

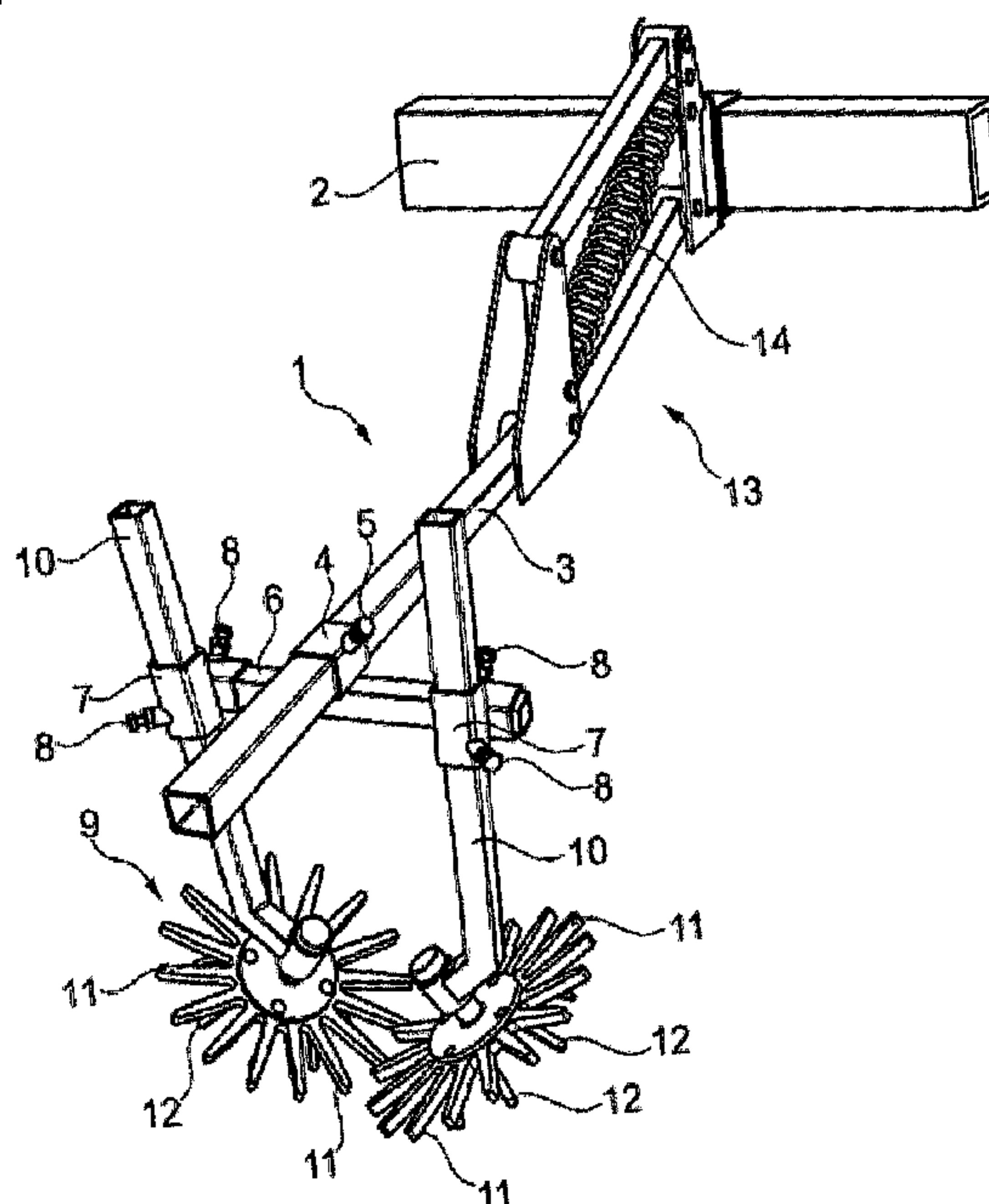


(86) Date de dépôt PCT/PCT Filing Date: 2015/12/22
(87) Date publication PCT/PCT Publication Date: 2016/09/22
(85) Entrée phase nationale/National Entry: 2017/09/08
(86) N° demande PCT/PCT Application No.: DE 2015/000610
(87) N° publication PCT/PCT Publication No.: 2016/146091
(30) Priorité/Priority: 2015/03/16 (DE10 2015 003 441.3)

