is to say having a heel plate 54, a sole plate 55 and downwardly directed parallel webs 56 and 57. It will be seen that portions 58 of the sole plate 55 project laterally beyond the final positions of the webs 56, 57. Subsequent to bending the webs 56, 57 out of the plane of the sole plates 54 and 55, apertures 59 are drilled to form mountings for axles for wheels 12a, the positions of which wheels 12a are indicated by dotted lines in Figure 16. The apertures 59 are drilled with the skate held in a jig such that axles extending through the aligned pairs of the apertures 59 will be accurately parallel to one another. Weight reducing apertures 61 are formed in the sole plate 55 and heel plate 54 by the original stamping as are holes 62 to receive screws whereby the skate may be secured to a boot. Initial stamping also deforms a front end portion of the sole plate 55 to form a recess 63 in the upper face, the recess being angled so that a mount for a toe stop can subsequently be secured by screwing, welding or riveting to the front end of the sole plate 55 at the underside thereof in a manner and at a location similar to that shown in Figures 1 and 2.

The skate of Figures 16 to 19 is in accordance with the dimensions of Table X.

Figure 2 shows that at least the middle wheel 12 of each skate may be formed in two equal halves with the plane of the joint 12b between the two halves extending perpendicular to the axis of rotation of the wheel and with each half wheel preferably being provided with two bearings.

TABLE X

DIMENSIONS IN MM

Boot Size	A	B	C	D	A + B	A - B	$\frac{A-B}{A+B}$	A + B as % of C
9 to 11½	78	66	190	2.5 - 4.5	144	12	.083	75.8
12 to 1½	86	73	210	2.5 - 4.5	159	13	.082	75.7
2 to 4½	94	80	230	2.5 - 4.5	174	14	.081	75.6
5 to 7½	102	87	250	2.5 - 4.5	189	15	.079	75.6
8 to 10	111	94	270	2.5 - 4.5	205	17	.082	75.9
10½ to 11½	118	101	290	2.5 - 4.5	219	17	.078	75.5
12 to 13	127	108	310	2.5 - 4.5	235	19	.081	75.8

CLAIMS

1. A pair of skates wherein each skate of the pair of skates has a rigid metal chassis comprising separate or combined sole and heel plates secured to a boot and two parallel webs depending downwardly from the sole and heel plates, the skate further comprises three wheels mounted in-line between the two parallel webs, each wheel has a width equal to at least 50% of its diameter and a floor engaging surface which is formed substantially as a part of a sphere, the lowermost part of a middle one of the wheels extends downwardly beyond a line joining the lowermost parts of the front wheel and the rear wheel by between 2.5 and 4.5 cm, the rearmost part of the rear wheel is located not more than 10 mm to the rear of the rearmost part of the boot, the boot extends forwardly to a position forward of the frontmost part of the front wheel, the axis of the middle wheel is spaced a distance A from the axis of the rear wheel and a distance B from the axis of the front wheel, A + B is equal to at least 70% of the overall length of the boot and $\frac{A - B}{A + B}$ lies within the range 0.06 to 0.09.

2. A pair of skates according to claim 1, in which each chassis is formed by providing the sole and heel plates, separate or combined, with slots therein and providing the webs as two separate members with tongue portions to be received in the slots, thereby accurately to position the webs respect to the sole and heel plates before securing of the webs to the sole and heel plates.

3. A pair of skates according to claim 1, in which each chassis is formed by stamping portions out of a flat metal plate and then bending the flat metal plate along two longitudinally extending bend lines to form the sole and heel plates and the webs integral with one another.

4. A pair of skates according to any one of claims 1 to 3, in which the lower edge of each of the webs of the pair of webs is cut-away between the locations of apertures therein to receive axles for the wheels such that portions of the lower edge of each web immediately beneath the apertures for the axles projects downwardly further than other portions of the lower edge.

5. A pair of skates according to claim 4, in which each web, intermediate the apertures for the axles, is provided with a plurality of further apertures and bumper members are provided with projections to be received in said further apertures to affix said bumper members to said webs on the outer face thereof, the bumper members being so proportioned and disposed relative to the webs and the sole and heel plates that, upon sidewards tipping of the skate in use, the bumper members will first contact the floor over which the skate is travelling and will thereby prevent portions of the webs or the sole and heel plates engaging the floor in a manner which would damage the floor.

