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(54) Height adjustable footrest

Höhenverstellbare Fußstütze

Repose-pied réglable en hauteur

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(73) Proprietor: **Score B.V.
9356 BX Tolbert (NL)**

(72) Inventors:
• **Mengerink, Tim
9356 BX Tolbert (NL)**
• **Broerse, Jan Wouter
9356 BX Tolbert (NL)**

(74) Representative: **V.O.
P.O. Box 87930
2508 DH Den Haag (NL)**

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Description

[0001] The invention relates to a footrest according to the introductory portion of claim 1.

[0002] Such a footrest is known from practice in the form of the "Basic 952" footrest commercially available from Score B.V. in Tolbert, The Netherlands. Such footrests are particularly used in situations where work surface height adjustment is not feasible and in particular if the seat would otherwise be too high above the floor so that the seat would hamper blood circulation through the legs. The "Basic 952" footrest has foot-operated instant height adjustment with a range of 8-29 cm and a load capacity of 100 kg. The "Basic 952" has 12 height levels, which can be easily adjusted while the user is seated using one foot to operate a pedal hinged to a base part. When the pedal is operated, the catch is retracted from engagement with the rack while the other foot is held in a position on top of the treadboard to counteract upward force exerted by springs urging the treadboard upwardly. Then the foot on top of the treadboard is pushed down if lowering of the footrest height is desired or lifted to allow the treadboard to rise if an increase of the footrest height is desired. When the desired height is reached, the pedal is released and the catch again engages the toothed rack to fix the footrest height at the level reached. Because the treadboard height is adjusted by changing the angle of mutually crossing leg structures under the treadboard, the footrest height can be adjusted without requiring a support permanently projecting to a maximum achievable height, which support projects above the treadboard when the footrest height is set to a lower level. Such a support projecting above the treadboard limits freedom of movement of the user's feet and can cause discomfort to a user when hit inadvertently with a foot or lower leg portion of the user.

[0003] From EP 1 351 214 another height adjustable footrest with mutually crossing leg structures is known. In this footrest, the adjustment structure includes a threaded rod rotatably mounted to the treadboard part and carrying an adjustment knob by which the rod can be rotated. The thread engages a nut mounted to an end portion of one of the leg structures, while the other leg structure is hinged to the treadboard part with its hinge axis in a fixed position. By rotating the knob, the distance between the hinge axes at the side of the treadboard is steplessly adjustable, so that the height of the footrest is steplessly adjustable. However, adjusting the height can only be operated by hand.

[0004] From WO86/06941 yet another height adjustable footrest with mutually crossing leg structures is known. In this footrest, the leg structures are not hinged to each other between end portions of the respective leg structures. Instead, the positions of the hinge axes at the side of the treadboard are fixed, which allows the treadboard to tilt. The footrest is adjustable in height by changing the distance between the lower ends of the leg structures by selecting a hole in an adjustment member ex-

tending from one lower leg structure end to the other lower leg structure end and engaging the selected hole with a pin on the other lower leg structure end. In this footrest, adjusting the height also requires manual intervention and the steps between selectable footrest heights are rather large.

[0005] From GB 982 538 a height adjustable platform with mutually crossing leg structures is known.

10 SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a height adjustable footrest with no support column projecting above the footrest, of which the height can be adjusted in small steps and with little effort, but in which the selected height is reliably maintained even if the footrest is subjected to large loads.

[0007] According to the invention, this object is achieved by providing a footrest according to claim 1.

[0008] Because the teeth of the rack each project from a base to a top in a direction transverse to the engagement directions to a counter surface facing the rack and, in the protruded position in which the catch and the rack are mutually engaged, the catch projects into a space between the rack and the counter surface, the catch is reliably held in engagement with the teeth even if resultant forces urge the catch away from the rack. This in turn allows the teeth of the rack to be relatively low and/or shaped to resist high shear forces, so that a required tooth load bearing resistance can be achieved with fine teeth and accordingly a large number of teeth per unit of length, which allows adjusting the height in small steps. This is of particular relevance in height adjustment of support structures with pivotable, mutually crossing leg structures, because in such structures, when the footrest is in a low height setting, loads exerted on the adjustment structure are typically very high and a small adjustment at the adjustment structure results in a relatively large height change.

[0009] Particular elaborations and embodiments of the invention are set forth in the dependent claims.

[0010] Further features, effects and details of the invention appear from the detailed description and the drawings.

45 BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a frontal view of an example of a footrest according to the invention with a treadboard being shown in cut-away fashion;

Fig. 2 is a side view of the footrest according to Fig. 1 with the treadboard shown in cut-away fashion;

Fig. 3 is a cross-sectional view along the line III-III in Fig. 2 without the treadboard;

Fig. 4 is a view according to Fig. 3, with the footrest in a lowered position;

Fig. 5 is a cross-sectional view along the line V-V in Fig. 1 without the treadboard;

Fig. 6 is a top view of the footrest according to Figs. 1-5 without the treadboard;

Fig. 7 is an enlarged view of detail VII in Fig. 6;

Fig. 8 is an enlarged view of detail VIII in Fig. 3; and

Fig. 9 is an enlarged view of detail IX in Fig. 5.

DETAILED DESCRIPTION

[0012] Below, an example of a footrest according to the invention shown in the drawings is described with a discussion of its particular features more in general. Examples of alternatives and variants within the framework of the invention are discussed as well.

[0013] The footrest shown in the drawings has a treadboard part 1 with a treadboard 14 and a treadboard frame 15, and a support structure 2 under the treadboard part 1 supporting the treadboard part 1. The support structure 2 has an adjustment structure 3 for adjusting the height at which the treadboard 1 is supported by the support structure 2. The treadboard 14 is pivotable relative to the treadboard frame 15 about a pivot axis 22.

[0014] The support structure 2 has two leg structures 4, 5. A first one of the leg structures 4 has two legs 6, 7 and shafts 10, 11 interconnecting its legs 6, 7. A second one of the leg structures 5 has two legs 8, 9 and shafts 12, 13 interconnecting its legs 8, 9. It is noted that one or both of the leg structures may also have a different number of legs, e.g. one or three legs, which may be equipped with foot members or connecting members e.g. in T-bar form and that the legs may be of any suitable cross-section, e.g. circular, T or I shaped or in the form of for instance (sandwich) plate shaped members. The legs 6-9 are hinged to the frame 15 of the treadboard part 1 about mutually parallel and spaced apart hinge axes 16, 17. As in the present example, the hinge axes are preferably located at generally opposite ends of the treadboard part so that relatively long leg structures can be accommodated and a large adjustment range (preferably more than 18 or 20 cm) is obtained. The leg structures 4, 5 cross each other in a position spaced from the hinge axes 16, 17 and are hinged to each other about a central hinge axis 18 at the crossing and parallel to the hinge axes 16, 17. The leg structures 4, 5 are also hinged to a base part 19 about base hinge axes 20, 21 parallel to the other hinge axes 16-18 and mutually spaced apart.

[0015] It is noted that the central hinge axis may be left out if a tilting treadboard part is desired. Alternatively, the base hinge axes and the base part may be left out. The leg structures do not need to intersect, but may cross along each other at a mutual distance as mutually skew lines.

[0016] The adjustment structure 3 is coupled to and extends between end portions of the leg structures 4, 5 at the treadboard side of the leg structures 4, 5 for adjusting the spacing between the hinge axes 16, 17 at the

treadboard side of the leg structures 4, 5. The adjustment structure 3 has a first adjustment member 23 coupled to the end portion of the leg structure 4. The first adjustment member has toothed racks 25, 26 oriented in longitudinal directions 28. A second adjustment member 24 of the adjustment structure 3 is coupled to the end portion of the other leg structure 5 and has a catch 27 displaceable along the racks 25, 26 and arranged for engagement with the racks 25, 26 in selectable positions along the racks 25, 26.