(51) Cl.Int./Int.Cl. *A01B 39/18* (2006.01),
A01B 39/08 (2006.01)
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(54) Titre : OUTIL POUR TRAVAILLER LE SOL; PROCEDE POUR GUIDER EN HAUTEUR AU MOINS UNE
SARCLEUSE A DOIGTS SUR UN RANG DANS UNE CULTURE EN RANGS
(54) Title: SOIL CULTIVATION MACHINE; METHOD FOR HEIGHT GUIDANCE OF AT LEAST ONE FINGER WEEDING
TOOL OVER A ROW IN A ROW CROP

Fig. 1



(57) **Abrégé/Abstract:**

The invention relates to a soil-working device (1) for row plantations, which has a frame (2) and at least one beam (3), on which at least one finger-weeder tool (9) is arranged, which in particular can be designed to be passively drivable and which is oriented at a setting angle to the soil in a working position for soil working, and to a method for the height guidance of at least one finger-weeder tool above a row in a row plantation, wherein the soil-working device (1) has at least one height-guiding apparatus, which keeps the setting angle of a finger-weeder tool in the working position constant and which can be designed advantageously in such a way that the height-guiding apparatus enables the height guidance of further soil-working tools which are operated next to the finger weeders and which thus can likewise be guided in height.



ABSTRACT

The invention relates to a soil-working device (1) for row plantations, which has a frame (2) and at least one beam (3), on which at least one finger-weeder tool (9) is arranged, which in particular can be designed to be passively drivable and which is oriented at a setting angle to the soil in a working position for soil working, and to a method for the height guidance of at least one finger-weeder tool above a row in a row plantation, wherein the soil-working device (1) has at least one height-guiding apparatus, which keeps the setting angle of a finger-weeder tool in the working position constant and which can be designed advantageously in such a way that the height-guiding apparatus enables the height guidance of further soil-working tools which are operated next to the finger weeders and which thus can likewise be guided in height.

Soil Cultivation Machine; Method For Height Guidance Of At Least One Finger Weeding Tool Over A Row In A Row Crop

Prior art

The invention is directed to a soil cultivation machine for row crops according to the generic type of claim 1 and a method for height guidance of at least one finger weeding tool over a row in a row crop according to the generic type of claim 11.

Soil cultivation machines used for mechanical soil cultivation and for combatting weeds in particular within one or more crop rows at the same time have been state of the art for a long time. Thus, European Patent EP 1 127 481 B1 and European Patent Application 1 116 427 A1 each comprise a finger weeding tool for combatting weeds, having a mechanical drive by means of floor drive elements, which are equipped with rotationally movable weeding fingers arranged above the floor drive elements. With this previously known finger weeding tool, it is possible to shift the soil cultivation work from the center of the row to the immediate vicinity of the crop plants, but adaptation of the finger weeding tools to the ground relief has proven to be difficult.

The invention and its advantages

The soil cultivation tool according to the invention for row crops with the characterizing features of claim 1 and the method according to the invention for height guidance of at least one finger weeding tool over a row in a row crop with the characterizing features of claim 11 have the advantage in comparison with the prior art that the soil cultivation machine, which has a frame and at least one member, is arranged on the at least one finger weeding tool, which is designed in particular to be passably drivable and is aligned in a working position for soil cultivation at an angle of incidence to the soil, wherein the member of a finger weeding tool in the working position is arranged over a row of the row crop or over rows of a row crop that are situated close together has at least one height guidance device, which maintains a constant height of the angle of incidence of the finger weeding tool in the working

position. If two finger weeding tools are to be arranged on one member, then they are preferably aligned with the weeding fingers in the soil relative to one another. Through the angle of incidence of the finger weeding tool, it is possible to have an influence on whether soil tends to be removed from the row or introduced into it. Whether it is desirable to remove soil from the row or add soil to the row will depend on the cultivation conditions. Regardless of that, however, this angle of incidence should be kept constant even if there are irregularities in height in the field. Therefore, when the angle of incidence is set, it is maintained, so that it does not change in the working position with a height adjustment relative to the soil.

