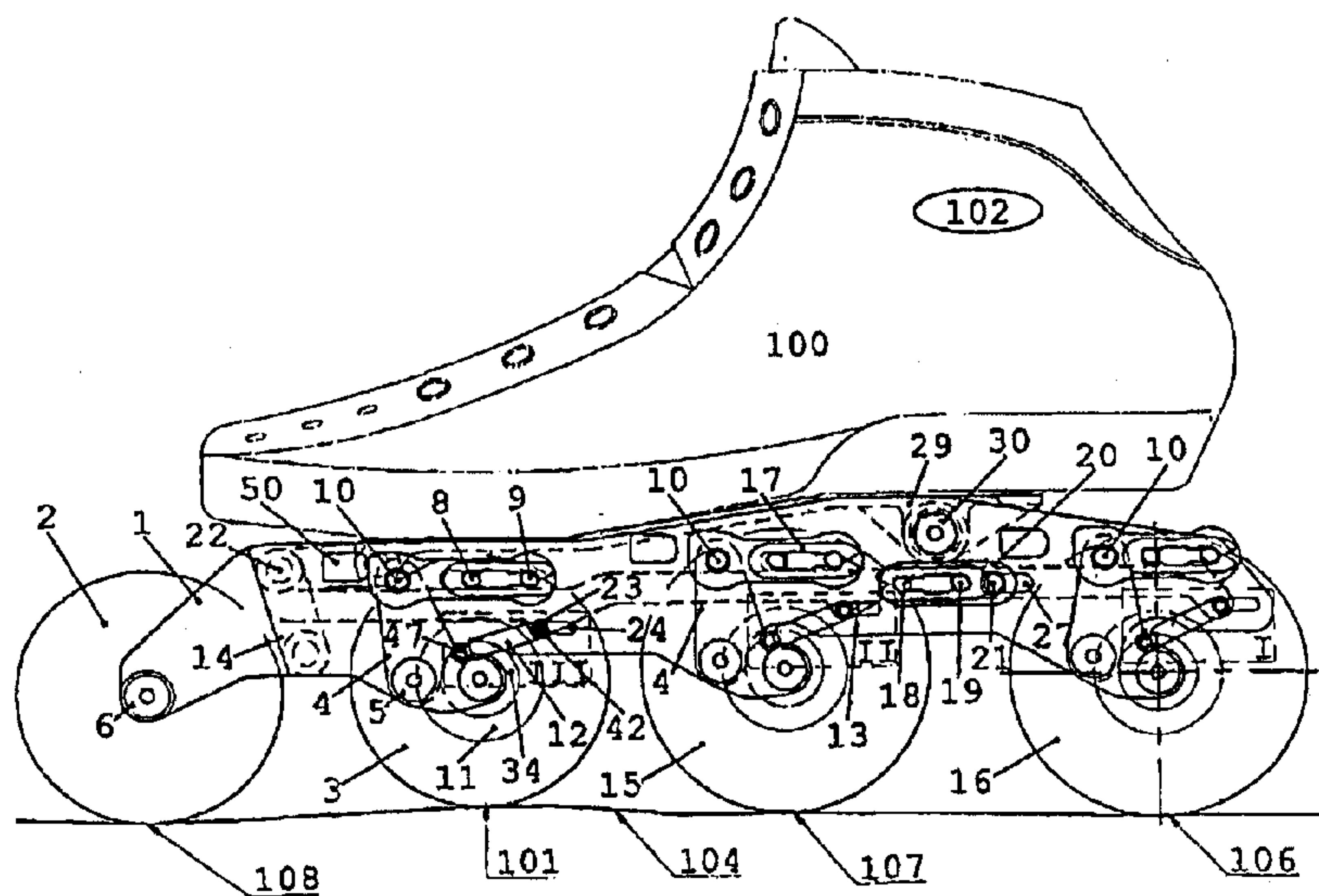




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(54) **PATIN A ROULETTES UNIVERSEL**
(54) **ALL ROUND ROLLER SKATE**



(57) Cette invention concerne un frein pour un patin à roulettes comprenant un cadre principal (1, 59) qui assure l'interconnexion entre une plaque de base/charnière (29/30) et une chaussure (100) ou une demi-botte (109). On actionne un levier (13) sur les charnières (14, 60), lequel levier est connecté à au moins un égaliseur (12) actionnant un disque. Un anneau d'actionnement (34) permet de pousser un frein à disque (11) contre la surface (26) d'une roue. Au moins une console (4) des roues est montée pivotante sur une vis de pivot (5) du cadre principal (1). Ce système permet d'accroître la résistance du patin sur les roues (3, 15, 16) et d'obtenir une action de freinage progressive et fluide.

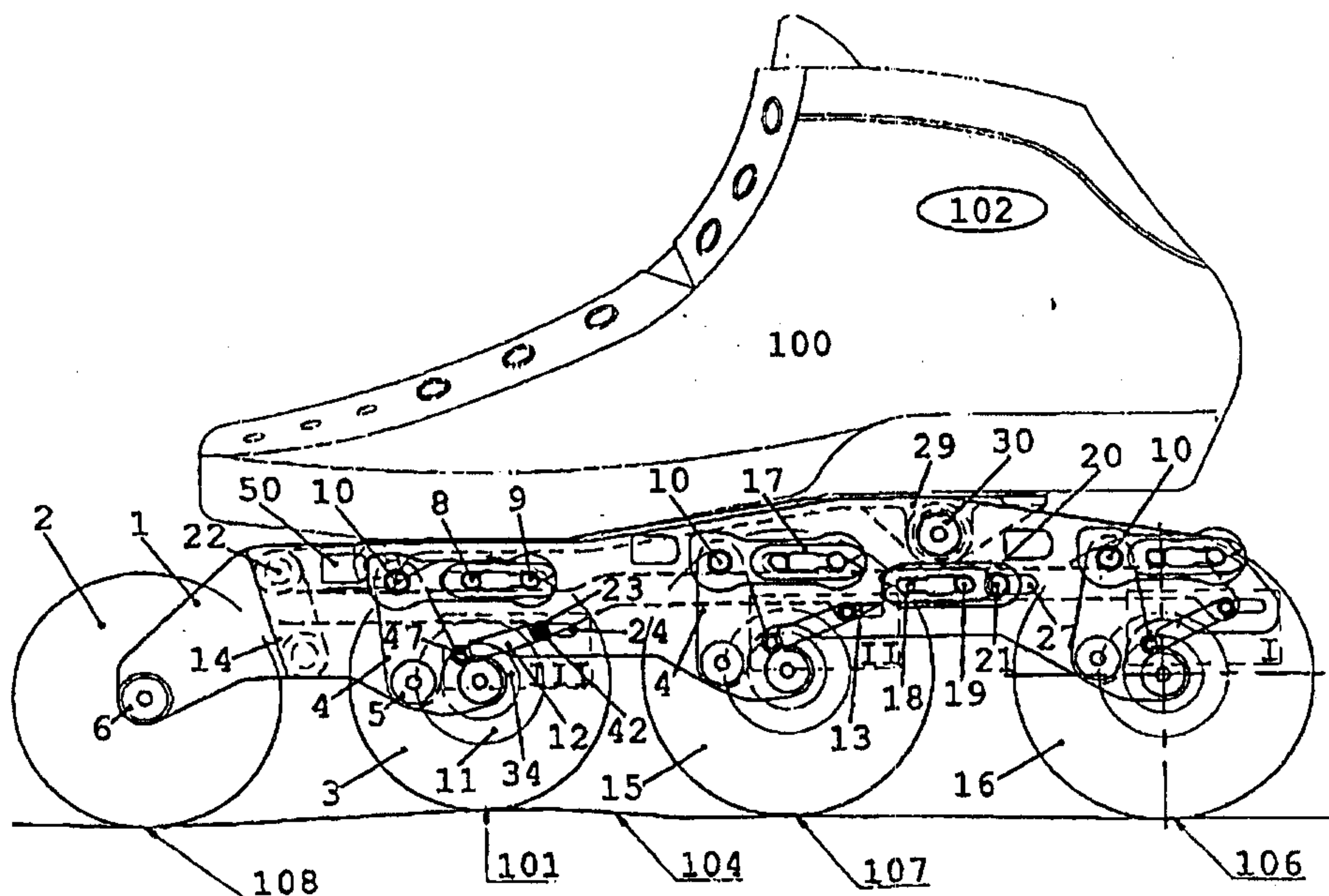
(57) The present invention relates to a brake for roller skates comprising, a main frame (1, 59) engaging a base plate/hinge (29/30) with a shoe (100) or a boot half (109). Operating a lever (13) over hinges (14, 60), connected with at least one equaliser (12) operating a disc, operating ring (34) which pushes a disc brake (11) against wheel surface (26) wheel casing (4) of which at least one is arranged pivotal on hinge screw (5) of mainframe (1). Thereby increasing the roller resistance on the wheels (3, 15, 16) and come to a fluent progressive braking action.

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(54) Title: ALL ROUND ROLLER SKATE



(57) Abstract

The present invention relates to a brake for roller skates comprising, a main frame (1, 59) engaging a base plate/hinge (29/30) with a shoe (100) or a boot half (109). Operating a lever (13) over hinges (14, 60), connected with at least one equaliser (12) operating a disc, operating ring (34) which pushes a disc brake (11) against wheel surface (26) wheel casing (4) of which at least one is arranged pivotal on hinge screw (5) of mainframe (1). Thereby increasing the roller resistance on the wheels (3, 15, 16) and come to a fluent progressive braking action.

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WO 99/36142

PCT/SE99/00033

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All round roller skate**TECHNICAL FIELD:**

5 The present invention relates to a roller skate with self adjusting brakes, working on load-adjusting wheels, said brakes have progressive operating strokes ranging from slight- to full while blocking of the wheels will, under normal circumstances, not occur. Said brakes can be divided over a number of wheels
10 and can be operated simultaneously. Without interference from each other.

BACKGROUND OF THE INVENTION:

15 Braking in roller-skating is done either by; directly pushing a solid pad which is attached to the mainframe of the skate, at the ground and uses the dry friction between the skating surface and the block to reduce velocity. Or by increasing the roller resistance, by a contact on the perimeter of one of the wheels
20 and uses the dry friction between roller and skating surface as a counter-force to reduce velocity.

Activating the brake is either done by rotating the foot, or pressing the heel down and extending the leg in the driving
25 direction or by using a hand operated cable mechanism.

An example of previously known brake pads, with a hand-controlled brake device of this kind is known from EP 625063.

30 A hand-held device operates the brake pad, which is either attached to the back of the roller- skate or in between, its wheels. The braking mechanism occupies the hands, while having the hands free is a very important demand in an agility sport like roller-skating. Furthermore the braking-pad increases the
35 overall length of the skate, it wears very fast and it leaves marks on the skating surface. Driving on uneven surfaces, especially the ones with crevices, the brake can hook-up itself up and in any case will behave very unpredictable.

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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Examples of previously known wheel-braking devices, with direct hand- or remote controlled devices of this kind is known from EP 486 013 A1. Whether the brake is controlled directly by hand or remote in either case the brake occupies one or two hands, while having the hands free is a very important demand in an agility sport such as roller skiing or -skating. Furthermore is ground contact of the rollers, on which to brake, in this construction only possible, when no more than two wheels are used in the entire construction. The whole brake operation system is bulky and prone to tangling up. Furthermore it is difficult to define a proportional growing brake-force against a fixed point, especially to control the force up to a point where skidding or blocking of the rollers will not occur.