6. A pair of skates according to claim 4 or claim 5, in which a bolt or stud to form an axle for a wheel of the skate has at least one screw threaded end portion and has a head and co-operates with a nut or co-operates with two nuts, each of the head, the nut or the nuts comprising an inner cylindrical portion of a diameter greater than the diameter of the stud or bolt, an outer disc portion with a diameter greater than that of said cylindrical portion and an axial extent as small as possible and engagement means in or on said disc portion whereby said disc portion can be engaged by a tool to rotate it or to prevent it from rotating.

7. A pair of skates according to claim 6, in which the inner cylindrical portions engage in said apertures in the webs of the skate, which said apertures are of a size to accept said cylindrical portions with minimum clearance and the disc portions engage the outer faces of the webs to restrict inward movement towards one another

of the head and the nut or the two nuts engaged in the apertures in the webs.

8. A pair of skates according to any one of claims 1 to 7, in which each wheel comprises a core member formed as a central generally tubular portion through which a respective axle passes and having in its end portions counter-bores of a greater diameter than the bore of the tubular portion, which counter-bores can receive bearings, and a tyre of a urethane material engaged over the core member.

9. A pair of skates according to claim 8, in which core member has a circumferentially projecting rib at a mid portion in its length.

10. A pair of skates according to claim 8 or claim 9, in which both the core member and the tyre are formed of a urethane material with the core member formed of a harder urethane material than the tyre and with the tyre bonded to the core member.

11. A pair of skates according to claim 9 or claim 10 when appendant to claim 9, in which the rib has transversely extending apertures therein, which apertures are filled by the material of the tyre to lock the tyre in position with respect to the core member.

12. A pair of skates according to any one of claims 8 to 11, including a distance piece extending between the inner races of the bearings engaged in the counter-bores, the distance piece being tubular and surrounding the axle.

13. A pair of skates according to any one of claims 1 to 12, in which one or more of the wheels, particularly the middle wheel of each skate, is formed in two equal halves with the plane of the joint between the two halves extending perpendicular to the axis of rotation.

14. A pair of skates according to claim 13, in which the abutting faces of the two halves of the wheel are faced with a low friction material or a shim of low friction material is located therebetween.

15. A pair of skates substantially as hereinbefore described and illustrated with reference to any of the accompanying drawings.

1/5

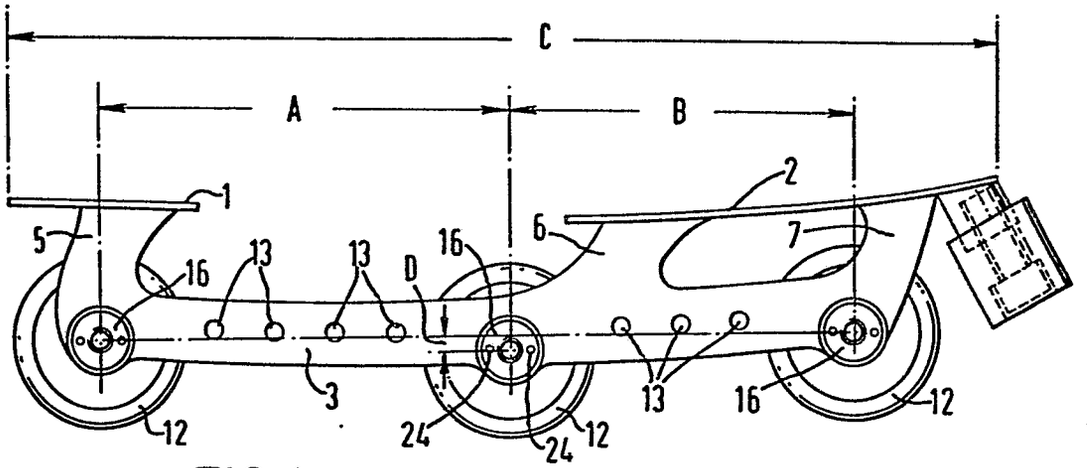


FIG. 1.