According to one advantageous embodiment of the soil cultivation machine according to the invention, at least two finger weeding tools (9) are arranged on each member for working a row of the row crop or several rows of a row crop close together. Since one member is situated above a crop row and/or above crop rows that are close together (multiple rows, e.g., double and/or triple rows) during the soil cultivation, the finger weeding tools mounted on the same member thus have the same height guidance, so that they are guided more precisely, for example, to the right and left of a crop row and/or to the right and left of multiple rows and/or between multiple rows. This arrangement makes it possible for a finger weeding tool arranged on the member, for example, to work the left side of the crop row, and by means of a second finger weeding tool mounted on the member to work the right side of the crop row.

According to an additional advantageous embodiment of the soil cultivation machine according to the invention, a height guidance device is adjustable and/or is arranged on the frame, on at least one member, on at least one cross member, on at least one longitudinal member, on at least one finger weeding member, on at least one tool member and/or on at least one finger weeding tool.

According to an additional advantageous embodiment of the soil cultivation device according to the invention, a height guidance device has at least one parallelogram guide rod, at least one telescoping device (telescopic suspension), at least one

sensor device, at least one support wheel, preferably running next to the row, at least one pair of support wheels, at least one depth limitation and/or at least one sliding element (e.g., cup-shaped sliding element). For example, one parallelogram guide rod or two parallelogram guide rods may be arranged on one member, for example. It is also conceivable for a support wheel to be arranged on the frame or on a member before or after a finger weeding tool. The support wheel is preferably adjustable in height (for example, mechanically, hydraulically, pneumatically and/or electrically), in particular by means of a height guidance device.

According to an additional advantageous embodiment of the soil cultivation machine according to the invention, the height guidance device has at least one loading and/or unloading device (for example, a spring, a hydraulic cylinder).

According to one embodiment of the soil cultivation machine according to the invention, which is advantageous in this regard, the loading and/or unloading device is adjustable, in particular mechanically, hydraulically, pneumatically and/or electrically adjustable, so the contact pressure can be varied.

According to one additional advantageous embodiment of the soil cultivation machine according to the invention, the height guidance device can be lifted by a lifting device. Therefore, the member, including all the subordinate modules, can be pivoted upward. This increases the ground clearance, so that transport is facilitated, for example, or better handling on the forward end is made possible.

According to an additional advantageous embodiment of the soil cultivation machine according to the invention, at least one additional tool (for example, a goniometer, tines, discs, duckfoot tines) is arranged on the soil cultivation machine (in particular on a member and/or cross member), so that the tool and the finger weeding tool are carried jointly.

According to an advantageous embodiment of the soil cultivation machine according to the invention, which is advantageous in this regard, at least one tool has a working position and a resting position. One or more tools are preferably moved from the

working position into the resting position by at least one hoisting device. This permits a rapid change to working with only a part of the tools, which may be helpful from the standpoint of agricultural requirements.

According to an additional advantageous embodiment of the soil cultivation machine according to the invention, at least one finger weeding tool has a working position and a resting position. One or more finger weeding tools are preferably moved by at least one lifting device out of the working position and into the resting position.

According to one advantageous embodiment of the method according to the invention for cultivation of soil in a row crop by means of a soil cultivation machine having at least one finger weeding tool, which has an angle of incidence relative to the ground in a working position, wherein the angle of incidence of the finger weeding tool, which is in the working position, is kept constant during the cultivation of the soil by means of at least one height guidance device of the soil cultivation machine, the angle of incidence of the finger cultivation tool is adjusted relative to the ground before the cultivation of the soil.