An example of a foot controlled braking pad is known from - US 5,649,715. The braking pad will wear very fast, leave marks on the skating surface and the braking angle increases in relation to the wear of the braking pad. The brake increases the length of the skate, the skating rollers- ahead of the roller, around which the skate rotates, will have to leave the ground and will make it difficult to keep the direction of motion. Again driving on uneven surfaces, especially the ones with crevices, will result in hooking up of the brake or at least an unpredictable behaviour of it.

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Examples of a foot controlled anti-lock brake roller is known from - US 5,088,748. The wheel instrumental in braking increases the length of the skate in comparison to the effectively needed length. The braking force is related to a given pre-set angle and pressure without factual relation to the dry-friction load ratio in the actual user condition and the therewith connected increase in brake-force (dry-friction increases in direct relation to load). The wheels in front of the wheel, around which the skate has to be manoeuvred in order to come to the braking position, have to leave the ground surface influencing the manoeuvrability and stability of the movement. Furthermore it is claimed in this invention, that the brake does not lock. But the generation of the braking-force on the wheel hubs, given the braking range from light up to full on such a small surface will result in the tilting of the skate till only one wheel (the

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SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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last- brake wheel) has ground contact and skids. The
aforementioned will also take place when the last wheel is
lifting itself over unevenness. Finally can the brake only be
used on one wheel, which surface and the thereto-connected dry
5 friction, may well be to limited.

Examples of a foot controlled brake on a roller skate wheel is
known from EP 379 906 A2. The wheel instrumental in braking is
placed on the last wheel, it hinges around the axle of the wheel
10 directly in front. Around said axle the skate is also pivoted to
come to the braking position, leading to a complicated and bulky
construction on the backside of the skate, increasing the length
nearly as much as an extra wheel would. Furthermore is the
braking done by direct contact to the wheel, which will make it
15 possible to generate roller resistance in excess of the dry-
friction of the wheel in itself. The wheels of the in-line skate
are fixed with the exemption of the last wheel. During use said
wheels wear differently and have each different ground contact.
Once an in-line skate especially after some use- is placed with
20 its wheels on a flat surface it will always be possible to
rotate some wheel freely. Indicating that the wheel contact
surfaces do not form a line, this means that the wheels which
are fixed within the roller skate, cannot be used as brake
wheels, because one never knows whether they have and keep full
25 ground contact. Another point arises when skating over uneven
surfaces. In this case ground contact changes frequently between
the wheels, reason why this brake configuration can only be used
on the one wheel which can be kept in continues road contact.
The brake requirements at higher speeds will take the dry
30 friction capacity of more than one wheel surface, reason why
this brake will not cover the requirements.

Example of a foot controlled brake on a roller skate wheel is known
from EP 0 677 310 A1. The restrictions on this design coincide
35 with the foregoing example. However with an additional flaw,
because when the third wheel is used as brake and the fourth
wheel as rest, a serious degradation of the braking function
will occur, when the last and fourth wheel is lifted on an
uneven part and the third wheel loses ground contact. This will

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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occur frequently on uneven surfaces like rough asphalt, splits in pavement etc.

Example of a foot controlled brake on a roller skate is known from UK 2 160 780 A. Pivoting the frame and a brake pad against the last wheel; the control of not creating a roller resistance in excess of the ground dry friction of the wheel at a solid brake point is very difficult, while the whole functions only on a skate with two wheels. While oscillations created between surface and roller, will make the functioning of the brake haphazardly.

Example of a lower leg controlled brake on roller-skates is known from US 5,649,715 A. The braking is done on a pad, operated by rotating the lower leg, together with the top-part of a boot around the bottom part and uses this motion to push a pad down over a hinge. The number of patents using this motion is staggering, therefore we have chosen a recent one. They all have in common that the aft part of the roller skate can be lifted of the ground by the leverage between shoe and roller-skates. Remaining is also the fact that skating on not even surfaces will produce oscillation between the parts and it will be easy to hook up the brake on sharp unevenness. Again the brake pad will wear fast and leaves markings on the surface.

Examples of brakes using the side of the wheels is known from UK 2 002 243 A. The braking is done pivoting to the roller plane around a hinge and uses the displacement around the hinge point to press two braking pads against the sides of two adjacent wheels. The construction is too and the regulation of the braking force is hard to control because of the oscillations created between rollers and skating surface.

Of all the solutions up to date, whether; - technically, - practically or- economical viable, it can be said that the functioning on uneven surfaces (rough asphalt, splits between pavement tiles etc. etc.) is questionable and not safe for the user. It also can be recorded that no compound solution is available for the different types of skates and their required

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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capabilities, as well as insulation against the oscillation created between the (uneven) skating surface and the rollers.

OBJECT OF THE INVENTION:

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The purpose of the invention is a brake system for the various types of roller skates, -skis and -skate boards and emphasising in-line roller skates. The brake: - functions on uneven surfaces, - does not lengthen the size of skate, - can be regulated under a brake stroke, - is self regulating, -has comprehensive indicators on wear, - has equalisers regulating the brake itself as well, as on a number of wheels, - is operated by a foot movement, remaining practically identical during, the standard brake life. The main objective is to create a safer use of roller skates.

SUMMARY OF THE INVENTION:

The present invention is encompassing a mainframe, in which a number of wheel casings are pivotal mounted. To said wheel casings, tensioning devices are attached. Said wheel casings are over said tensioning devices connected to said mainframe via flexible, permanent elastic springs. Said springs are produced in a comprehensive range, which makes it possible to adapt each pair of skates to the individual in terms of body weight as well as skating technique and velocity. Said springs act as load dividers and make sure that all wheels have 'road contact, so that braking action is always possible on a given number of the wheels. To the wheel casings are disc brakes mounted centric with the diameter of each wheel. Said disc brakes can be forced against the side of said wheels, by rotating a disc-operating ring and the disc-brake around one another, resulting in a controlled increase of roller resistance on/of the wheel. To the rotating brake half an equaliser is attached in order to disperse the brake force evenly over the wheels and to compensate for and indicate wear.

The said purpose is fulfilled with a roller skate embodiment within the scope of the present claims.

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SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

6

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BRIEF DESCRIPTION OF THE DRAWINGS:

A detailed description of the invention will now be given with reference to the accompanying drawings of which:

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Fig. 1 shows a three-dimensional view of a roller skate with a centrally operated self-adjusting brake and load-adjustment on the rollers. The wheels have been removed in order to show the moving parts in a better view.

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Fig. 2 shows a three-dimensional view of a roller-skate as in fig.1 equipped for use with boots of which the lower- and top halves are pivotally connected with each other.

Fig. 3 shows a side elevation of the device shown in Fig. 1, with the wheels placed on an uneven skating surface.

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Fig. 4 shows a side elevation of the device shown in Fig. 1, while the brakes are activated and the wheels pass over an uneven skating surface.

Fig. 5 shows a bottom view of the device shown in Fig. 1, with the second front wheel removed in order to show the hinge mechanism.

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Fig. 6 shows a cross section of the bearing and disc brake of a wheel.

Fig. 7 shows a partial cross section over an equaliser of the device shown in Fig. 1.

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Fig. 8 shows a three dimensional view of a disc brake of the device shown in Fig. 1.

Fig. 9 shows a three dimensional view of a disc operating ring of the device shown in Fig. 1.

Fig. 10 shows the equaliser of Fig. 3 detail I.

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Fig. 11 shows the equaliser of Fig. 3 detail II.

Fig. 12 shows the equaliser of Fig. 3 detail III.

Fig. 13 shows the equaliser of Fig. 4 detail IV.

Fig. 14 shows the equaliser of Fig. 4 detail V.

Fig. 15 shows the equaliser of Fig. 4 detail VI.

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

7

Fig. 16 shows a side elevation of a roller skate with a brake system operated by the movement of the lower leg.

Fig. 17 shows the device of drawing 16 with the brake activated.

5 DESCRIPTION OF THE INVENTION:

The embodiments hereafter described show a roller skate with a foot or lower leg operated self-adjusting brake and load adjustment of the wheels 2,3,15,16 in order to keep contact with the ground at uneven surfaces. The roller skate is mounted to a shoe 100,109, and fig. 1-2 is showing a three-dimensional picture in which a front wheel is arranged to be rigidly attached to a main frame 1 in order to keep motion direction, while the following wheels 3,15,16 are arranged to be located in pivoted wheel casings 4. Disc brakes 11 and permanent elastic springs 7 are attached to these wheel casings 4. Between the main frame 1 and the wheel casings 4 equalisers 12 are installed in order to operate the disc brakes 11. The main frame 1 has a pivot connection to the shoe over a base plate 29 or is directly mounted to the shoe. Preferably, the base plate is incorporated with the shoe.

Fig. 1 shows a three dimensional view of the roller skate without the actual first wheel 2, the second wheel 3, the third wheel 15 and the last wheel 16 (see fig.3), the base plate 29, which is preferably incorporated in the sole of shoe 100 (see fig. 3), is connected pivotally to the main frame 1 over a hinge 30. At the front the base plate 29 is connected to the main frame 1 over a hinge mechanism 14. The base plate 29 can now rotate in the main frame 1, and can while doing so move a pinion 22 (see fig. 3) of the hinge mechanism 14 from position A to B (see fig. 4). The pinion 22 holds a central brake lever 13 (see fig. 3) and moves this backwards when the base plate 29 is rotated in the main frame 1. On lever 13 are installed three pins 42 to which the topside 23 of the equalisers 12 are installed. Furthermore a pinion 21 is installed on lever 13, which pinion 21 fits in a slot 27 in the main frame 1 and the stroke of lever 13 is thus limited to the size of the slot 27. On pinion 21 a permanent elastic spring 20 is installed in such a way that when lever 13 is continuously pressed forward, said

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

8

continuous pressure works on pinion 22 (see fig. 3) of the hinge mechanism 14 and presses shoe 100 with base plate 29 continuously against the main frame. The first wheel 2 (see fig. 3) is fixed between a left half 43 and a right half 44 of mainframe 1 in order to keep the direction of motion under control. Load adjusting being done by angling the foot around the ankle 102. The second wheel 3, the third wheel 15 and the last wheel 16 (see fig. 3) are connected to the main frame via the wheel casings 4 with the halves 43 and 44. The wheel casings 4 are connected pivotal to the mainframe 1 over a hinge screw 5. On the top of the wheel casings 4 a pinion 10 is installed, engaging the permanent elastic spring 7. The permanent elastic spring 7 is pre-stressed between a pin 8 and a pin 9, which pins are installed on the main frame 1. The pre-stress is necessary to compensate for the initial load, related to body weight, technique and velocity of the skater, which vector-force will work at 101, 106 and 107 (see fig. 3). Around the centre of the wheels 3, 15 and 16 are on a left half 45 of the wheel casing, the disc brakes 11 installed. To avoid the disc brakes 11 from rotating and being installed wrong, they have a hexagonal one-way fit 57 on the left half of the wheel casing 45 (see fig. 8). The disc brakes 11 can be moved to come in contact with the sides 26 of the wheels, by rotating a ring 34 (see fig. 6) The equalisers 12 are installed between the pins 42 on lever 13 and the pins 47 on the brake operating ring 34. When the lever 13 is moved backwards the equalisers 12 will at first follow as a whole, rotating the brake operating ring 34 in an affiliated motion. Once contact at said side 26 is established only the top part 23 will continue to move, thereby compressing a spring 39 in the equaliser (see fig. 7). The compression of the spring 39 will result in an increasing pressure of disc brakes 11 towards the wheel sides 26 and thereby creating a proportional growing friction between the wheel sides 26 and the disc brake 11 and subsequently higher roller resistance. The initial rotation of ring 34, in order to move the disc brake 11 against the surface 26 can be different for the wheels 3, 15 and 16 and depends on how far the braking surface 26 is worn. The aforementioned different distances do hardly influence the braking capacity, while the continuation of the braking stroke, by compressing said springs 39, will give a proportional brake stroke.