[0017] The catch 27 is displaceable relative to the racks 25, 26 in engagement directions 29 transverse (preferably perpendicular) to the longitudinal direction 28 between a protruded position as shown in the drawings in which the catch 27 and the racks 25, 26 are mutually engaged and a retracted position in which the catch 27 and the racks 25, 26 are mutually released.

[0018] By disengaging the catch 27 from the racks 25, 26 and engaging the catch 27 with the racks 25, 26 in another position, the overall length of the adjustment structure 3, and accordingly the distance between the hinge axes 16, 17 at the treadboard side of the leg structures 4, 5, can be changed as is illustrated by Figs. 3 and 4. With this change, also the vertical distance between the hinge axes 16, 20 and 17, 21 is changed so that the height setting of the footrest is changed. On one side of the treadboard frame 15 and the base part 19, the leg structures are hinged about axes 17, 21 in fixed positions, whereas on the opposite side, the shafts 10, 13 are slidably guided in slots 39-42 for allowing the distance between horizontally opposite hinge axes 16, 17 and 20, 21 to be changed.

[0019] As can be seen in Fig. 4, in the lowest height setting, the leg structures 4 and 5 have been pivoted into an orientation almost parallel to the longitudinal direction 28 of the adjustment structure 3, in which direction the length of the adjustment structure 3 is adjustable. In view of this effect, when the footrest is in a low height setting, loads exerted on the adjustment structure are typically very high and a small adjustment at the adjustment structure 3 results in a relatively large height change. Therefore, a rack in which a combination of a high tooth load resistance is combined with teeth with a small pitch is of particular relevance in height adjustment of support structures with pivotable, mutually crossing leg structures.

[0020] The teeth 30 of the racks 25, 26 each project from a base 31 to a top 32 in a direction 33 transverse (preferably perpendicular) to the engagement directions 29 to a counter surface 26, 25 facing the respective rack 25, 26. In the protruded position in which the catch 27 and the racks 25, 26 are mutually engaged, the catch 27 projects into a space 34 between the rack 25, 26 and the counter surface 26, 25 and is in contact with the counter surface 26, 25. In the present example, the racks 25, 26 each form the counter surface facing the other rack, but the counter surface may in principle also be of a different design, for instance in the form of a smooth surface.

[0021] Because the catch 27 engages the racks 25, 26 in a direction transverse to the direction in which the teeth 30 project from the respective bases thereof, tooth pressure components urging the catch away from the respective teeth do not operate in a direction contrary to the engagement direction, but transverse thereto and result in the catch 27 being pressed against the counter surface. In the present example the tooth pressure components urging the catch 27 away from the racks 25, 26 cancel each other out. Thus, the catch 27 is reliably prevented from becoming dislodged from the racks 25, 26 due to tooth pressure urging the catch 27 away from the respective rack 25, 26. This in turn allows the teeth 30 of the racks 25, 26 to be relatively low and/or shaped to resist high shear forces, so that a required tooth load bearing resistance can be achieved with fine teeth and accordingly a large number of teeth per unit of length. This allows adjusting the height in small steps.

[0022] For bringing and keeping the catch 27 in engagement with the racks 25, 26, a bolt 35 projects from a bridge 36 of the treadboard frame 15 through strips of the first and second adjustment members 23, 24 and carries a spring 37 biasing the strips against each other and towards a lower side of the bridge 36. The strips extend through a slit 38 in the bridge so that the distance over which the second adjustment 24 member can be urged away from the first adjustment member 23 is limited.

[0023] For bringing the catch 27 out of engagement with the racks 25, 26 the second adjustment member 24 has a release arm 43 which has an operating end projecting slightly above the treadboard 14. By pressing the release arm 43 down, at the catch 27, the second adjustment member 24 is pressed away from the first adjustment member 23 against a biasing force exerted by the spring 37, so that the catch 27 is brought out of engagement with the racks 25, 26. Since the spring 37 does not have to counteract tooth force components perpendicular to the racks 25, 26, the spring 37 can be dimensioned to exert a small biasing force and a small operating force is sufficient to urge the catch 27 out of engagement with the racks 25, 26. When the catch 27 is out of engagement with the racks 25, 26 torsion springs 44, 45 around the central hinge axis 18 and helical springs 46, 47 tensioned between treadboard ends of the leg structures 4, 5 bias the treadboard ends of the leg structures 4, 5 towards each other so the treadboard 14 is urged in upward direction. The treadboard level can easily be controlled by the same foot of a user with which also the release arm is operated. By pressing that foot down or lifting it, the user can change the height of the footrest to the desired height. By then releasing the release arm 43, the catch 27 is caused to be biased back into engagement with the racks 25, 26 by the spring 37. Thus, releasing and locking the adjustment structure 3 and adjusting the height of the footrest can easily be operated with one foot.

[0024] In the present example, the catch 27 and the release arm 43 are bolted to opposite sides of a strip of

the second adjustment member 24 by bolts 49.

[0025] By providing that, as in the present example, the counter surface facing the rack 25, 26 is formed by a second toothed rack 26, 25 respectively, and that the catch 27 also engages teeth 30 of the counter surface when the catch and the other, first toothed rack 25, 26 are mutually engaged, tooth pressure forces urging the racks 25, 26 and the catch 27 apart are balanced out generally centering the catch between the racks and the forces exerted via the catch 27 are distributed over two racks. This reduces the loads exerted onto each single rack 25, 26, so that a required overall load resistance can be achieved with smaller teeth and an even finer adjustment pitch can be achieved.

[0026] In the present example, the catch 27 has toothed faces with a plurality of teeth 48 with a pitch in the longitudinal direction 28 which, when the catch 27 and the racks 25, 26 are mutually engaged, engage teeth 30 of the toothed racks 25, 26 with a corresponding pitch in that longitudinal direction 28. By providing a plurality of pairs of mutually engaged teeth with a pitch in longitudinal direction, loads exerted via the catch 27 are distributed over a larger number of teeth, which are therefore loaded less and can be of smaller dimensions, which further allows reducing the adjustment pitch.

[0027] The racks 25, 26 are part of the first adjustment member 23 which is coupled to the end portion of the first leg structure 4. Flanks 50 of the teeth 30 of the toothed racks 25, 26 facing towards that leg structure end portion have a positive pressure angle α . Due to this positive pressure angle α , the teeth 30 can withstand a large load in the longitudinal direction. This also allows the teeth 30 to be dimensioned relatively small, so that a small pitch and accordingly a small adjustment pitch can be achieved. A positive pressure angle results in a relatively large tooth pressure component urging the catch 27 away from the respective rack 25, 26. In the present invention, a relatively large tooth pressure component urging the catch 27 away from the respective rack 25, 26 can be accepted since movement of the catch 27 away from the rack 25, 26 is limited by the counter surface (in the present example the opposite rack). The pressure angle is preferably larger than 5° and more preferably larger than 7° . The pressure angle is preferably smaller than 15° and more preferably smaller than 13° .

[0028] In the present example, the flanks of the teeth 30 of the toothed racks 25, 26 facing away from the leg structure end portion coupled to the first adjustment member 23 have a larger positive pressure angle than the positive pressure angle α of the flanks 50 that rest against teeth 48 of the catch 27 when the footrest is loaded with for instance the weight of the legs of a user. The asymmetric tooth shape further increases resistance of the teeth 30 against loads exerted in the longitudinal direction 28. Essentially the same considerations, but in a contrary longitudinal direction apply to the teeth 48 of the catch that are of a shape matching the interspaces between successive teeth 30 of racks 25, 26 and form an

essentially Christmas tree shaped configuration.