According to an additional advantageous embodiment of the method according to the invention, at least one parallelogram guide rod, at least one telescopic device, at least one sensor device, at least one support wheel, which preferably runs next to the row, at least one pair of support wheels, at least one depth limitation and/or at least one sliding element is used as the height guidance device..

According to an additional advantageous embodiment of the method according to the invention, a soil cultivation machine according to any one of claims 1 to 10 is used as the soil cultivation machine.

Additional advantages and advantageous embodiments of the invention can be derived from the following description, drawings and claims.

Drawings

A preferred exemplary embodiment of the subject matter according to the invention is illustrated in the drawings and explained in greater detail below.

- Fig. 1 shows a perspective detailed view of a soil cultivation machine according to the invention,
- Fig. 2 shows a perspective view of one possible specific embodiment of a finger weeding tool according to the invention,
- Fig. 3 shows an overhead view of another possible specific embodiment of a finger weeding tool,
- Fig. 4 shows a side view of the finger weeding tool according to Fig. 3,
- Fig. 5 shows a sectional drawing of the finger weeding tool according to sectional line A-A from Fig. 3,
- Fig. 6 shows a sectional drawing of the finger weeding tool according to sectional line A-A from Fig. 3, a cup-shaped height guide being additionally disposed therein,
- Fig. 7 shows a sectional drawing of the finger weeding tool according to sectional line A-A from Fig. 3, a spoon being additionally disposed on the weeding fingers,
- Fig. 8 shows a perspective detailed view of a soil cultivation machine 1 according to the invention for row crops,
- Fig. 9 shows a detailed view of a soil cultivation machine according to the invention,
- Fig. 10 shows a perspective view of a telescopic suspension,
- Fig. 11 shows a side view of a telescopic suspension from Fig. 10,

Fig. 12 shows a perspective view of a telescopic suspension in another specific embodiment and

Fig. 13 shows a detailed view A of the telescopic suspension from Fig. 12.

Description of the exemplary embodiment

Fig. 1 shows a perspective detailed view of a soil cultivation machine 1 according to the invention for row crops in which a member 3 is arranged on a frame 2. A cross member 6 is mounted on the member 3, so that it is displaceable by means of a holder 4 having fixation means 5. For cultivation of a row, finger weeding tools 9 are mounted displaceably on the cross member 6 by means of holders 7 having fixation means 8. A finger weeding tool 9 consists of a finger weeding mount 10 in particular, on which the weeding fingers 11 are arranged so they can rotate. The drive is mechanical, based on floor drive elements 12, which run over the ground. It is of course also conceivable for the cross member 6 to span a plurality of rows of the row crop, so that more finger weeding tools 9 are arranged on the cross member 6 accordingly. To adjust the finger weeding tools 9 accurately to the ground relief, the member 3 has a parallelogram guide rod 13. By means of a loading and/or unloading device 14 which is preferably adjustable hydraulically, pneumatically and/or electrically, the effect of the parallelogram guide rod 13 on the respective given facts of the situation can be adjusted when using the soil cultivation machine 1 according to the invention.

Fig. 2 shows a perspective view of one possible specific embodiment of a finger weeding tool 9.

Fig. 3 shows an overhead view of another possible specific embodiment of a finger weeding tool 9, which can be mounted on the finger weeding member (not shown) to rotate about an axis of rotation 15. A cover plate 17 is attached to the weeding finger 11 by means of screws 16.

Fig. 4 shows a side view of the finger weeding tool 9 according to Fig. 3. It can be seen here that a drive plate 18, on which the floor drive elements 12 are arranged, is connected to the weeding fingers 11.