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

9

The wheels 3, 15 and 16 have a load adjustment, in order to have always all wheels at the skating surface when braking, The load adjustment does not interfere with the brake function. When a load at for example the ground surface 101 becomes higher, the moment of force between 101 and hinge 5 increases. To come to equilibrium the counter moment of force between hinge 5 and spring 7 at point 10 will have to increase in conformity. It will do so by stretching spring 7 between pin 9 and pinion 10 and thus increase the force on pinion 10. Because of the said stretching of spring 7 the wheel 2, receiving the higher load will move upward, to the given point thereby dividing the general load again relatively over all the wheel surfaces at 101-106-107 and 108 and visa versa.

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Fig. 2 shows a three-dimensional view of a second embodiment of the roller skate with removed wheels. The main frame 59 is directly mounted to a boot half 109 (see fig. 16). A hinge mechanism 60 on the backside of the shoe now operates the central brake lever 13 (see fig. 16 and 17) to move in the same way as in the previous described embodiment, i.e. a longitudinal motion of a force transmitting member, in these embodiments arranged as a rigid central brake lever 13, forces a brake operating ring 34 to rotate and thereby axially force a disc brake 11 towards the side 26 of a roller skate wheel 3,15,16 when the skater changes the foot or leg angle towards the skating surface. In other embodiments the force transmitting member can be a flexible member, such as a cable.

Fig. 3 shows the roller skate of Fig. 1 with the wheels 2, 3, 15 and 16 in place and in contact with an uneven surface 104. The first wheel 2 has contact with the ground over main frame 1, shoe 100 with base plate 29 and ankle 102. Said contact is necessary to keep the direction of motion under control, while at the same time the ability of vibration insulation between the parts is optimal. The second wheel 3 and its wheel casing 4 have pivoted around hinge 5 to its maximum within main frame 1. Representing a situation in which roller skating of the kind described would be impossible, providing the interference would repeat at a more than regular frequency. The third wheel 15 and

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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its wheel casing 4 have pivoted around hinge 3 half the available distance. While the fourth wheel 16 has remained in neutral position. The placement of wheel 2, 3, 15 and 16 represent a practical situation and representing a dynamic equilibrium, changing instantly with the general operating conditions. The wheels 2, 3, 15 and 16 have all contact with the surface and are in a position where braking on the wheels will give the requested counter force from the dry friction the wheels have on the surface 104. Fig. 2 also shows the shoe 100 with the base plate 29 and the location of hinge 30. At hinge 30 the main frame 1 can pivot in respect to the base plate 29. The wheel casing 4 of the fourth wheel 16 is in its neutral position. Indicating that the pre-tensioning of spring 7, between the pins 8 and 9 is equal or lower than the result of the moment of force between hinge 5 and reaction force 106 on pinion 10 of wheel casing 4. The equaliser 12 is suspended between a pin 47 of the brake operating ring 34 (see fig.9) and pin 42 on lever 13 and is not exposed to a force between the pins 42 and 47. The wheel casing 4 of the third wheel 15 has pivoted under influence of the reaction force 107. Indicating that the result of the moment of force between hinge 5 and the reaction force 107 exceeds the pre-tension of spring 7 between the pins 8 and 9. Causing the pinion 10 on wheel casing 4 to move forward and tension spring 7 to such an extent that it equals the result of the moment of force between hinge 5 and reaction force 107 on pinion 10. The pin 47 on the brake operating ring 34 will have rotated together with wheel casing 4 around hinge 5. Taking with it the bottom side of equaliser 12. The equaliser 12 rotates around pin 42 and becomes a little shorter. The change in length will not result in a force between the pins 42 and 47 because of the compensation space 41 within the equaliser 12. (See fig. 6) The wheel casing 4 of the second wheel 3 has pivoted under the influence of reaction force 101. Indicating that the result of the moment of force between hinge 5 and reaction force 101 exceeds the pre-tension of the spring 7 between the pins 8 and 9. Causing the pinion 10 on wheel casing 4 to move forward and tension spring 7 to such an extent that it equals the result of the moment of force between hinge 5 and reaction force 101 on pinion 10. The pin 47 on brake operating ring 34 will have rotated together with the wheel casing 4

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

11

around hinge 5. Taking with it the bottom part of the equaliser 12. The equaliser rotates around pin 42 and will adhere to the same length as shown on the fourth wheel 16. The stretch expansion of spring 7 has now come to an end, while it abuts a buffer 50. When contact at buffer 50 is made it represents a lifting of the wheel. Furthermore, it is shown in fig. 2, the lever 13, its linkage to the frontal hinge mechanism 14 and the three hinge pins 42 for the equaliser 12. The hinge pins 42 slide in a slot 24 in main frame 1. Shown is also a forward pin 18 and a second pin 19, which are installed on the main frame 1 and holding spring 20. Spring 20 is pre-stressed between pin 18 and 21. Pin 21 is an integral part of lever 13. Consequently lever 13 will always be pushed forward and will exert pressure on hinge pinion 22 and keep the shoe 100 and base plate 29 in contact with main frame 1. It is understood that the springs 7 and 20 are secure locked in place by a spring clip 17. The springs 7 and 20 are located on the outside of the main frame and can be exchanged easily, making it possible to adapt the bearing- and braking capacity of the skate to the individual. In rigid in-line roller skates the wheels have all the same diameters, in order to create an even wear and thereby all-over ground contact on all the wheels. In the design at hand wear on the perimeter of the wheel is compensated for, thereby it becomes possible to fit the diameter of the wheels within the anatomical lines of the foot. The diameter of the last wheel can therefore be increased compared to the front wheels, without moving the foot upwards. The increased diameter of the wheel will result in a lower roller-resistance increasing the dry friction and consequently brake capacity.

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Fig. 3 shows the roller skate when the braking mechanism is fully deployed, in this situation the lever 13 and pinion 22 are moved backwards from its original position symbolised by A to its position B. During the move from position A to B a slight rotation around pinion 21 and vertical displacement of lever 13 has taken place. The topside 23 of the individual equaliser has moved and rotated around the pins 47, in coherence with said slight rotation and in relation to the movement from A to B. Said vertical displacement has no influence on the whole other than a vertical enlargement of the slots 24 in the main frame.

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SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

12

It is also shown that the ground surface has a not flat profile and that the wheels act all at the different levels. The wheel 2 is fixed in the frame and has no brake, in order to maintain steering capacity. In the Fig. 2 it is also supposed, that the side 26 of wheel 3 is more worn, than the ones on wheel 15 and 16 (see fig. 6). The sides of wheel 15 and 16 are supposed to have worn equally, the result is represented by the distance C and C1 (see fig.4). The space 25 resembles the clearance between disc brake and the surface of the wheel (see fig. 6). The movement forward of the pins 47 has resulted in a displacement pin 42 and rotations of the brake operating ring 34. The rotation of brake operating ring 34 results in a forward movement (axially towards the sides of the wheels) of disc brake 11. Once said forward movement of the disc brake 11 closes clearance 25, the spring 39 in the equalisers will start to compress. Said compression increasing the compression force 55 (see fig.7) along the centre of a central spring guide 37 and diametrical on disc-operating ring 34 and increasing the pressure of disc brake 11 against the wheel side 26. Resulting in an increased roller resistance of the wheel. At this point it will be very important to understand that said roller resistance should not supersede the dry friction of the given wheel on the skating surface, because than the wheel will block. The wear of the wheel surface under the disc brake will eventually increase the clearance 25. Requiring an increasing part of the rotation of ring 34 to close said clearance 25. The stroke of the lever 13 has an over capacity. The distance as represented in either C or C1 give an indication how much, - said over capacity has been used, - the brakes have worn, - brake capacity is left. A test, to check the actual brake condition, will be to place the foot holding the skate on the knee of the other leg and draw at the front of the skate, in order to imitate the brake movement. The opening remaining at either C or C2 will give a direct indication of the braking capability left. The distance as is represented in C is considered -maximum wear-, a mark 56 (see fig.7) on the centre shaft 27 of the equaliser 12 indicates that the wheel has to be turned or exchanged.

Fig. 4 shows also the base plate 29 which is, preferably, integrated with shoe 100 and hinge 30 which connects base plate

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

13

29 pivotally on main frame 1. The front of the base plate 29 connects pivotally at a pinion 51 to a lever 52 of the frontal hinge 14. Lever 52 connects at pinion 22 with a bottom lever 53 of hinge 14. Lever 53 is pivotally connected to the mainframe 1 at a pinion 54. The pinion 22 circulates around a pinion 51 and the pinion 54 simultaneously when the shoe 100 and base plate 29 are rotated around hinge 30, the rotation of the shoe being limited within the slot 27 of the main frame. The configuration has the following targets; the mainframe 1 and base plate 29 have to be perfectly in line with each other; the mainframe and base plate 29 have always to be pressed against one another; to initiate braking an initial force is required; braking can be done gradually over an on-going movement of the foot.

Fig. 5 shows a bottom view of the device shown in fig.1 with the second wheel removed in order to show the outlines of hinge 14 bearings in place. It shows the, - base plate 29 and central lever 13, - halves 43 and 44 of the main frame, - levers 52 and 53 of the frontal hinge mechanism 14 and the fixing points at the hinge 5, at a front wheel bolt 6 and at the base plate hinge 30 which keep the construction together. Fig. 5 also shows the springs 7, 20 and the clips 17.

Fig. 6 shows a sectional view over the centre of the fourth wheel 16 of a device as shown in Fig. 1 and 3, with the equaliser 12 removed. Said view is representative for the other wheels equipped with brakes. Shown is a bearing for a wheel axle comprising a screw member 103 and a nut member 105 which bearing has a limited and predictable axial clearance and has the capacity to accept the thrust forces generated by the disc brake 11 on the wheel surface 26. Said thrust forces will not influence the roller resistance of the bearing. The disc brake 11 and the left half of wheel casing 45 have a hexagonal fit, to avoid wrong assembly. The disc 11 slides easily on the hexagonal tap 57 of wheel casing half 45 and is pressed by a disk spring 32 against the side of the wheel casing half 45. Said spring 32 is kept in place by a spring clip 31. On the circumference of the disc 11 are two inclining slopes 33 (see fig. 8). The slopes 33 match with two inclining slopes 35 in rotating ring 34 (see fig. 7). Between the slopes 33 and 35 a ball 49 is lodged in

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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order to reduce friction. When the ring 34 is turned around the disc-brake 11 it pushes the disc-brake 11 over the balls 36 and slopes 33,35 inwards against the wheel side 26 and increases the roller resistance of the wheel. The pressure on the disc brake 11 can be varied at the equalisers 12 over a substantial range. The friction between disc brake 11 and the wheel side 26 can be kept low and the maximum brake output is chosen to be lower than the dry friction of the wheel on a standard surface. Practically this means that the brake surface of disc brake 11 is quite smooth and never will need replacing. At the same time will the abrasion of the wheel side 26 be very low. It is a given fact that brake capabilities coincide with the roller skate capacity in general. Which indicates that the number of wheels and their respective diameter dictates the attainable speed at the cost of flexibility etc. In the design at hand the brake capacity grows with the number of wheels and their respective diameter. Furthermore is shown on fig. 6, a seal 36 to avoid dust entering and impairing the functioning of the inter-relation of the disc 11 and the ring 34. Also a left half 45 of the wheel casing is shown in fig. 6.