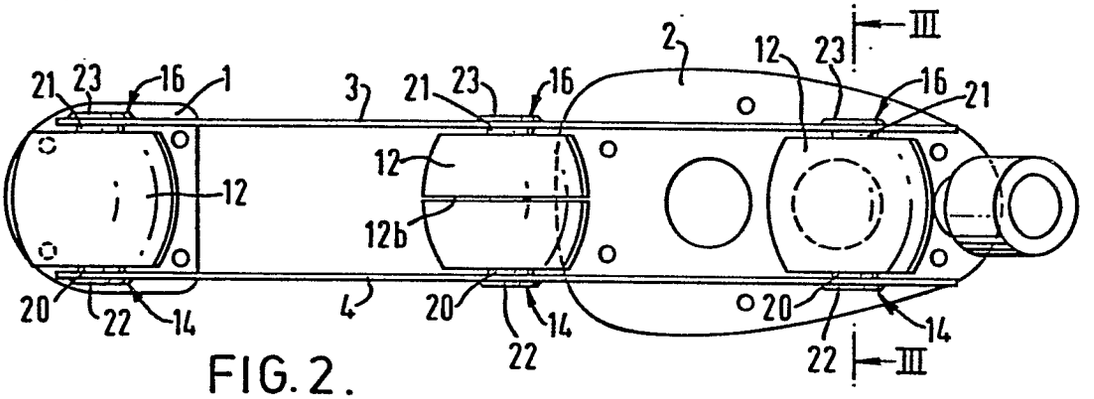


FIG. 2.

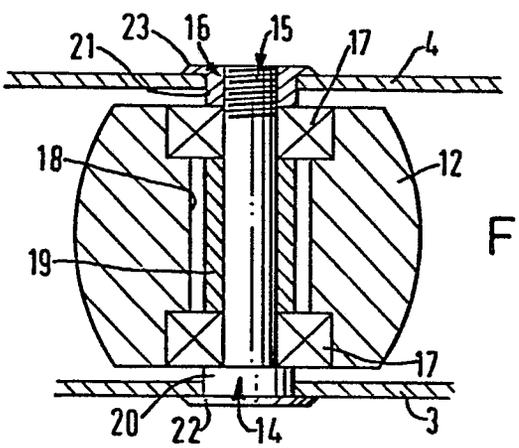
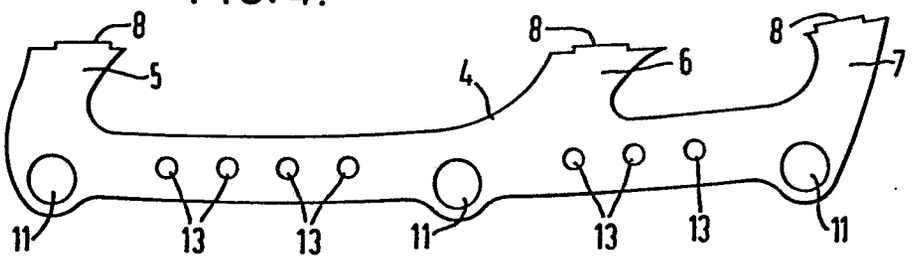


FIG. 3.

FIG. 4.



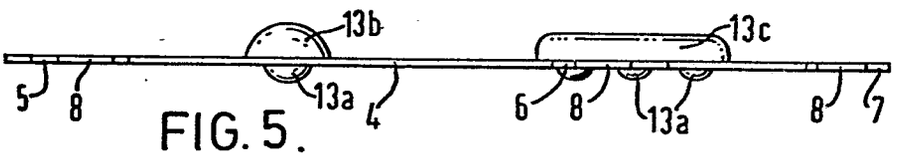


FIG. 5.

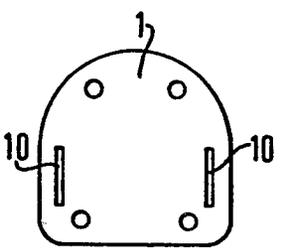


FIG. 6.

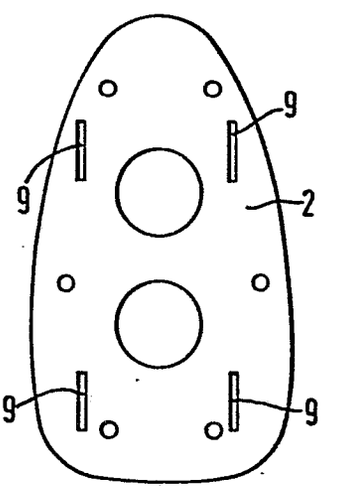


FIG. 7.

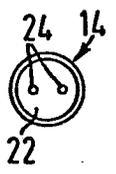


FIG.9

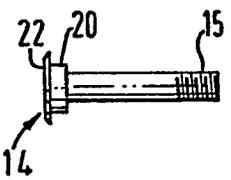


FIG. 8.

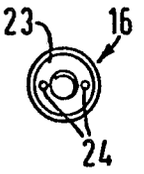


FIG.11.