[0029] The shape of the teeth 48 of the catch 27 is identical to the shape of the teeth of the racks 25, 26. Thus, the teeth of the racks 25, 26 and the teeth 48 of the catch 27 are designed to the same load bearing capability and optimal use is made of the material available at a minimal pitch and occupying a minimal space.

[0030] In the present example, the adjustment structure is mounted to the treadboard part 1, which is advantageous because it allows both direct operation of the adjustment structure 3 and controlling the treadboard level with one foot. It is however also conceivable to provide the adjustment structure at the base side or base part of the support structure. The catch will then have to be operated in a different manner, for instance via a pedal mounted to a base part of the footrest or via an operating member mounted to the treadboard part and coupled to the catch via a flexible operating structure, such as a Bowden cable.

[0031] In the present example, the racks are arranged on inner surfaces of a slot in a strip of metal, preferably steel. Thus, a particularly flat construction is obtained that can be accommodated without adding much to the minimum height of the footrest. Moreover, such a flat construction is concealed from view particularly effectively, when mounted to the treadboard part 1 under the treadboard 14.

[0032] It is also possible to arrange the rack and the counter surface, which may also be a rack, in a different structure, for instance on mutually facing inner surfaces of a U-profile.

Claims

1. A height adjustable footrest comprising:

a treadboard part (1);
a support structure (2) comprising first and second leg structures (4, 5), each comprising at least one leg (6-9), the leg structures (4, 5) being hinged to the treadboard part (1) about mutually parallel and spaced apart hinge axes (16, 17), wherein the leg structures (4, 5) cross each other in a position spaced from said hinge axes (16, 17) and are at least hinged to each other about a further hinge axis (18) at said crossing and parallel to said hinge axes (16, 17) or to a base part about base hinge axes (20, 21) parallel to said hinge axes (16, 17) and mutually spaced apart; and
an adjustment structure (3) coupled to and extending between end portions of the leg structures (4, 5) at a treadboard side or at a base side of the leg structures (4, 5) for adjusting the spacing between the hinge axes (16, 17) at the treadboard side of the leg structures (4, 5), the adjustment structure (3) comprising a first adjust-

ment member (23) coupled to one of said end portions and having a toothed rack (25, 26) oriented in a longitudinal direction (28) and a second adjustment member (24) coupled to the other one of the end portions and comprising a catch (27) displaceable along the rack (25, 26) and arranged for engagement with the rack (25, 26) in selectable positions along the rack (25, 26), wherein at least the catch (27) or the rack (25, 26) is displaceable in engagement directions (29) transverse to said longitudinal direction (28) between a protruded position in which the catch (27) and the rack (25, 26) are mutually engaged and a retracted position in which the catch (27) and the rack (25, 26) are mutually released;

wherein the teeth (30) of the rack (25, 26) each project from a base (31) to a top (32) in a tooth height direction (33) transverse to said engagement directions (29) to a counter surface (26, 25) facing said rack (25, 26) and wherein, in the protruded position in which the catch (27) and the rack (25, 26) are mutually engaged, the catch (27) projects into a space (34) between the rack (25, 26) and the counter surface (26, 25) and contacts the counter surface (26, 25).

2. A footrest according to claim 1, wherein the counter surface (26, 25) is formed by a second rack (26, 25), the catch (27) also engaging teeth of the counter surface (26, 25) when the catch (27) and the other, first toothed rack (25, 26) are mutually engaged.

3. A footrest according to claim 1 or 2, wherein the catch (27) has a toothed face comprising at least two teeth (48) with a pitch in said longitudinal direction (28) which, when the catch (27) and the rack (25, 26) are mutually engaged, engage teeth (30) of the toothed rack (25, 26) with a corresponding pitch in said longitudinal direction (29).

4. A footrest according to any of the preceding claims, wherein flanks (50) of the teeth of the rack (25, 26) facing towards the leg structure end portion to which the adjustment member (23) comprising that rack (25, 26) is coupled have a positive pressure angle (α).

5. A footrest according to any of the preceding claims, wherein the racks (25, 26) are arranged on inner surfaces of a slot in a strip of metal, preferably steel.

6. A footrest according to any of the preceding claims, wherein the adjustment structure (3) is mounted to the treadboard part (1), preferably under a treadboard (14).

7. A footrest according to any of the preceding claims,

wherein at least in cross-section along a plane in longitudinal direction (28) perpendicular to the racks (25, 26), the teeth (48) of the catch (27) and the teeth of the racks (25, 26) have the same shape.

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Zahnstange (25, 26) ineinander eingreifen, die Arretierung (27) in einen Raum (34) zwischen der Zahnstange (25, 26) und der Gegenfläche (26, 25) hervorsteht und die Gegenfläche (26, 25) berührt.

Patentansprüche

1. Höhenverstellbare Fußstütze, umfassend:

ein Trittbrettteil (1);
eine Stützstruktur (2), umfassend erste und zweite Beinstrukturen (4, 5) mit jeweils mindestens einem Bein (6-9), welche Beinstrukturen (4, 5) an dem Trittbrettteil (1), um zueinander parallele und in einem Abstand voneinander angeordnete Gelenkachsen (16, 17) angelenkt sind, wobei die Beinstrukturen (4, 5) einander kreuzen in einer von den Gelenkachsen (16, 17) beabstandeten Position und mindestens aneinander angelenkt sind, um eine weitere Gelenkachse (18) an der Kreuzung und parallel zu den Gelenkachsen (16, 17) oder zu einem Basisteil um Basisgelenkachsen (20, 21) parallel zu den Gelenkachsen (16, 17) und in einem Abstand voneinander; und
eine Anpassungsstruktur (3), gekoppelt an und verlaufend zwischen Endabschnitten der Beinstrukturen (4, 5) an einer Trittbrettseite oder an einer Basisseite der Beinstrukturen (4, 5) zum Anpassen des Abstands zwischen den Gelenkachsen (16, 17) an der Trittbrettseite der Beinstrukturen (4, 5), die Anpassungsstruktur (3) umfassend ein erstes Anpassungselement (23), gekoppelt an einen der Endabschnitte und versehen mit einer Zahnstange (25, 26), ausgerichtet in einer Längsrichtung (28), und ein zweites Anpassungselement (24), gekoppelt an den anderen der Endabschnitte und umfassend eine Arretierung (27), verschiebbar entlang der Zahnstange (25, 26) und angeordnet zum Eingreifen mit der Zahnstange (25, 26) in wählbaren Positionen entlang der Zahnstange (25, 26), wobei mindestens die Arretierung (27) oder die Zahnstange (25, 26) verschiebbar ist in Eingreifrichtungen (29) quer zu der Längsrichtung (28) zwischen einer vorspringenden Position, in der die Arretierung (27) und die Zahnstange (25, 26) ineinander eingreifen, und einer zurückgezogenen Position, in der die Arretierung (27) und die Zahnstange (25, 26) voneinander gelöst sind; wobei die Zähne (30) der Zahnstange (25, 26) jeweils von einer Basis (31) zu einer Oberseite (32) in einer Zahnhöhenrichtung (33) quer zu den Eingreifrichtungen (29) zu einer Gegenfläche (26, 25) gegenüber der Zahnstange (25, 26) hervorsteht, und wobei in der vorspringenden Position, in der die Arretierung (27) und die

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2. Fußstütze nach Anspruch 1, wobei die Gegenfläche (26, 25) von einer zweiten Zahnstange (26, 25) gebildet wird, die Arretierung (27) ebenfalls eingreifend in Zähne der Gegenfläche (26, 25), wenn die Arretierung (27) und die andere erste Zahnstange (25, 26) ineinander eingreifen.