Fig. 7 shows the equaliser 12 of a device as shown in Fig. 1 with the top half 23 the central spring guide 37, a compensation ring 38, the spring 39 and a slack 41. The equaliser rotates simultaneously between pin 42 and 47 when the wheel casing is rotated at hinge 5. The length alteration during said simultaneous rotation is accepted at slack 41. It is understood that when lever 13 is moved backwards, the disc 11 will approach the side of the wheel 26 (see fig. 6). As soon as disc 11 abuts the surface 26 of the wheel, the spring 39 will start to compress drawing with its compression force at 40 and increasing by its compression the force exerted to the surface between the wheel side 26 and the disc-brake 11 (see fig. 6).

Fig. 8 shows the disc brake 11 of a device as shown in Fig. 1 three dimensionally, showing the sloping configuration of paths with the inclining slope 33 around which the balls 49 are revolving (see fig. 6).

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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Fig. 9 shows the brake-operating ring of a device as shown in fig. 1. Ring 34, showing the sloping configuration of paths with inclining slope 48 around which a ball is revolving. The seal 36 is aimed at keeping dust away from the fit between disc 11 and ring 34 and the wheel casing 45.

Fig. 10 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on fig. 3 section I enlarged. B indicates the distance between the bottom side of equaliser 12 and the centre of pin 42.

Fig. 11 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on fig. 3 section II enlarged. Shown is that although the equaliser 12 has been turned an angle D, compared to Fig. 10, the length B has stayed the same. Proving that the up and down movement of the wheels does not interfere by involuntary operating the brake.

Fig. 12 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on fig. 3 section III. Shown is again that distance B stays the same although the equaliser 12 is turned an additional angle D1 compared to Fig. 10. Proving again that the up and down movement of the wheels does not interfere by involuntary operating the brake.

Fig. 13 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on fig. 4 section VI enlarged. C1 indicates between the bottom side of equaliser 12 and the centre of pin 42. The brake disc 11 is now in contact with the surface 26 (see fig. 6).

Fig. 14 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on fig. 4 section V enlarged. The wear on surface 26 of the wheel (See Fig. 6) is similar to the wear in Fig. 13. Shown is that although the equaliser 12 has turned an angle D2, compared to Fig. 13, the length C1 has stayed the same. Proving that the up and down movement of the wheels, while driving on uneven surfaces, does not interfere by in- or decreasing the set brake force.

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SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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Fig. 15 shows a sectional view of an equaliser of a device as shown in fig. 1 in the position as indicated on Fig. 4 section IV enlarged. Shown is that the side 26 (See Fig. 6) has worn to such extent, that the wheels have to be turned or exchanged.

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Fig. 16 shows the second embodiment of the roller skate from fig. 2 attached to a boot that fastens around the foot with the bottom part 109 of the boot and the lower leg with the top part 110 of the boot. The two parts 109 and 110 can pivot jointly around each other at a boot hinge 58. The roller skate has the following differences compared with the embodiment shown in Fig. 1; - Both side plates 43 and 44 form now one main frame 59, - the base plate 29 and hinge 30 are removed and - the frontal hinge mechanism 14, which operates the lever 13, has been replaced by hinge mechanism 60. All further functions with respect to the functioning are the same and the numbers on fig 15 correlate with the identical numbers on previous figures. To the top part 110 a profile 70 is attached, sharing a pinion 61 on the boot with a top lever 62. The lever 62 can pivot around pinion 61. At the bottom side of lever 62 a slot 63 in lever 62 engages a pinion 64. The pinion 64 is attached to a lever 65. The lever 65 is pivotally connected to a pinion 66, which is attached to the main frame 1 over pinion 66. Another lever 67 is connected pivotally between a pinion 69, which is attached to the brake operation lever 13 and a pinion 68, which is attached to the lever 65. A forward rotation of the upper boot will result in pinion 64 sliding in slot 63 and nothing will happen. A backward rotation of the upper boot will result in both levers 62 and 65 engaging each other around pinion 68 and will result in pivoting of both levers 62 and 64 around their perspective pinions 61, 66 and their common pinion 68. During this movement also a lever 67 will move and pivot around pinions 68 and 69, taking with it brake operating lever 13 in a straight backward movement.

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Fig. 17 represents the situation in which the top boot 110 has pivoted backwards around hinge 58. Lever 62 has rotated around pinion 61 and taken pinion 64 with it. Constructing another triangle of the levers 62 and 65 with the pinions 66 -fixed to the main frame 59, pinion 61-fixed to upper boot 110- and pinion

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SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

17

64. Caused by the outward movement of pinion 64 and the rotation of lever 65, pinion 65 will also move outward in a related movement, taking with it the lever 67 and its pinion 69. The movement of pinion 69 will be followed by lever 13, which will in its turn move the topside of the equalisers 23 and consequently will start the braking.

10 In the above mentioned embodiments it is advantageous that a locking member is arranged for blocking the disc brakes in locked position in order to walk on the roller skates. This locking member is connected to the central brake lever and thus operating on all wheels simultaneously.

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

18.

CLAIMS:

1. Method of braking a roller skate, characterised in that a longitudinal motion of a force transmitting member (13) operates at least one equaliser (12) that forces a brake operating ring (34) or a disc brake (11) to rotate and thereby axially forcing a/the disc brake (11) towards the side (26) of a wheel (3,15,16) when the skater change the foot or the leg angle in relation to the main frame (1,59).
2. Roller skate comprising a main frame (1,59), a wheel casing (4) pivotally connected to the main frame (1,59), a wheel (2,3,15,16) rotatably mounted at one end in the wheel casing (4), characterised in that a force transmitting member (13) is movably mounted in the main frame (1,59) and operating a disc brake (11) over at least one equaliser (12) whereby a longitudinal motion of the force transmitting member (13) forces a brake operating ring (34) or a disc brake (11) to rotate and thereby axially forcing a/the disc brake (11) towards the side (26) of the wheel (3,15,16) when the skater change the foot or the leg angle in relation to the main frame (1,59).
3. Roller skate according to claim 2, characterised in that a load adjusting spring (7) is mounted between the other end of the wheel casing (4) and the main frame (1,59).
4. Roller skate according to any of the claims 2-3, characterised in that an equaliser (12) is mounted between the brake operating ring (34) and force transmitting member (13).
5. Roller skate according to any of the claims 2-4, characterised in that a pivotally mounted base plate (29) connected to a skaters shoe (100) is arranged to operate the force transmitting member (13) and equaliser (12) by means of a lever mechanism (22,51,52,53,54) when the skater change the foot angle in relation to the main frame (1,59).
6. Roller skate according to any of the claims 2-4, characterised in that a top part (110) of a skaters

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

19

boot is pivotally connected to a bottom part 109 of the boot and that the top part (110) is arranged to operate the force transmitting member (13) by means of a lever mechanism (60,61,62,63,64,65,66,67,68,69,70) when the skater change the leg angle and thereby pivot the top part (110) in relation to the main frame (1,59).

7. Roller skate according to any of the claims 1-6, characterised in that the force transmitting member is a rigid central brake lever (13).

8. Roller skate according to any of the claims 2-7 comprising at least, a main frame (1, 59) with wheel casings (4), of which at least one casing is pivotal arranged at a hinge screw (5) in the main frame (1, 59), a wheel (2) rotationally fixed between the main frame (1, 59) and wheel (3, 15 and 16) rotationally mounted in the wheel casings (4), a load adjusting spring (7) connecting wheel casings (4) with main frame (1,59), a base plate (29), which can rotate in main frame (1) at hinge (30) placed somewhere along the length of frame (1), a hinge (14, 60) connected to a lever (13) connected to equalisers (12) and a spring (20), characterised in that a brake unit (11) is attached to at least one of the side of one of the wheels. (2, 15 and 16) and operated by a lever (13).

9. Roller skate according to claim 8, characterised in that a lever (13) is adapted to act, as the base plate (29) is pivoted in the mainframe (1), by the movement of pinion (22) of hinge (14).

10. Roller skate according to any of the claims 8-9, characterised in that a lever (13) is adapted to act as the top part (110) of a boot is pivoted backwards around the lower part (109) activating hinge (60).

11. Roller skate according to any of the claims 8-10, characterised in that lever (13) is pushed forward by the resilient member (20) acting upon pinion (21) of lever (13) and thereby closing base plate (29) on mainframe (1).

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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12. Roller skate according to any of the claims 8-11, characterised in that lever (13) acts under pressure of the resilient member (20). Making the pivoting of base plate (29) in main frame (1) at hinge (30) subject to pressure. 5 Thereby avoiding oscillation between mainframe (1) and base plate (29).

13. Roller skate according to any of the claims 8-12, characterised in that the resilient member (20) is 10 adapted to be pre-tensioned.

14. Roller skate according to any of the claims 8-13, characterised in that the resilient member (20) acts as a vibration insulator between base plate (29) and mainframe (1). 15

15. Roller skate according to any of the claims 8-14, characterised in that the resilient member (20) is exchangeable to customise brake force.

20 16. Roller skate according to any of the claims 8-15, characterised in that a hinge (14) connects the base plate (29) and the main frame (1) with lever (52) via pinion (51) to base plate (29) with lever (53) via pinion (54) to mainframe (1) and pinion (22) between the levers (52,53). 25

17. Roller skate according to any of the claims 8-16, characterised in that hinge (14) connects the base plate (29) to the main frame (1). Together with hinge (30) and keeps base plate 29 in line with the main frame (1). 30

18. Roller skate according to any of the claims 8-17, characterised in that hinge (14) unfolds with the pivoting of base plate (29) in main frame (1).

35 19. Roller skate according to any of the claims 8-18, characterised in that the levers (52, 53) rotate simultaneously around pinion (22) when hinge (14) unfolds therewith displacing lever (13) and creating thereby a brake stroke. 40

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

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20. Roller skate according to any of the claims 8-19, characterised in that the lever (13) is moved within the main frame (1) when the base plate (29) or top boot half 110 are pivoted in the main frame.

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21. Roller skate according to any of the claims 8-20, characterised in that the lever (13) when it is moved within the frame displaces the topside of the equalisers (23). The equalisers (12) rotate, the brake operating ring (34) activates brake disc (11) against wheel surface (26) which will increase roller resistance on the wheel (3, 15 and 16) and reduces velocity.

22. Roller skate according to any of the claims 8-21, characterised in that the roller resistance of the wheels (3, 15 and 16) is increased when the base plate (29) or top boot half (100) are pivoted in the mainframe (1).

23. Roller skate according to any of the claims 8-22, characterised in that a equaliser (12) is installed in between pin (47) of lever (13) and the pin (42) on the disc operating ring.