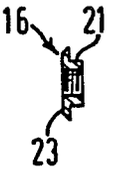


FIG.10.

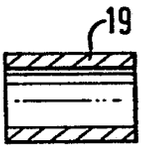


FIG.14.

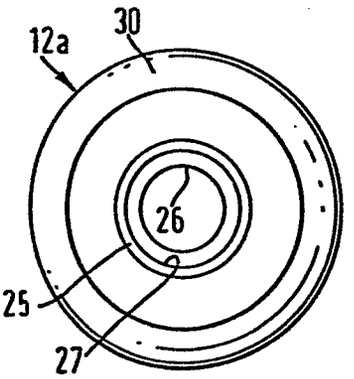


FIG. 13.

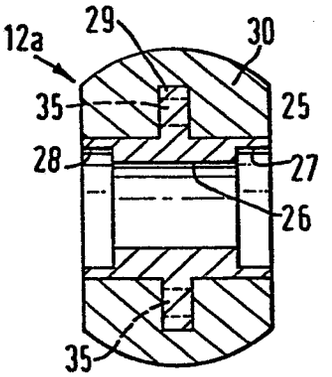


FIG.12.

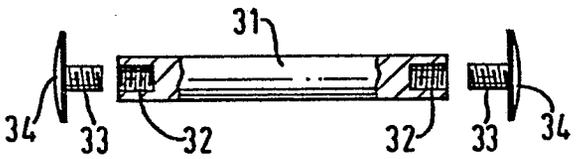


FIG.15.

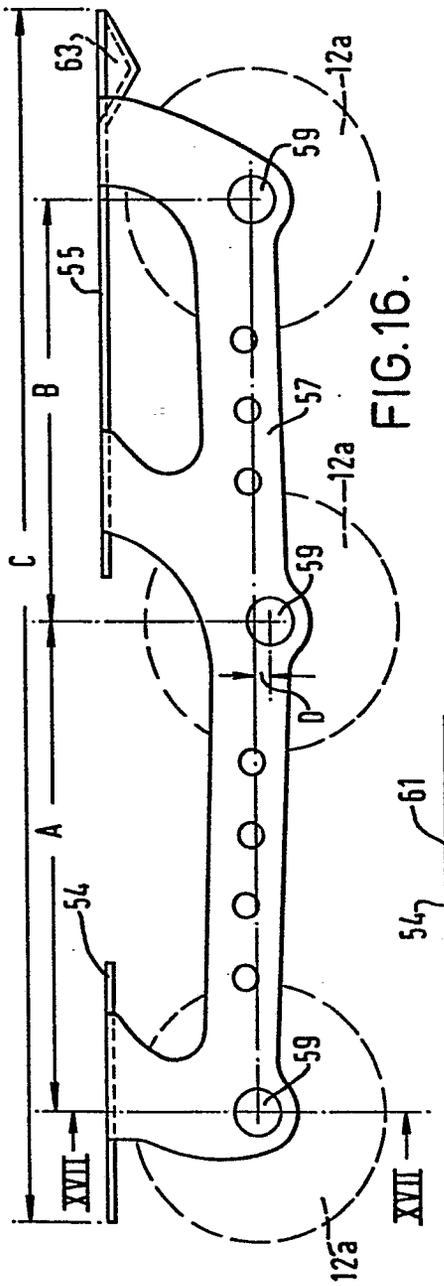


FIG.16.

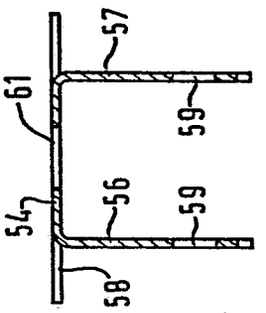


FIG. 17.