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3. Fußstütze nach Anspruch 1 oder 2, wobei die Arretierung (27) eine gezahnte Fläche hat, umfassend mindestens zwei Zähne (48) mit einer Neigung in der Längsrichtung (28), die, wenn die Arretierung (27) und die Zahnstange (25, 26) ineinander eingreifen, in Zähne (30) der Zahnstange (25, 26) mit einer entsprechenden Neigung in der Längsrichtung (29) eingreifen.

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4. Fußstütze nach einem der vorhergehenden Ansprüche, wobei Flanken (50) der Zähne der Zahnstange (25, 26), gerichtet zu dem Endabschnitt der Beinstruktur, an den das Anpassungselement (23), das diese Zahnstange (26, 26) umfasst, gekoppelt ist, einen positiven Druckwinkel (α) haben.

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5. Fußstütze nach einem der vorhergehenden Ansprüche, wobei die Zahnstangen (25, 26) an Innenflächen eines Schlitzes in einem Streifen aus Metall, bevorzugt Stahl, angeordnet sind.

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6. Fußstütze nach einem der vorhergehenden Ansprüche, wobei die Anpassungsstruktur (3) an dem Trittbrettteil (1), bevorzugt unter einem Trittbrett (14), montiert ist.

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7. Fußstütze nach einem der vorhergehenden Ansprüche, wobei mindestens im Querschnitt entlang einer Ebene in Längsrichtung (28) senkrecht zu den Zahnstangen (25, 26) die Zähne (48) der Arretierung (27) und die Zähne der Zahnstangen (25, 26) dieselbe Form haben.

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Revendications

1. Repose-pieds ajustable en hauteur comprenant :

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une partie de marche (1) ;
une structure de support (2) comprenant des première et seconde structures de patte (4, 5), comprenant chacune au moins une patte (6-9), les structures de patte (4, 5) étant articulées par rapport à la partie de marche (1) autour d'axes de charnière mutuellement parallèles et espa-

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- cés (16, 17), dans lequel les structures de patte (4, 5) se croisent dans une position espacée desdits axes de charnière (16, 17) et sont au moins articulées entre elles autour d'un autre axe de charnière (18) au niveau dudit croisement et parallèles auxdits axes de charnière (16, 17) ou à la partie de base autour des axes de charnière de base (20, 21) parallèles auxdits axes de charnière (16, 17) et mutuellement espacés ; et
- une structure d'ajustement (3) couplée à et s'étendant entre des parties d'extrémité des structures de patte (4, 5) du côté de la marche ou du côté de la base des structures de patte (4, 5) pour ajuster l'espacement entre les axes de charnière (16, 17) du côté de la marche des structures de patte (4, 5), la structure d'ajustement (3) comprenant un premier élément d'ajustement (23) couplé à l'une desdites parties d'extrémité et ayant une crémaillère dentée (25, 26) orientée dans une direction longitudinale (28) et un second élément d'ajustement (24) couplé à l'autre des parties d'extrémité et comprenant un cliquet (27) déplaçable de le long de la crémaillère (25, 26) et agencé pour se mettre en prise avec la crémaillère (25, 26) dans des positions pouvant être sélectionnées le long de la crémaillère (25, 26), dans lequel au moins le cliquet (27) ou la crémaillère (25, 26) peut être déplacé(e) dans des directions de mise en prise (29) transversales par rapport à ladite direction longitudinale (28) entre une position en saillie dans laquelle le cliquet (27) et la crémaillère (25, 26) sont mutuellement mis en prise et une position rétractée dans laquelle le cliquet (27) et la crémaillère (25, 26) sont mutuellement libérés ; dans lequel les dents (30) de la crémaillère (25, 26) font chacune saillie d'une base (31) jusqu'à une partie supérieure (32) dans une direction de hauteur de dent (33) transversale par rapport auxdites directions de mise en prise (29) vers une contre-surface (26, 25) faisant face à ladite crémaillère (25, 26), et dans lequel, dans la position en saillie dans laquelle le cliquet (27) et la crémaillère (25, 26) sont mutuellement mis en prise, le cliquet (27) fait saillie dans un espace (34) entre la crémaillère (25, 26) et la contre-surface (26, 25) et est en contact avec la contre-surface (26, 25).
2. Repose-pieds selon la revendication 1, dans lequel la contre-surface (26, 25) est formée par une seconde crémaillère (26, 25), le cliquet (27) mettant également en prise des dents de la contre-surface (26, 25) lorsque le cliquet (27) et l'autre première crémaillère dentée (25, 26) sont mutuellement mis en prise.
3. Repose-pieds selon la revendication 1 ou 2, dans lequel le cliquet (27) a une face dentée comprenant au moins deux dents (48) avec un pas dans ladite direction longitudinale (28) qui, lorsque le cliquet (27) et la crémaillère (25, 26) sont mutuellement mis en prise, mettent en prise des dents (30) de la crémaillère dentée (25, 26) avec un pas correspondant dans ladite direction longitudinale (29).
4. Repose-pieds selon l'une quelconque des revendications précédentes, dans lequel les flancs (50) des dents de la crémaillère (25, 26) orientés vers la partie d'extrémité de structure de patte à laquelle l'élément d'ajustement (23) comprenant cette crémaillère (25, 26) est couplé, ont un angle de pression positive (α).
5. Repose-pieds selon l'une quelconque des revendications précédentes, dans lequel les crémaillères (25, 26) sont agencées sur des surfaces internes d'une fente dans une bande de métal, de préférence de l'acier.
6. Repose-pieds selon l'une quelconque des revendications précédentes, dans lequel la structure d'ajustement (3) est montée sur la partie de marche (1), de préférence sous une marche (14).
7. Repose-pieds selon l'une quelconque des revendications précédentes, dans lequel au moins en section transversale le long d'un plan dans la direction longitudinale (28) perpendiculaire aux crémaillères (25, 26), les dents (48) du cliquet (27) et les dents des crémaillères (25, 26) ont la même forme.