24. Roller skate according to any of the claims 8-23, characterised in that an equaliser (12) translate the linear movement of lever (13) in a rotation of disc operating ring (34). By moving the pin (42) simultaneously with pin (47).

25. Roller skate brake according to any of the claims 8-24, characterised in that a spring (39) can be compressed in the equaliser (12). Thereby regulating the pulling force between the pins (42, 47) the pulling force on disc operating ring (34) and the resulting pressure between disc brake (12) and wheel surface (26).

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26. Roller skate brake according to any of the claims 8-25, characterised in that by compressing a spring (39) in equaliser (12) enables the pivoting between base plate (29) and main frame to continue. Even after contact is established between disc brake (11) and wheel side (26).

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

22

27. Roller skate brake according to any of the claims 8-26, characterised in that by compressing a spring (39) in equaliser (12). The pressure of disc brake (11) against wheel side (26) is increased and therewith the roller resistance of the wheels (3, 15 and 16).

28. Roller skate brake according to any of the claims 8-27, characterised in that the pivoting of base plate (29) on top boot half 110 results in an increased roller resistance on the wheels (3, 15 and 16).

29. Roller skate brake according to any of the claims 8-28, characterised in that the force to pivot the base plate (29), or top boot 110 totals the reaction forces of all the equaliser (12), springs (39) and the progressive growing counter force of the resilient member (20).

30. Roller skate brake according to any of the claims 8-29, characterised in that the counter force generated in the mainframe (1) during the pivoting of base plate (29) assures balance.

31. Roller skate brake according to any of the claims 8-30, characterised in that the compensation ring (38) in equaliser (12). Makes it possible to move the equaliser (12) between the pins (42, 47) with the pivoting movement of wheel casing (4) around hinge screw (5) of the main frame (1), without altering the length of equaliser (12).

32. Roller skate brake according to any of the claims 8-31, characterised in that the surface (26) wears differently. The difference of wear will be compensated by the compression of spring (39) off equaliser (12).

33. Roller skate brake according to any of the claims 8-32, characterised in that a mark (56) on the equaliser (12). Signals when the base plate (29) or top half 110 of the boot and the mainframe (1) have been pivoted maximal how much the spring (39) is compressed and the wheel surface at (26) has worn.

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34. Roller skate brake according to any of the claims 8-33, characterised in that the mark (56) determinates at a standard control involving pivoting for hand shoe (100), base plate (29) and the mainframe (1). When the mark (56) does not show out side the equaliser (12) the effective life of wheel brake surface (26) is used.

35. Roller skate brake according to any of the claims 8-34, characterised in that resilient members (20) are attached to at least one of the wheel casings (4) the resilient member is exchangeable.

36. Roller skate brake according to any of the claims 8-35, characterised in that the resilient member (20) is adapted to act as load adjuster, keeping the wheels (3, 15 and 16) in ground contact at all skate able surfaces.

37. Roller skate according to any of the claims 8-36, characterised in that the rotation of the top part (110) of a boot, attached to the lower leg, rotates around a hinge (58) and operates a hinge mechanism (60).

38. Roller skate according to any of the claims 8-37, characterised in that a forward rotation of the top part of the boot (110) around the hinge (58) results in sliding pinion (64) in slot (63) and does not result in operation of the brake-operation lever (13)

39. Roller skate according to any of the claims 8-38, characterised in that the backward rotation of the top part of the boot (110), around the hinge (58). Results in the rotation of the levers (62, 65) and a movement separating the main frame (59) and the pinion (64) further.

40. Roller skate according to any of the claims 8-39, characterised in that the movement away of the pinion (64) from the main-frame (59) results in pivoting and transporting the lever (67) outwards of the main-frame (59).

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

24

41. Roller skate according to any of the claims 8-40, characterised in that the brake operating lever (13) is moved linear and parallel in the main-frame (59) by pinion (69) when lever (67) is moved backwards in the main-frame (59).

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42. Roller skate according to any of the claims 8-41, characterised in that the brake operating lever (13) is moved linear and parallel to the main frame (69) when the boot (110) is rotated around the hinge (58).

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43. Roller skate according to any of the claims 8-42, characterised in that the wear of the wheel (3, 15, 16), around its perimeter, is compensated for. By the rotation of the wheel casing (4) in the main frame (1, 59) and the resilient members (7) and that they therefore keep ground contact.

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44. Roller skate according to any of the claims 8-43, characterised in that the wear on the perimeter of wheel (3, 15, 16) is compensated for and that they therefore can have different diameters.

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45. Roller skate according to any of the claims 8-44, characterised in that a ball (49) is placed between the disc brake (11) and the disc brake operation ring (32) and therewith reduces friction between this parts.

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46. Roller skate according to any of the claims 1-44, characterised in that a locking member is connected to the central brake lever arranged for blocking the disc brakes in locked position for a possibility to walk on the skates.

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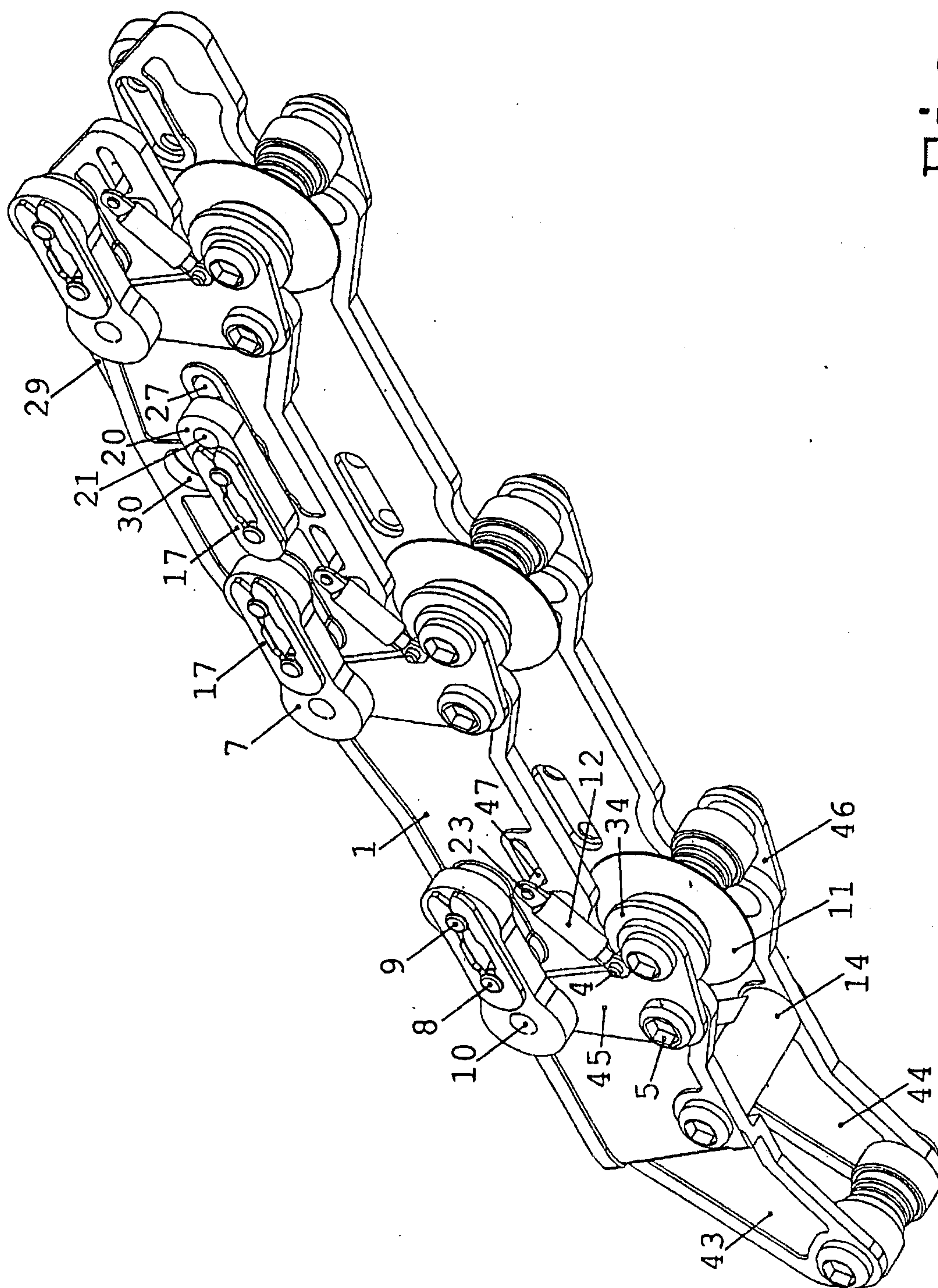
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WO 99/36142

PCT/SE99/00033

1/11

Fig. 1



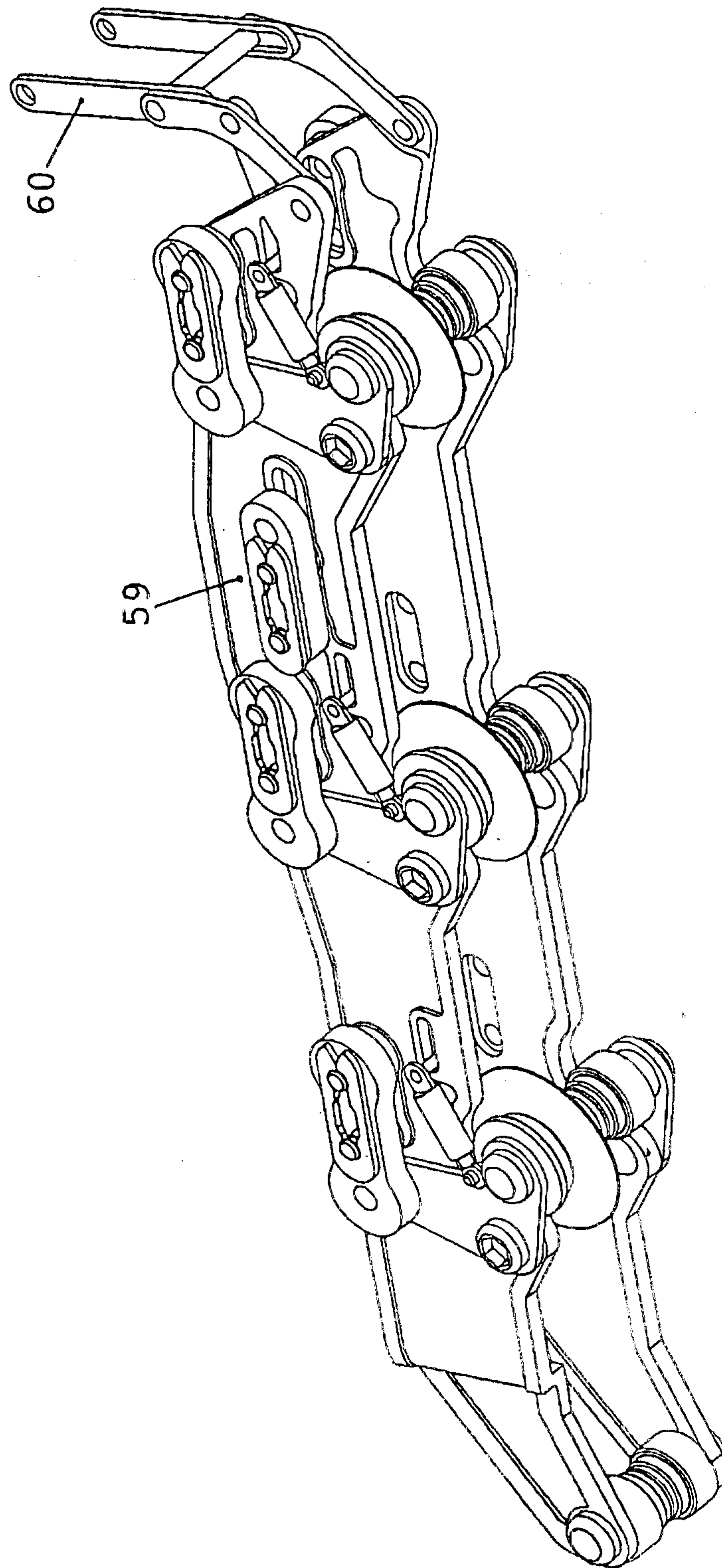
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WO 99/36142