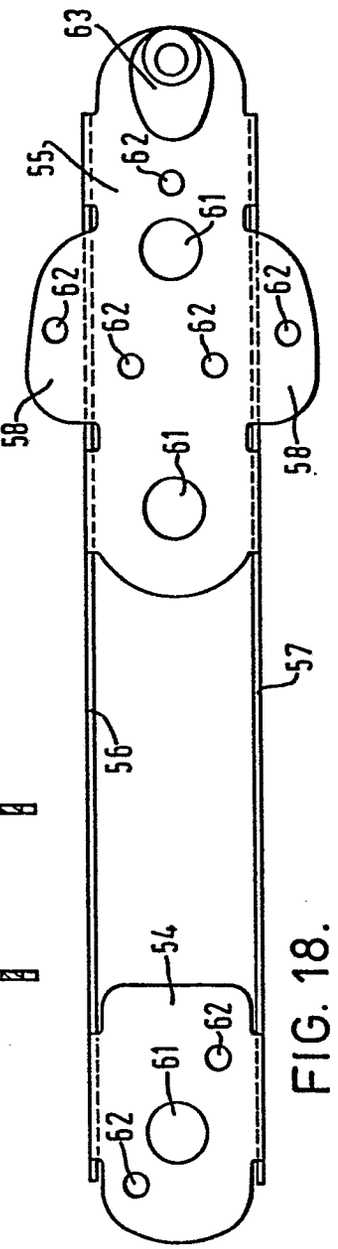


FIG. 18.

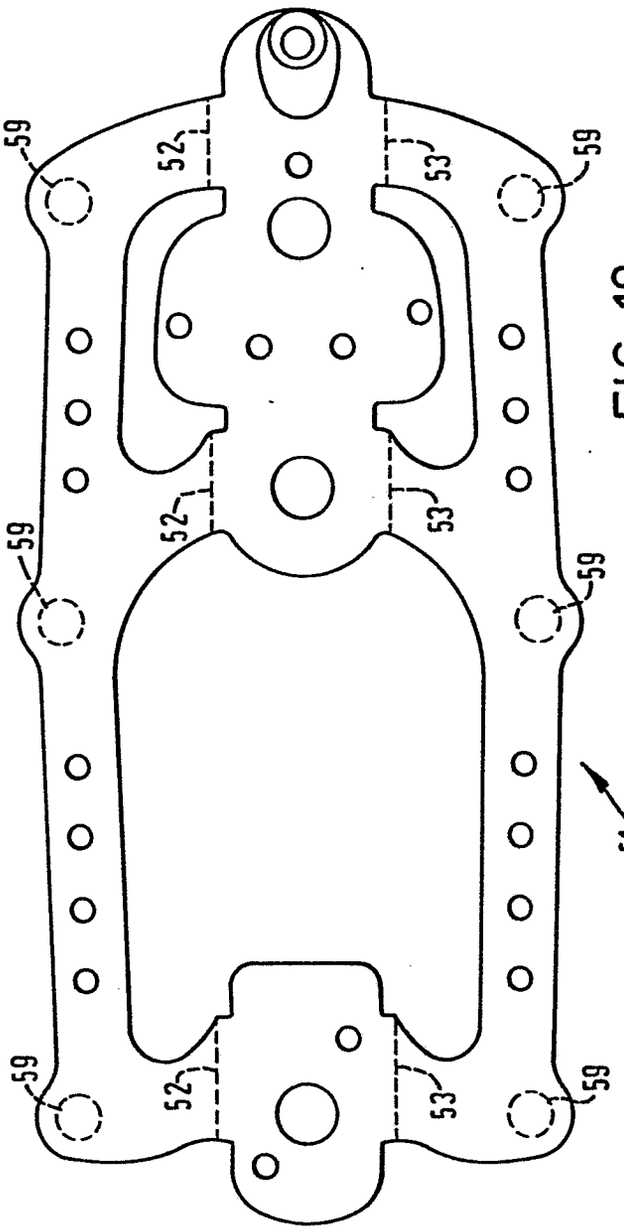


FIG. 19.

0043250

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 81 30 2881

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	GB - A - 201 974 (MILLER-METCALF) * Whole document *	1,3,4,6,7
	CH - A - 184 903 (FEHLMANN) * Whole document *	1,3,6,7,8
	DE - C - 812 169 (WICHELHAUS & HAAG) * Whole document *	1,6,7
	US - A - 4 058 324 (DALLAIRE) * Whole document *	1
	GB - A - 708 889 (STEVENS, LANGNER PARRY & ROLLINSON) * Page 2, lines 46-49; figures 3,4 *	9
	FR - A - 405 380 (PAYNE,MAZEY) * Page 1, lines 30-43; figure 1 *	13
	FR - A - 414 746 (LONCLAS) * Page 2, lines 33-40 *	13
A	CH - A - 602 147 (STEEB)	
A	DE - C - 583 104 (STEIN)	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
A 63 C 17/06

TECHNICAL FIELDS SEARCHED (Int. Cl.³)
A 63 C

CATEGORY OF CITED DOCUMENTS
X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons
&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29-09-1981	SCHLESIER