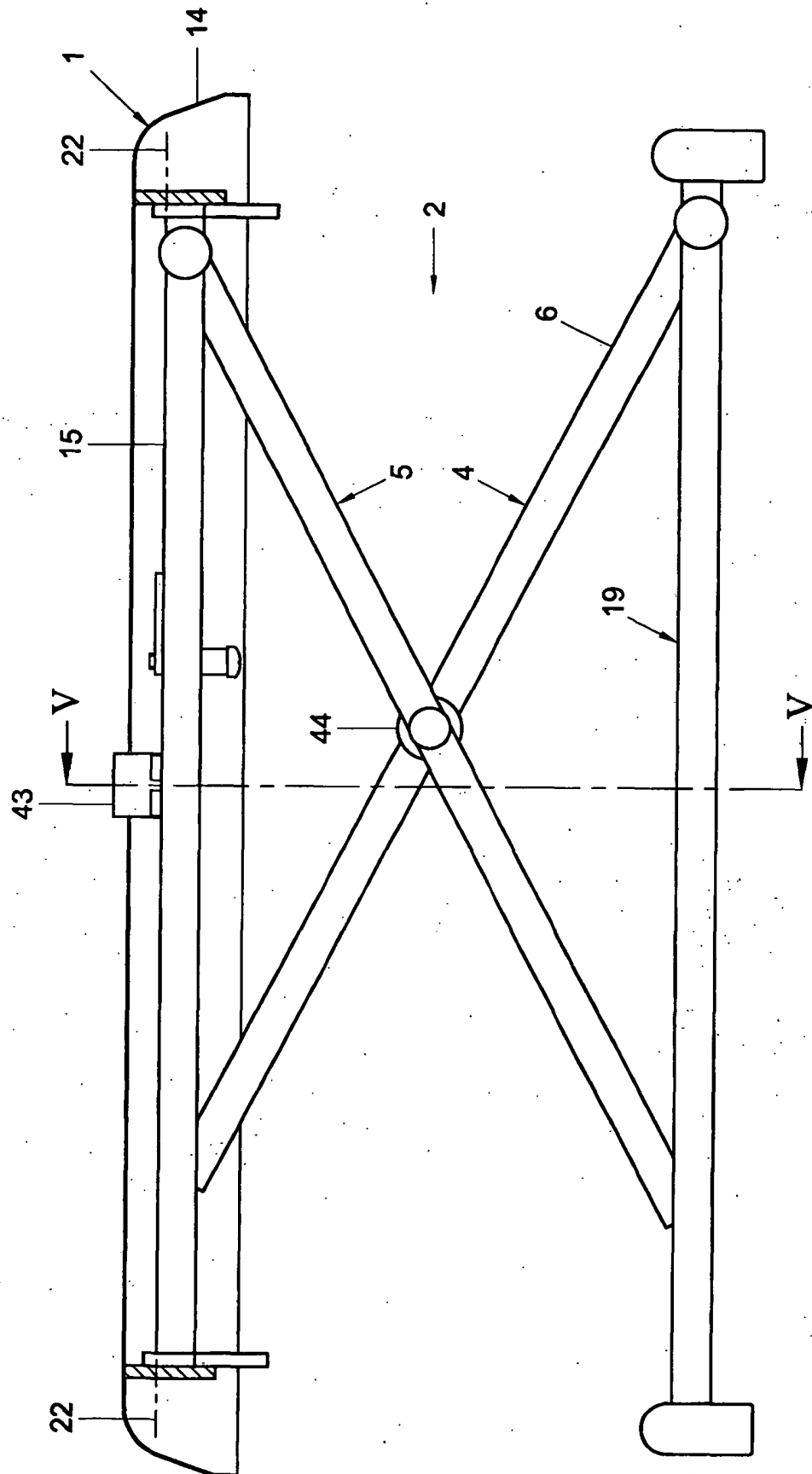


Fig. 1

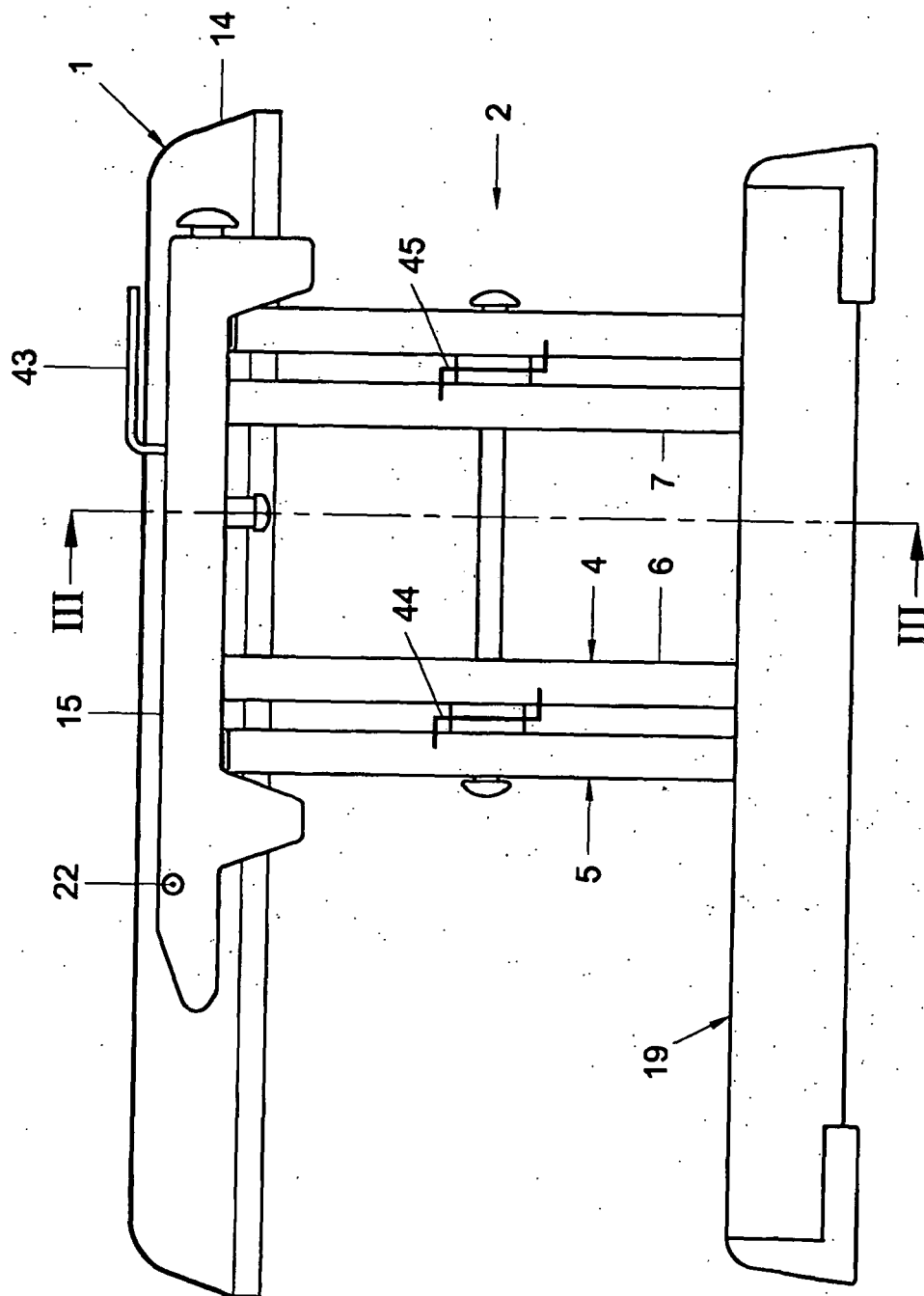


Fig. 2

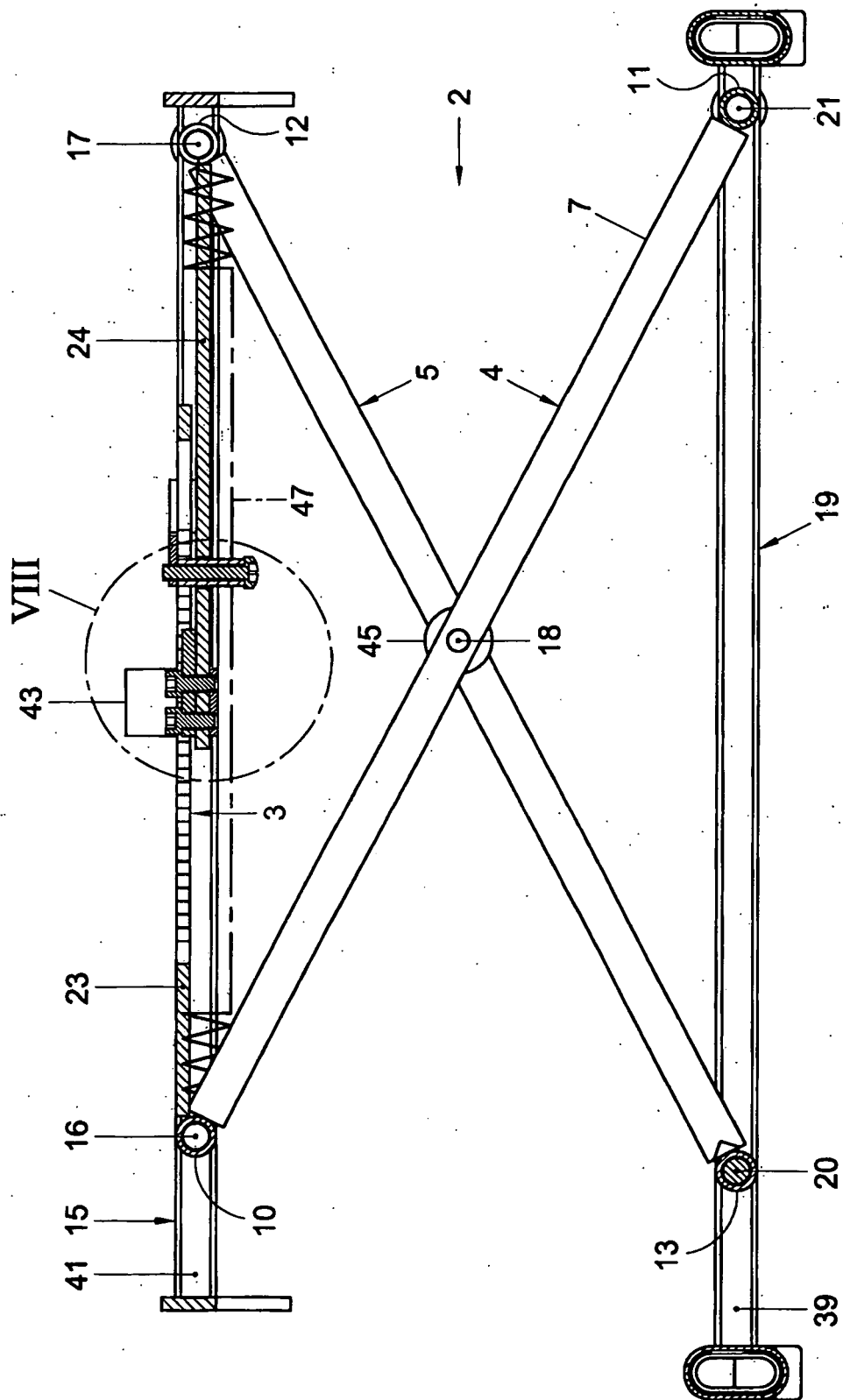