PCT/SE99/00033

2/11

Fig. 2



SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

3/11

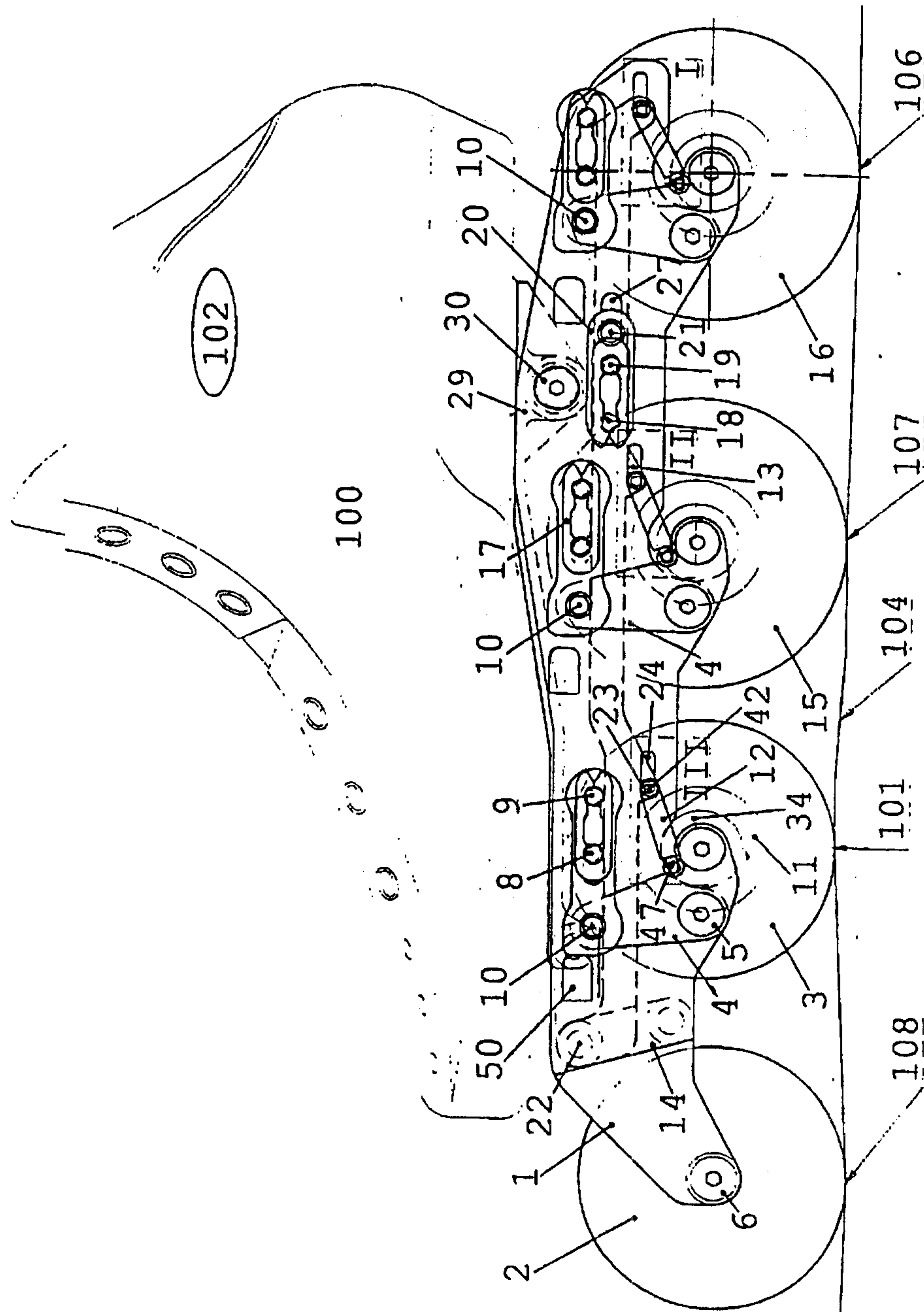


Fig. 3

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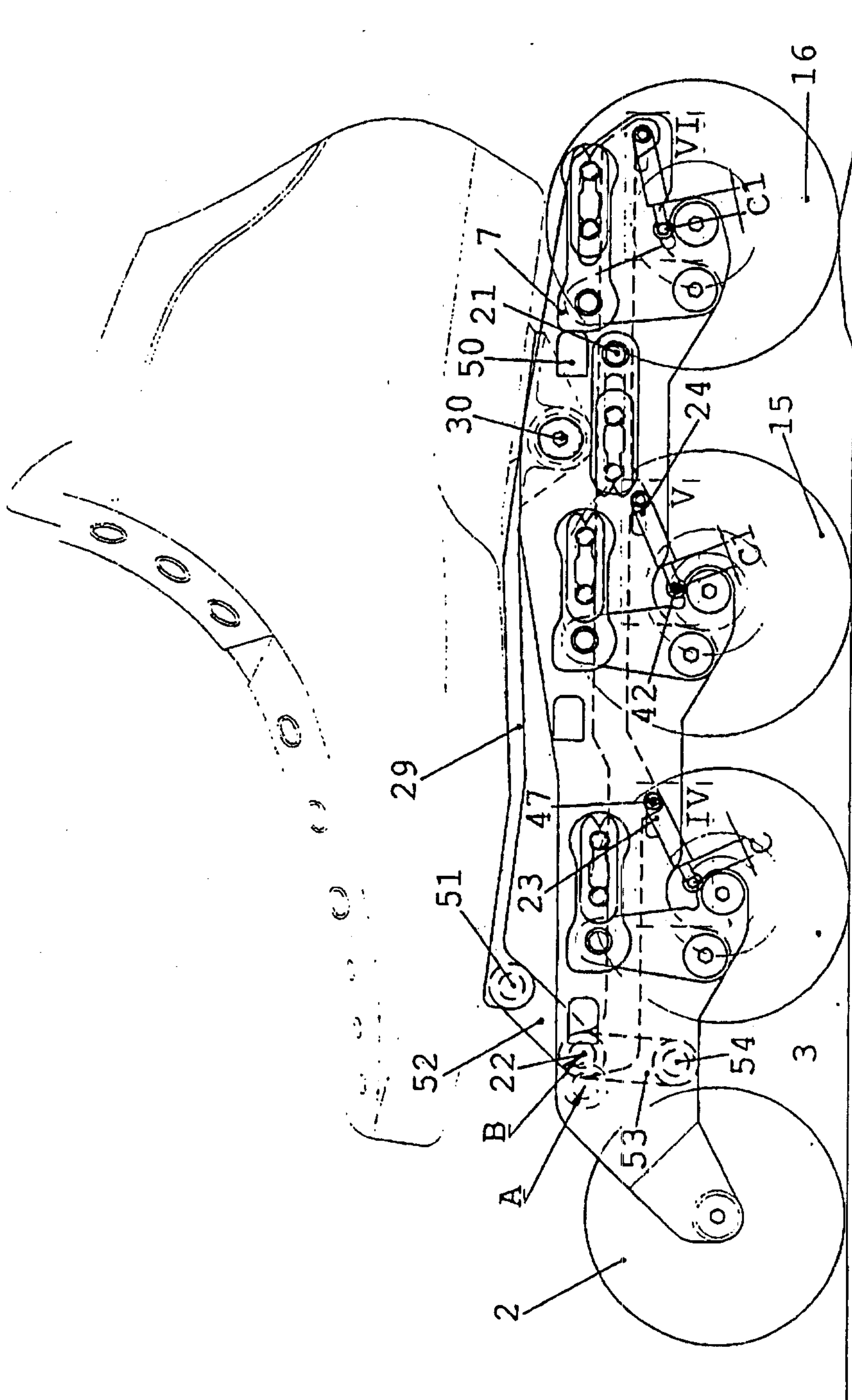