Fig. 5 shows a sectional drawing of the finger weeding tool 9 according to the sectional line A-A from Fig. 3. The finger weeding tool 9 has a bearing, consisting of one or more roller bearings 19, which are encapsulated to protect them from dust and moisture and are positioned by means of a spring ring 20 in the bushing 21. The radial shaft seal 22 is responsible for sealing the finger weeding tool 9 in the direction of the suspension.

Fig. 6 shows a sectional drawing of the finger weeding tool 9 according to the sectional line A-A from Fig. 3 in which a cup-shaped height guide 23 (sliding element) is also arranged.

Fig. 7 shows a sectional drawing of the finger weeding tool 9 according to the sectional line A-A from Fig. 3 in which a spoon 24, which serves to additionally mix the soil, is also arranged on the weeding fingers 11. It is also conceivable for spoons 24 to be arranged on the bottom side of a weeding finger 11 and/or for spoons 24 to be arranged on the bottom and top sides of weeding fingers 11.

Fig. 8 shows a perspective detailed view of a soil cultivation machine according to the invention for row crops in which an additional cross member 25 is arranged on the member 3. Tools in the form of goniometers 26 in the present case are mounted on the cross member 25.

Fig. 9 shows a detailed view of a soil cultivation machine 1 according to the invention, in which a longitudinal member 30 is arranged on a tool member 29, wherein a finger weeding member 10 is provided on one end and a vibro spring 31 with a duckfoot tine 32 is mounted on the other end.

Fig. 10 shows a perspective view of a telescopic suspension 33, by means of which a height adjustment of the member 3 is made possible. The telescopic suspension

33 is preferably vertically displaceable, wherein the displaceability is tooled by the fact that one plane is stationary and the second plane slides over the first (as illustrated in Fig. 10) or rolls over it, for example. The telescopic suspension 33 has the advantage over a parallelogram that it is shorter, i.e., there is less need for space in the case of a linkage between the axles of the tractor or in the case of a front linkage, the center of gravity is shifted toward the part being towed by the tractor.

Fig. 11 shows a side view of the telescopic suspension 33 from Fig. 10.

Telescopic suspensions 33 require a relatively large amount of space in the vertical direction. In the case of a linkage on between the axles of the tractor, for example, the space in the vertical direction may be limited, so Fig. 13 shows a perspective view of a telescopic suspension 33 in another specific embodiment, which is more economical with regard to space. The telescope here is mounted so that the telescopic suspension 33 points downward from the frame 2. Because of the small height of the passage thereby remaining in such an assembly, the telescopic suspension 33 is preferably mounted next to the row. To nevertheless be able to optimally absorb the resulting forces, the member 3 may be mounted between two telescopic suspensions 33, as illustrated in Fig. 12.

Fig. 13 shows a detailed view A of the telescopic suspension 33 from Fig. 12.

To be better able to absorb the lever forces occurring on the member 3, a plurality of the telescopic suspensions 33 described above may also be arranged side by side or – as illustrated in the fingers – one after the other.

All of the features discussed in the description and the following claims and illustrated in the drawings may be essential to the invention either alone or in any combination with one another.

List of Reference Numerals

- | | |
|----|---------------------------------|
| 1 | soil cultivation machine |
| 2 | frame |
| 3 | member |
| 4 | holder |
| 5 | fixation means |
| 6 | cross member |
| 7 | holder |
| 8 | fixation means |
| 9 | finger weeding tool |
| 10 | finger weeding member |
| 11 | weeding finger |
| 12 | floor drive element |
| 13 | parallelogram guide rod |
| 14 | loading and/or unloading device |
| 15 | axis of rotation |
| 16 | screw connection |
| 17 | cover plate |
| 18 | drive plate |
| 19 | roller bearing |
| 20 | spring ring |
| 21 | bushing |
| 22 | radial shaft seal |
| 23 | cup-shaped height guide |
| 24 | spoon |
| 25 | cross member |
| 26 | goniometer |
| 29 | tool member |
| 30 | longitudinal member |
| 31 | vibro spring |