Fig. 3

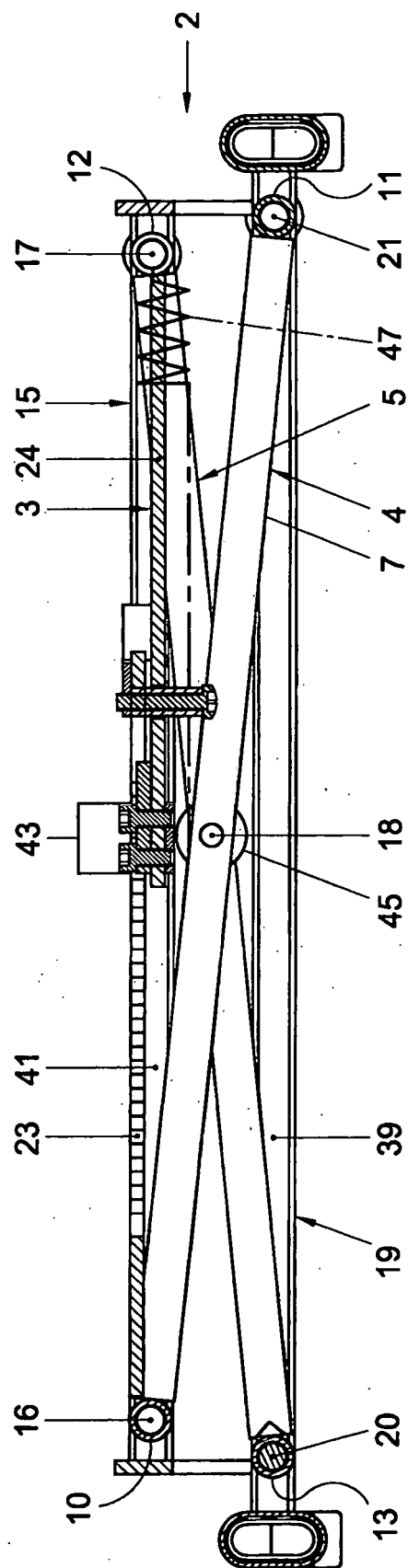


Fig. 4

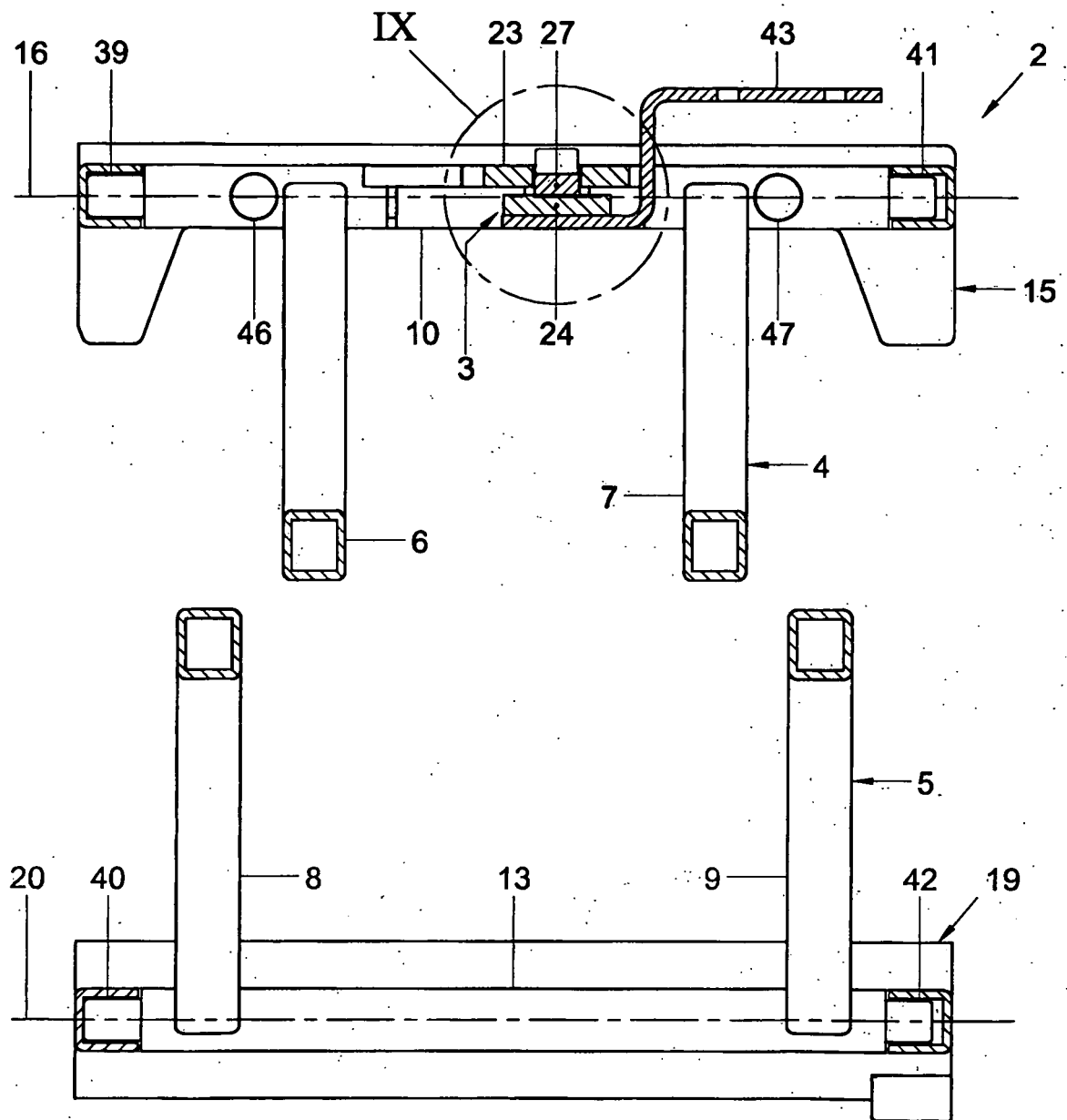


Fig. 5

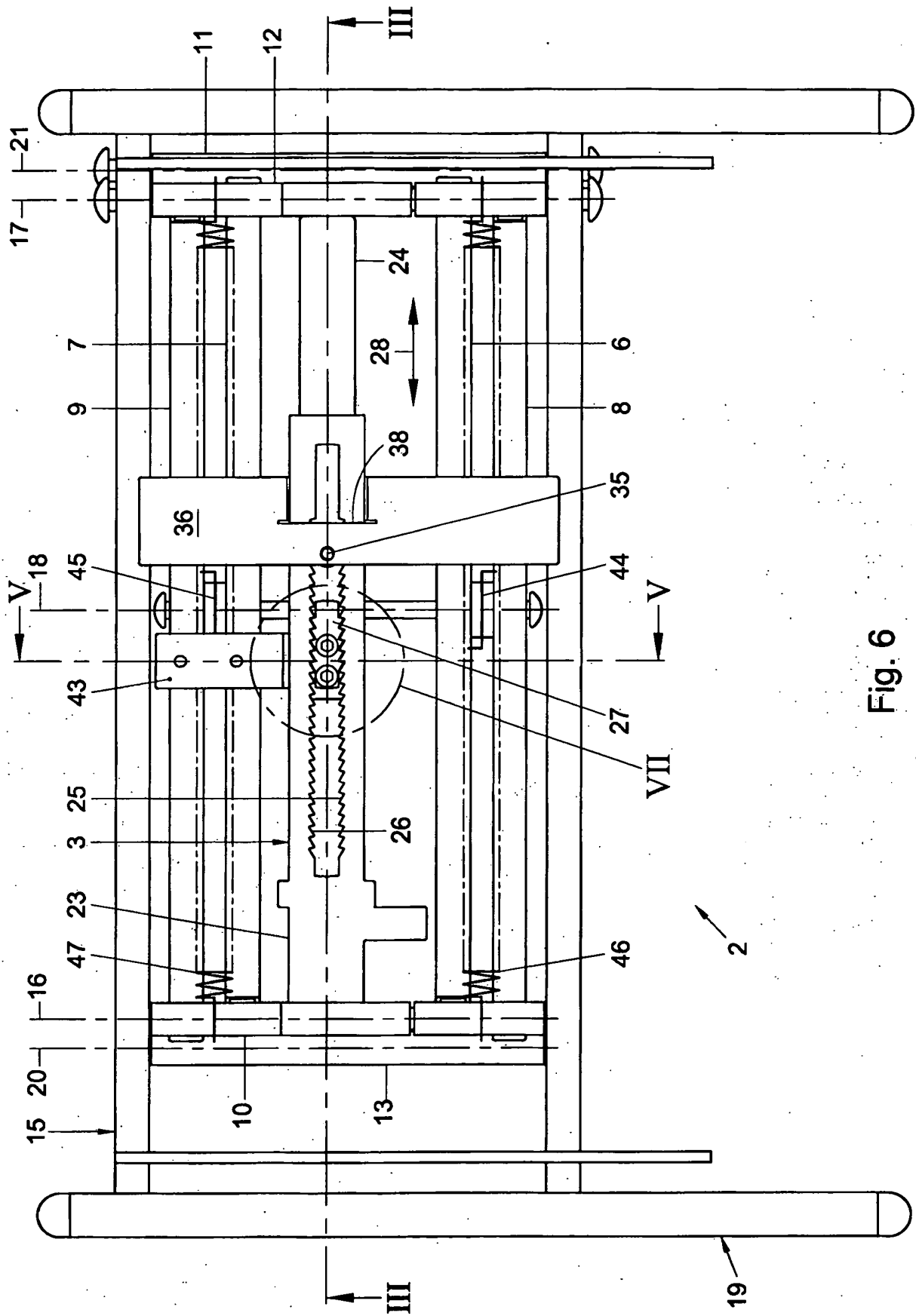