Fig. 4

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

5/11

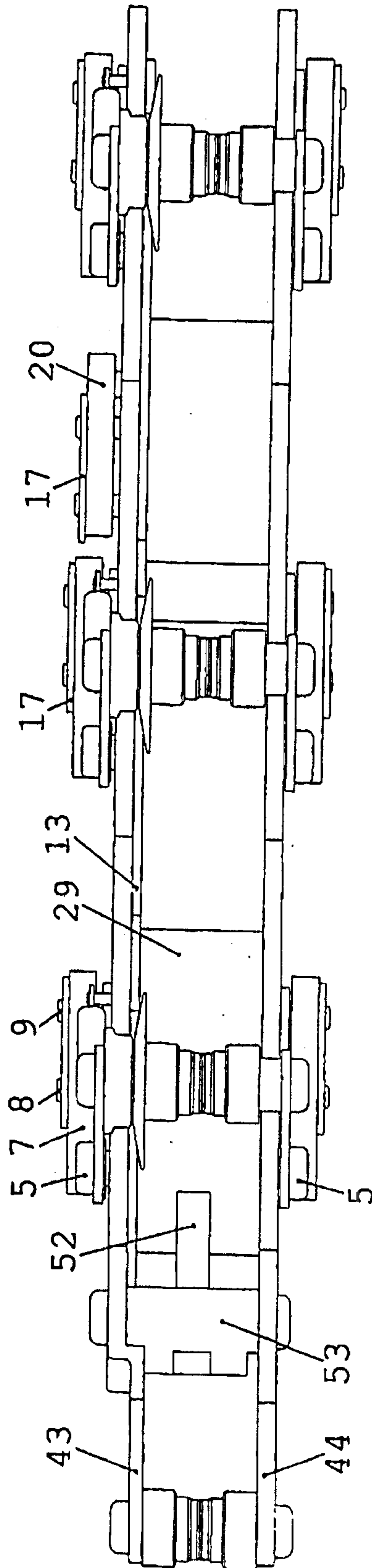


Fig. 5

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

6/11

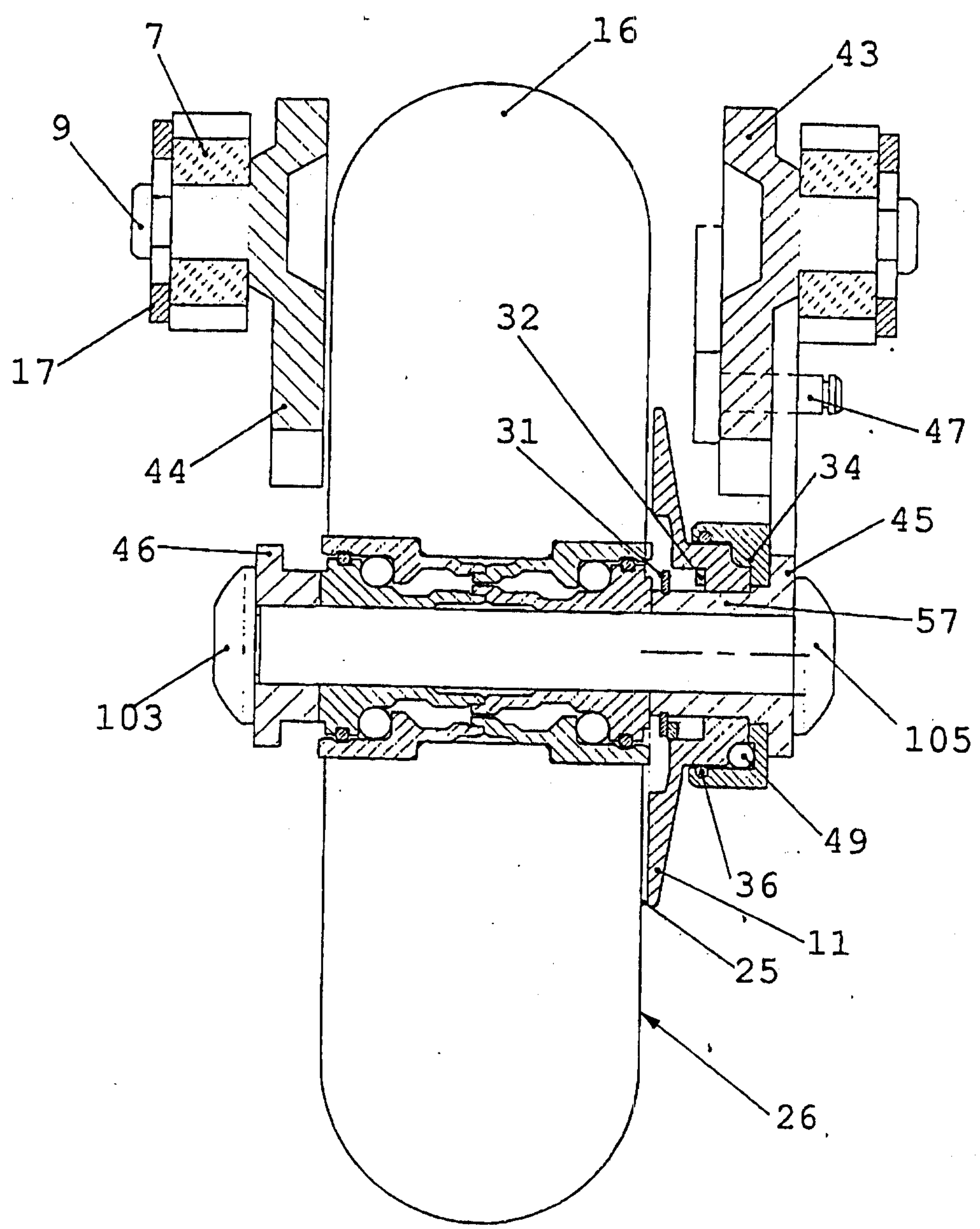


Fig. 6

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

7/11

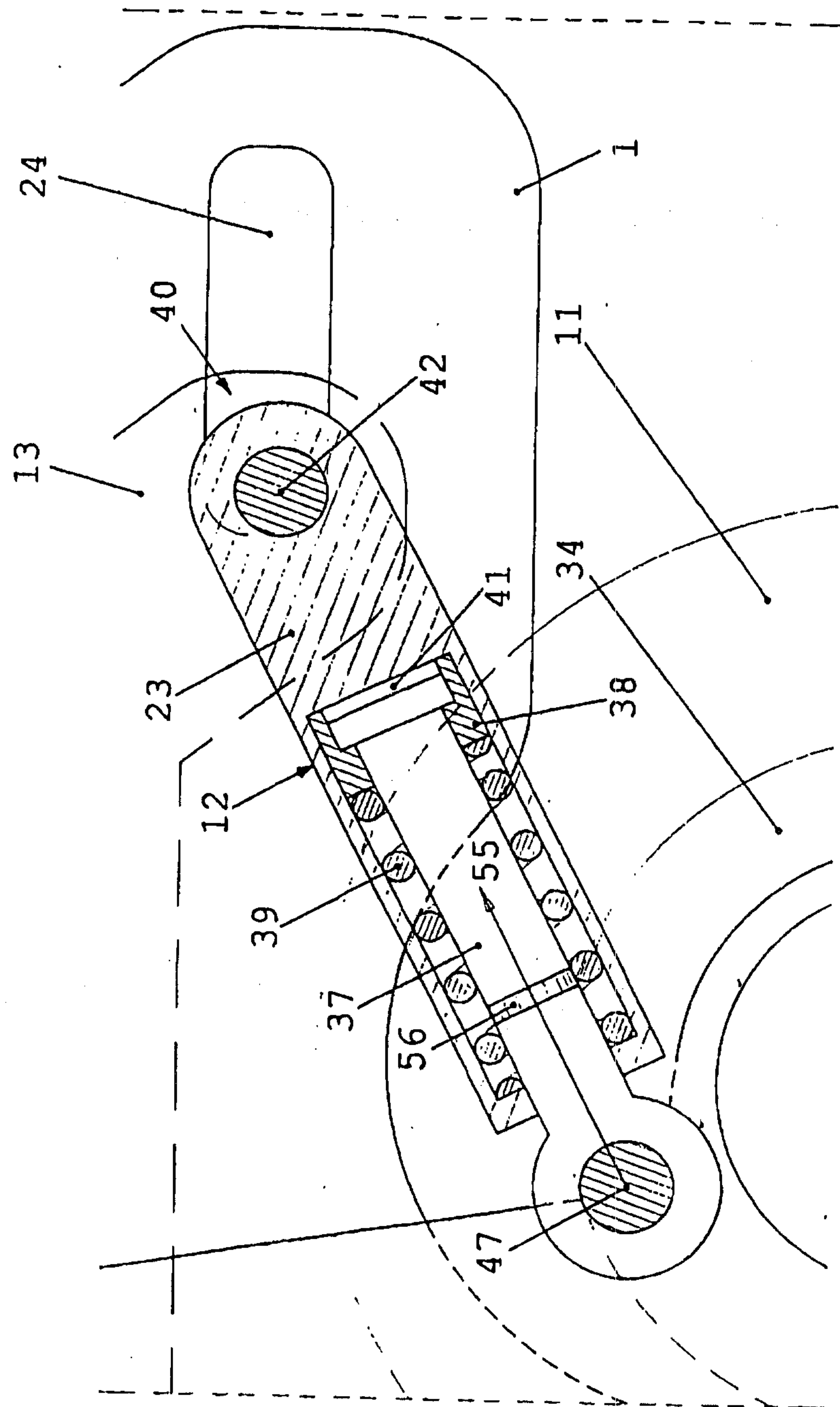


Fig. 7

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

8/11