32 duckfoot tine

33 telescopic suspension

Soil Cultivation Machine; Method For Height Guidance Of At Least One Finger Weeding Tool Over A Row In A Row Crop

Patent Claims

1. A soil cultivation machine (1) for row crops,
 - having a frame (2) and
 - having at least one member (3) on which at least one finger weeding tool (9) is arranged, wherein the finger weeding tool (9) is arranged on the member (3) by means of a cross member (6) and is aligned in an angle of incidence relative to the ground in an operating position for soil cultivation, characterized in thatat least one member (3) is arranged above a row of the row crop or above rows of a row crop situated close together and at least one finger weeding tool (9) arranged on this member (3) by means of a cross member (6) is provided for cultivation of rows of a row crop situated close together, and the soil cultivation machine (1) has at least one height guide device to maintain a constant angle of incidence from the ground.
2. The soil cultivation machine (1) according to claim 1, characterized in that
- at least two finger weeding tools (9) are arranged on each member (3) for cultivation of one row of the row crop or of rows of a row crop situated close together.
3. The soil cultivation machine (1) according to claim 1 or claim 2, characterized in that
- a height adjustment device is adjustable and/or a height adjustment device is arranged on the frame (2), on at least one member (3), on at least one cross member (6, 25), on at least one longitudinal member (30), on at least one

finger weeding member (10), on at least one tool member (29) and/or on at least one finger weeding tool (9).

4. The soil cultivation machine (1) according to any one of the preceding claims, characterized in that
the height guidance device has at least one parallelogram guide rod (13), at least one telescoping device, at least one sensor device, at least one support wheel, at least one pair of support wheels, at least one depth limitation and/or at least one sliding element.
5. The soil cultivation machine (1) according to any one of the preceding claims, characterized in that
the height guidance device has at least one loading and/or unloading device (14).
6. The soil cultivation machine (1) according to claim 5, characterized in that
the loading and/or unloading device (14) is adjustable.
7. The soil cultivation machine (1) according to any one of the preceding claims, characterized in that
the height guidance device can be lifted by a lifting device.
8. The soil cultivation machine (1) according to any one of the preceding claims, characterized in that
at least one additional tool is arranged on the soil cultivation machine (1).
9. The soil cultivation machine (1) according to claim 8, characterized in that
at least one tool has a working position and a resting position.
10. The soil cultivation machine (1) according to any one of the preceding claims, characterized in that

at least one finger weeding tool (9) has a working position and a resting position.

11. A method for height guidance of at least one finger weeding tool over a row in a row crop or over rows of a row crop situated close to one another by means of a soil cultivation machine (1), which has at least one member (3), on which at least one finger weeding tool (9) is disposed, wherein the finger weeding tool (9) is disposed on the member (3) by means of a cross member (6), and the finger weeding tool (9) has an angle of incidence to the ground when in a working position, characterized in that
at least one member (3) is guided over a row of the row crop or over rows of a row crop situated close together, and for cultivation of a row of the row crop or for cultivation of rows of a row crop that are situated close together, at least one finger weeding tool (9) arranged on this member (3) by means of a cross member (6) is situated, and the angle of incidence of the finger weeding tool (9) in the working position is maintained at a constant level by means of at least one height guidance device of the soil cultivation machine (1) during the cultivation of the soil.
12. The method according to claim 11, characterized in that
the angle of incidence of the finger weeding tool (9) relative to the ground is adjusted before cultivation of the soil.
13. The method according to claim 11 or claim 12, characterized in that
at least one parallelogram guide rod (13), at least one telescoping device, at least one sensor device, at least one support wheel, at least one pair of support wheels, at least one depth limitation and/or at least one sliding element is/are used as the height guidance device.

- ▲
1. 14. The method according to any one of claims 11 to 13,
characterized in that
a soil cultivation machine (1) according to any one of claims 1 to 10 is used as
the soil cultivation machine (1).