Fig. 6

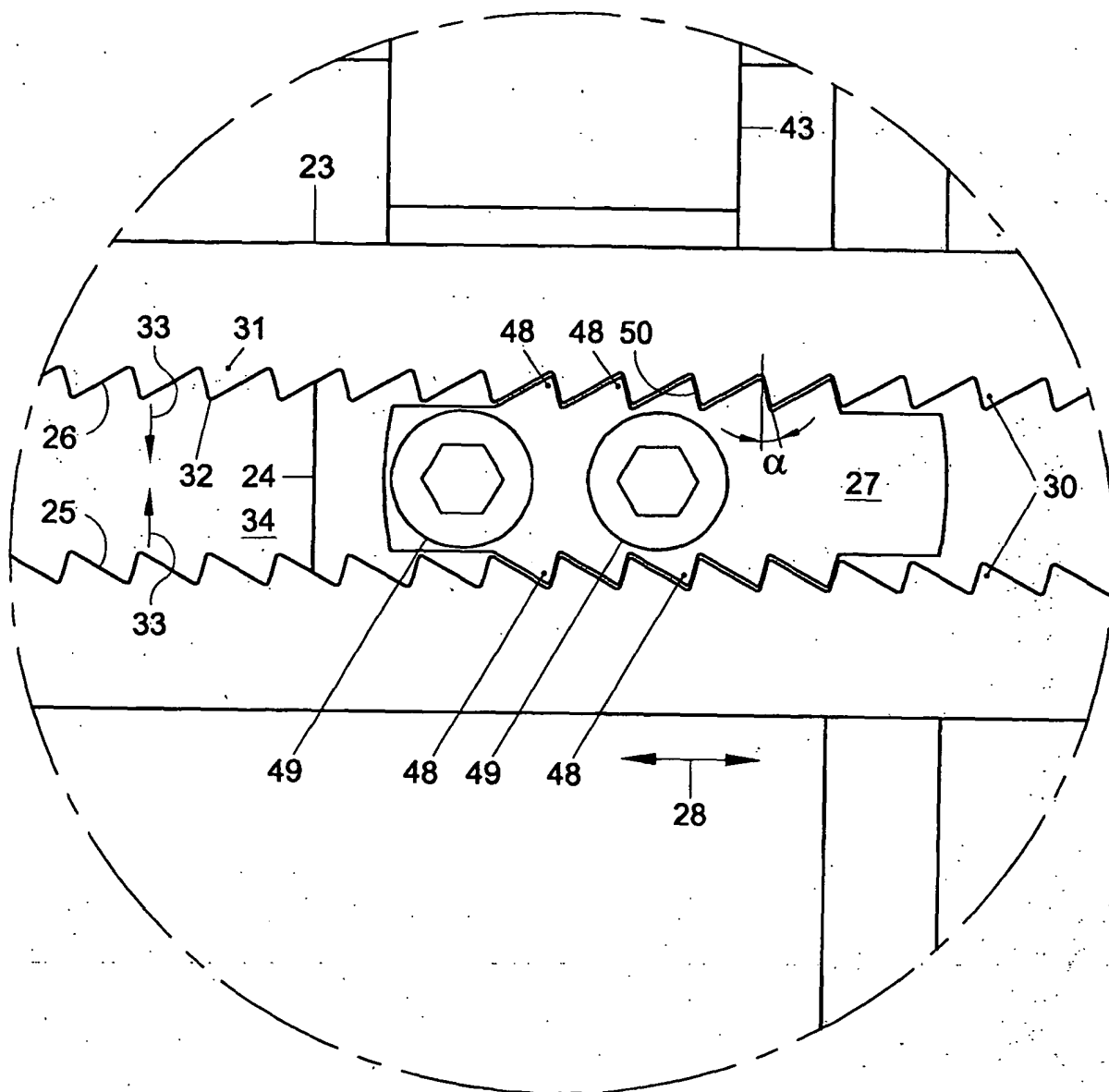


Fig. 7

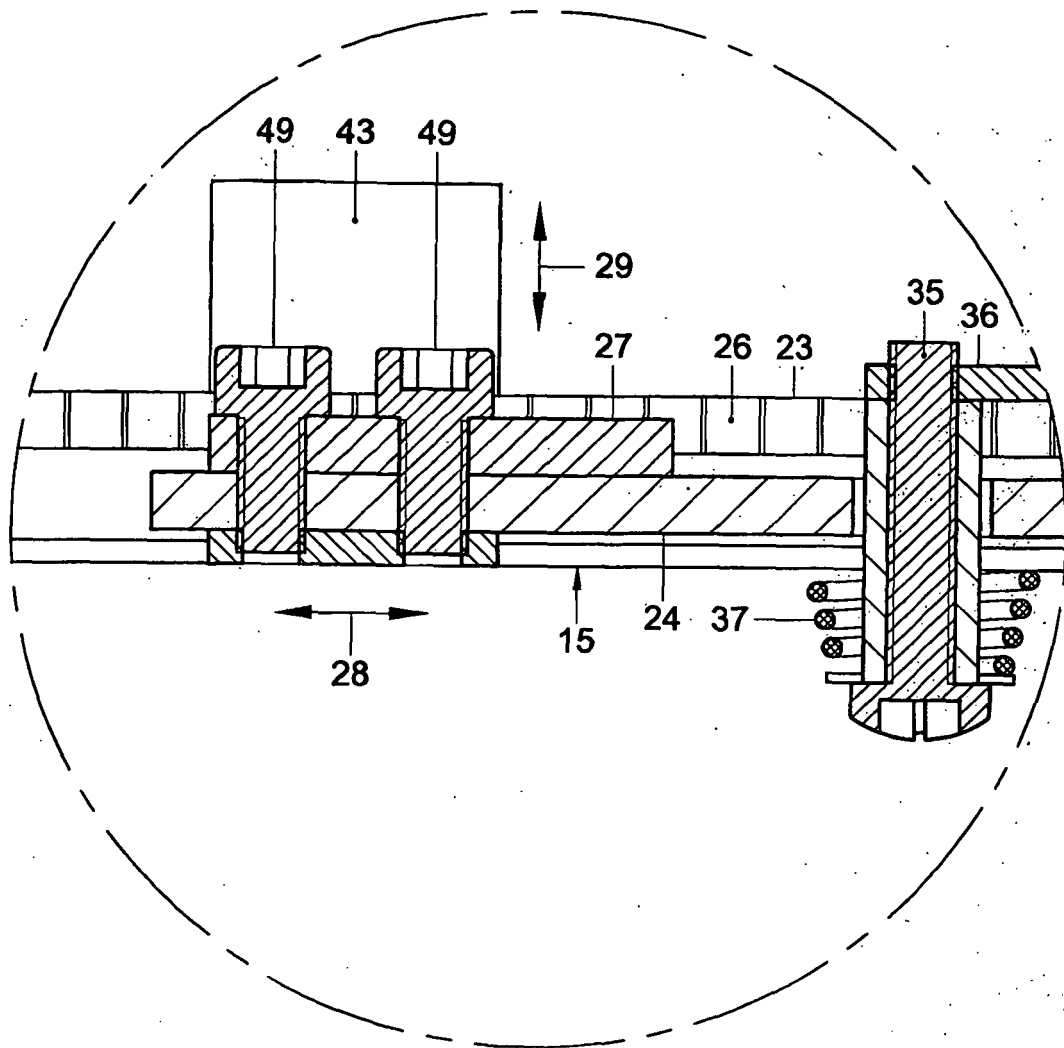


Fig. 8