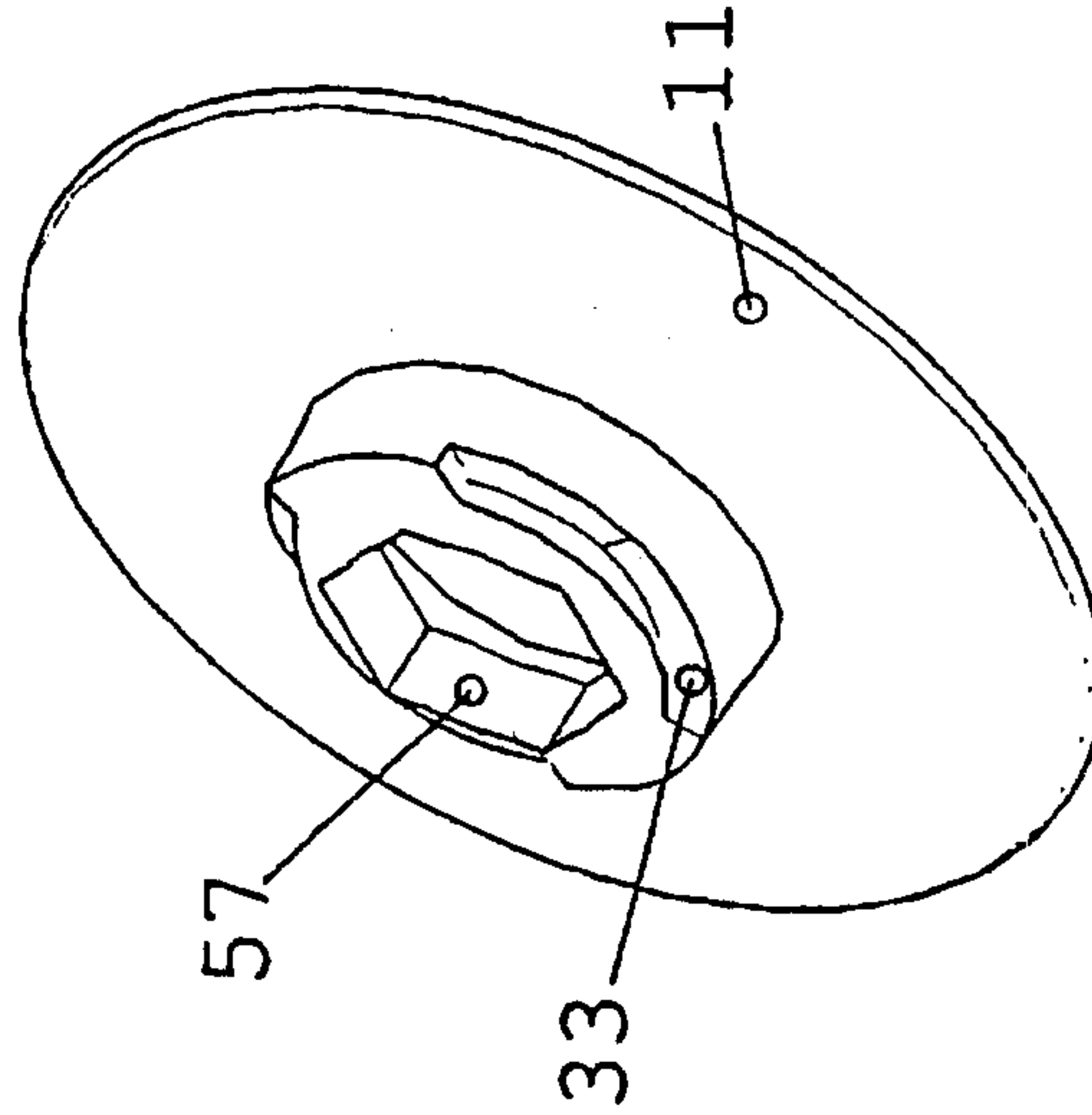


Fig. 8

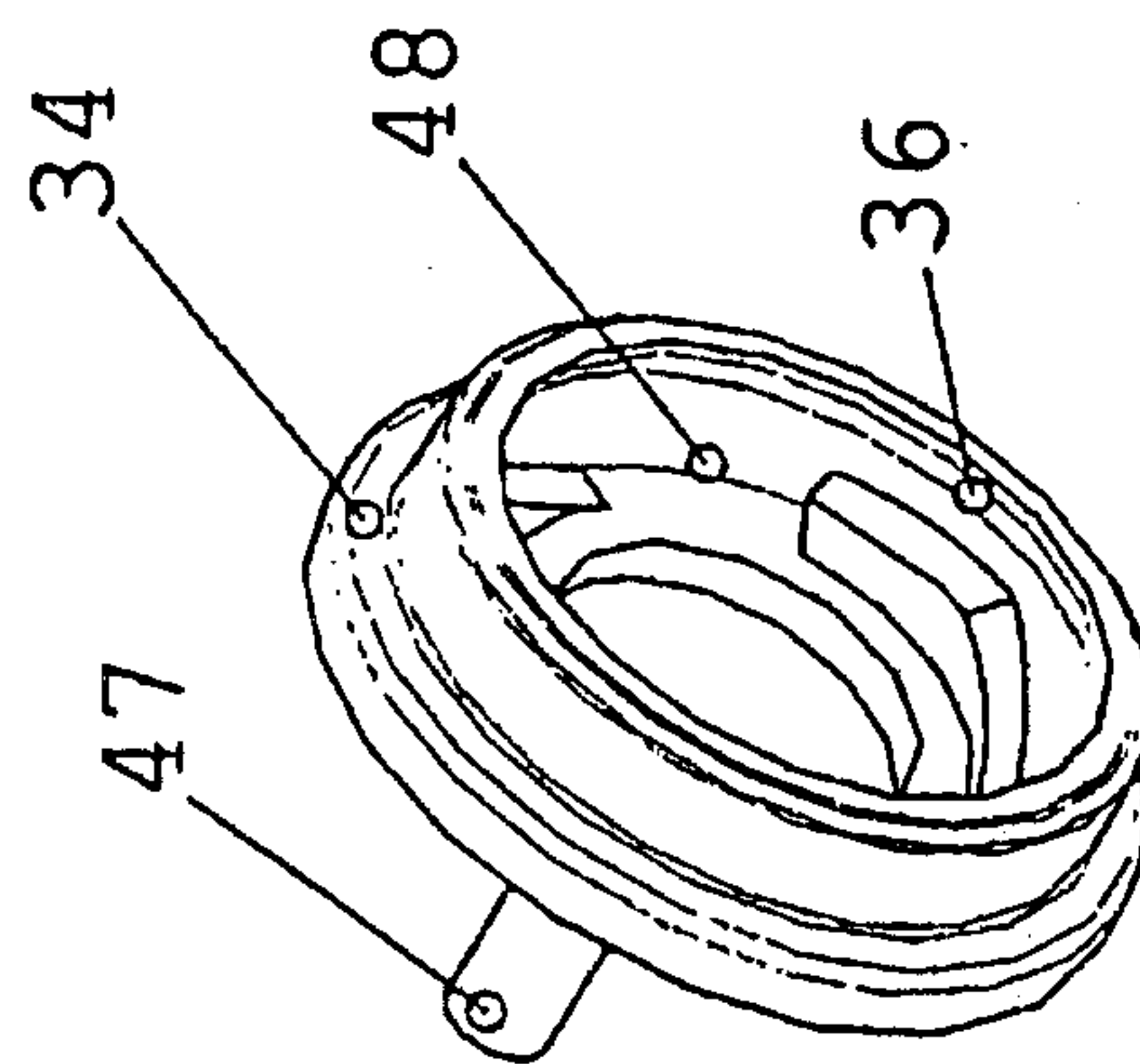


Fig. 9

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

9/11

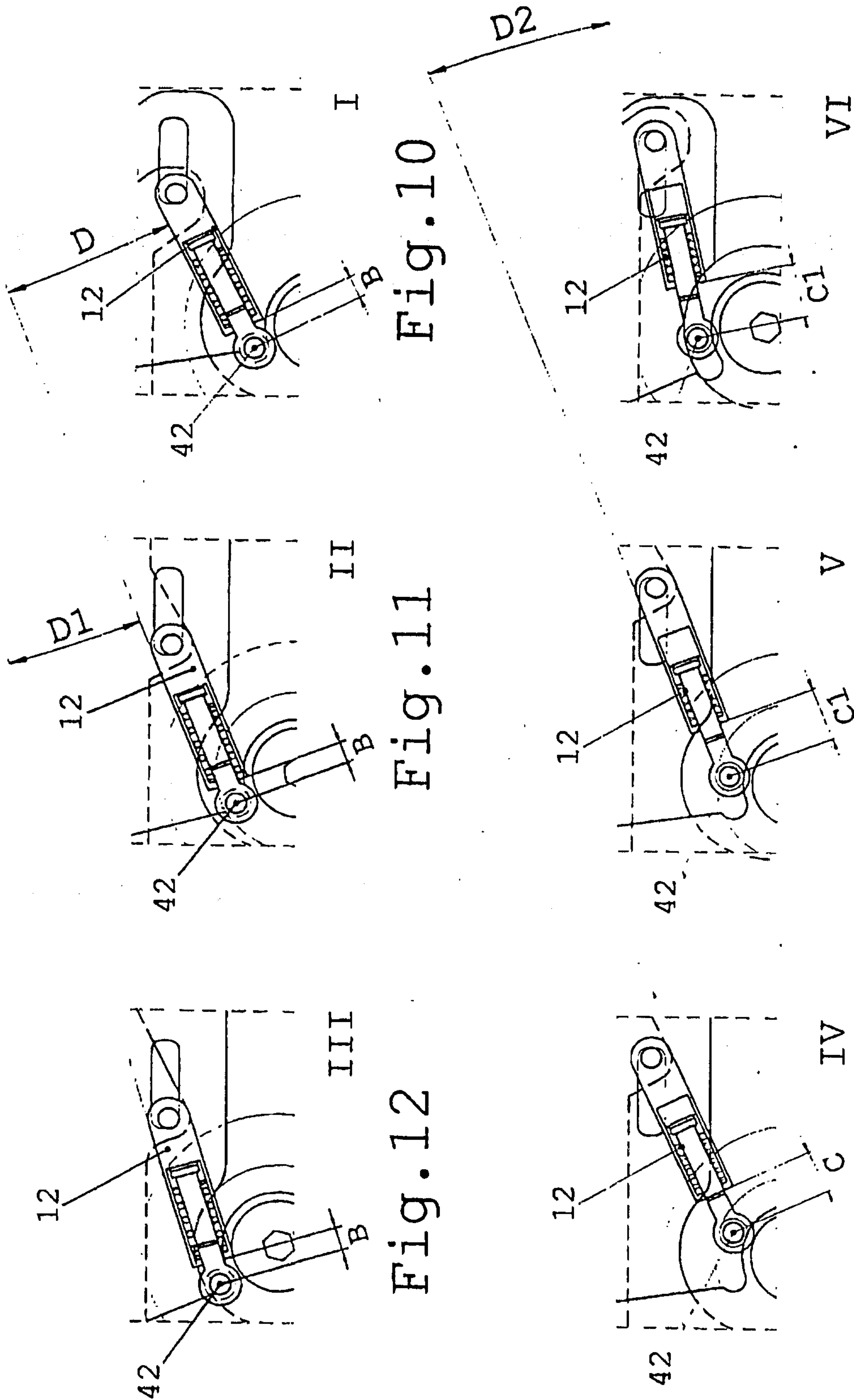


Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

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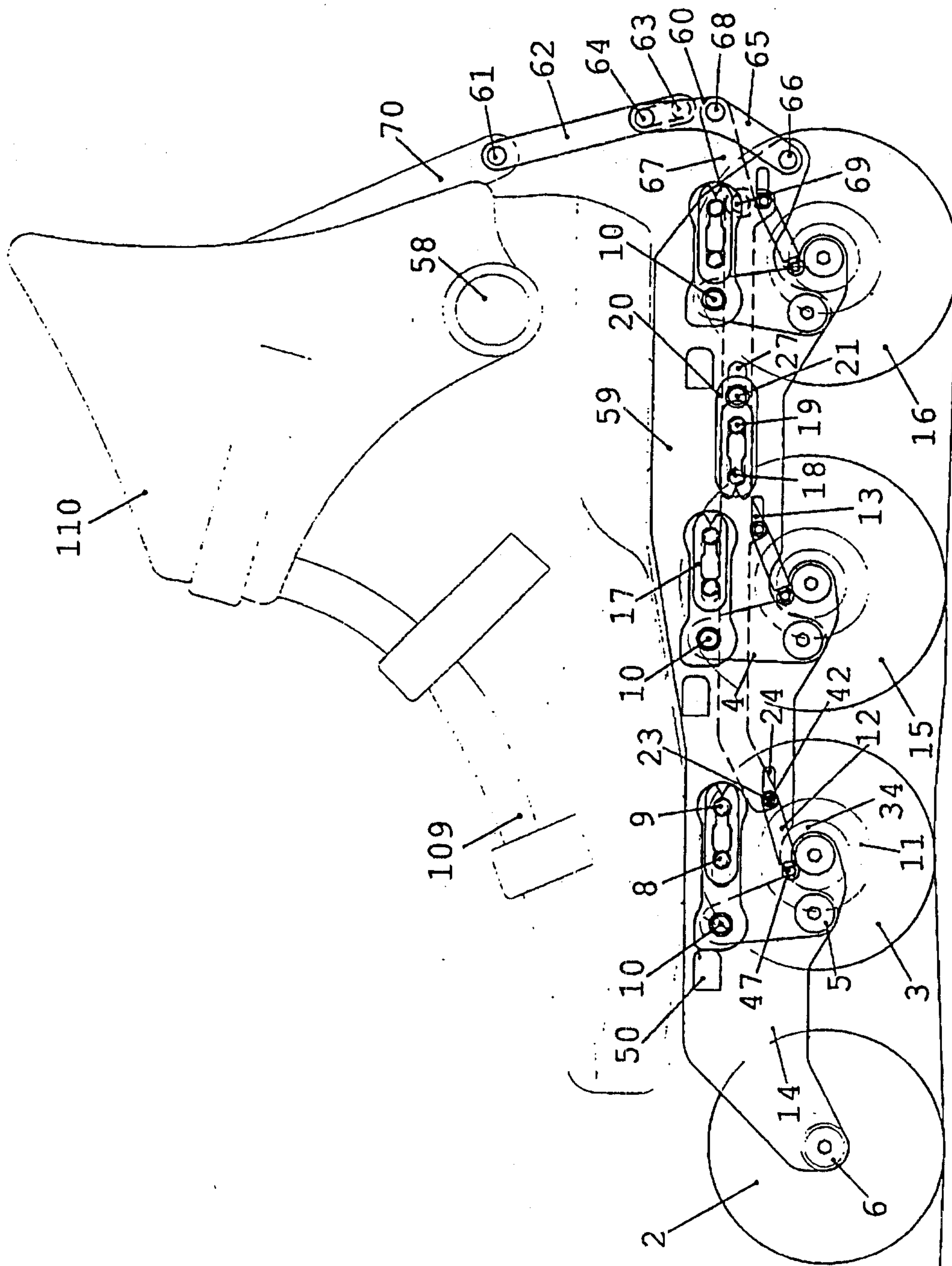


Fig. 16

SUBSTITUTE SHEET (RULE 26)

WO 99/36142

PCT/SE99/00033

11/11