Fig. 1

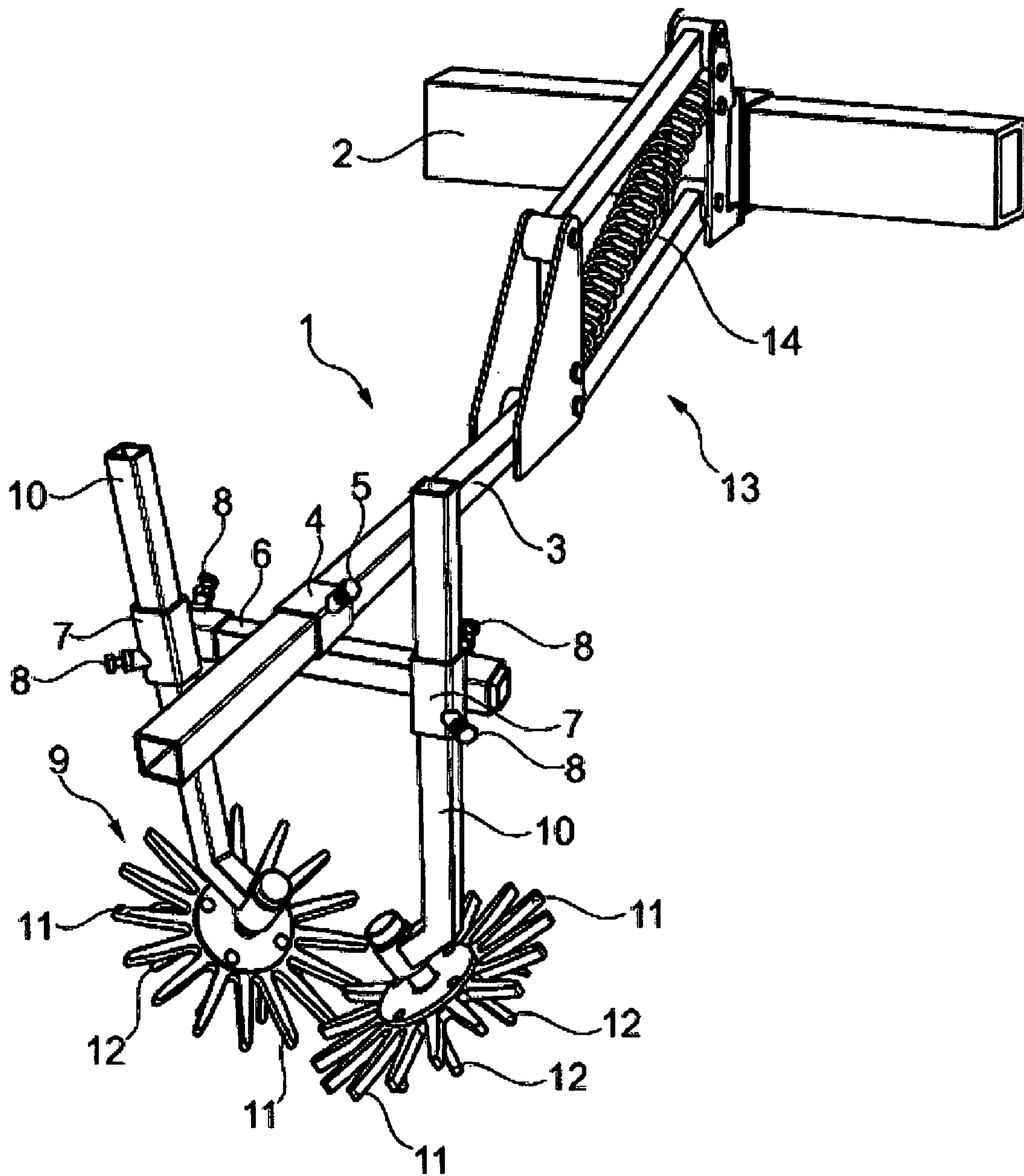