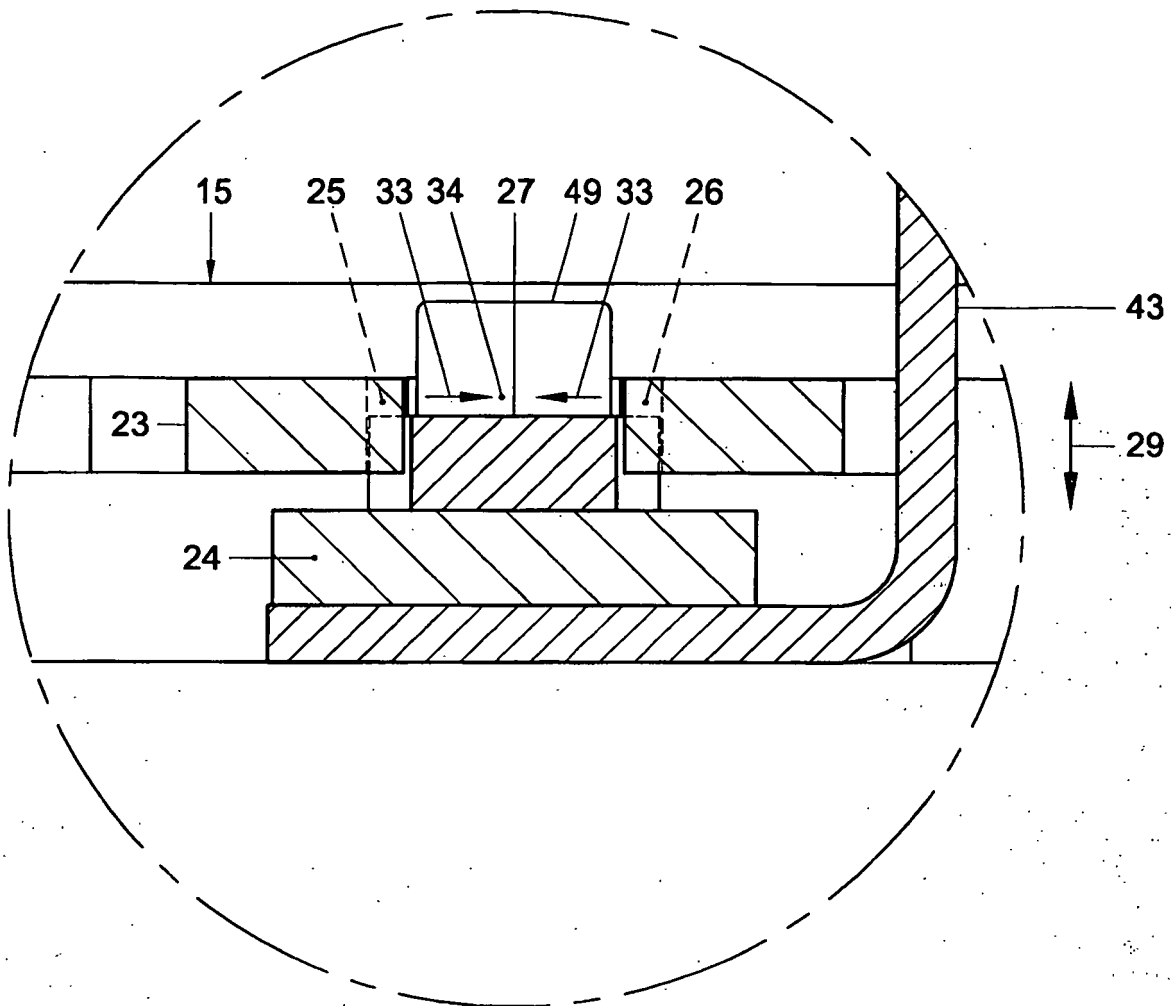


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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