Fig. 2

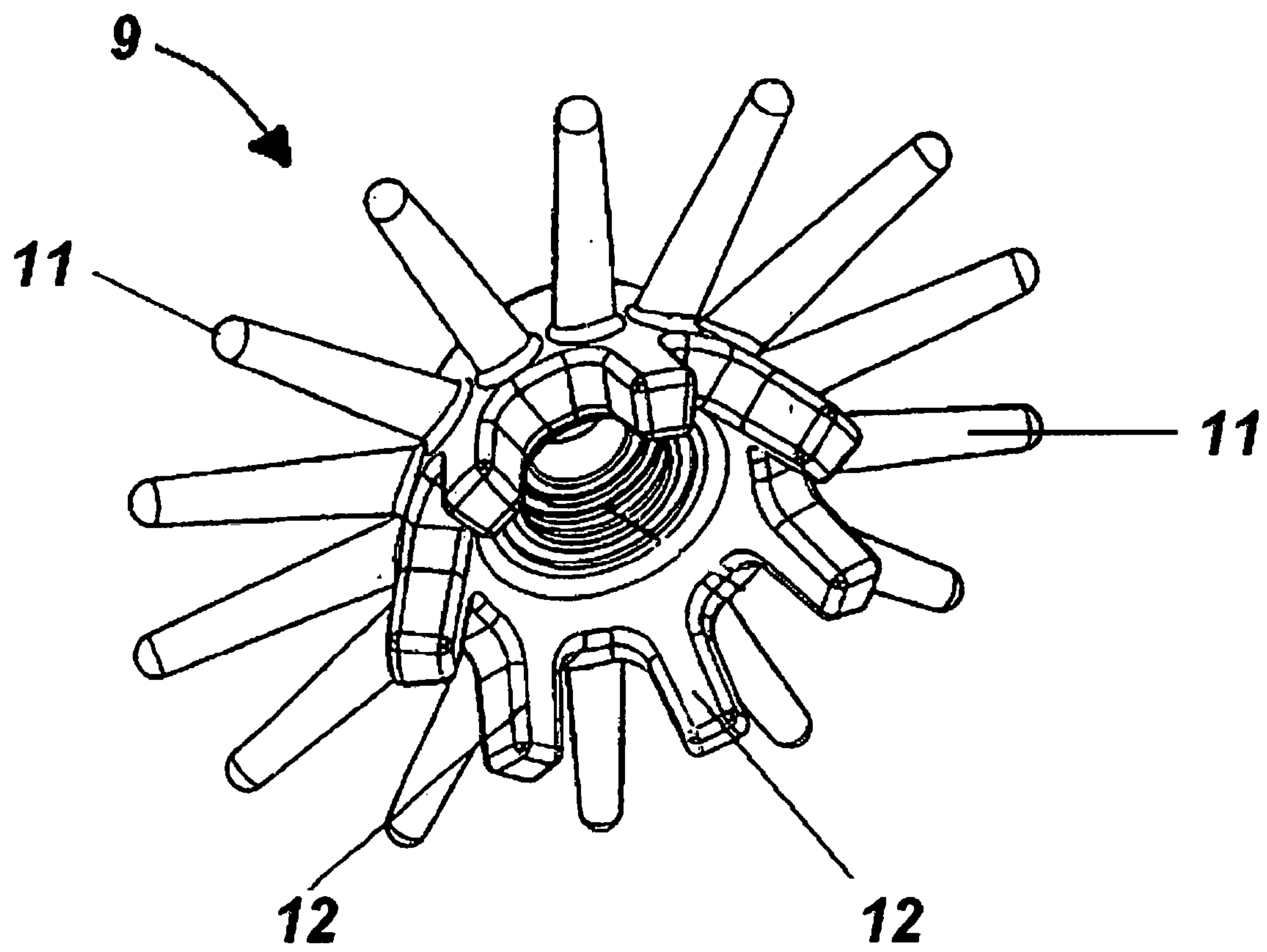


Fig. 3

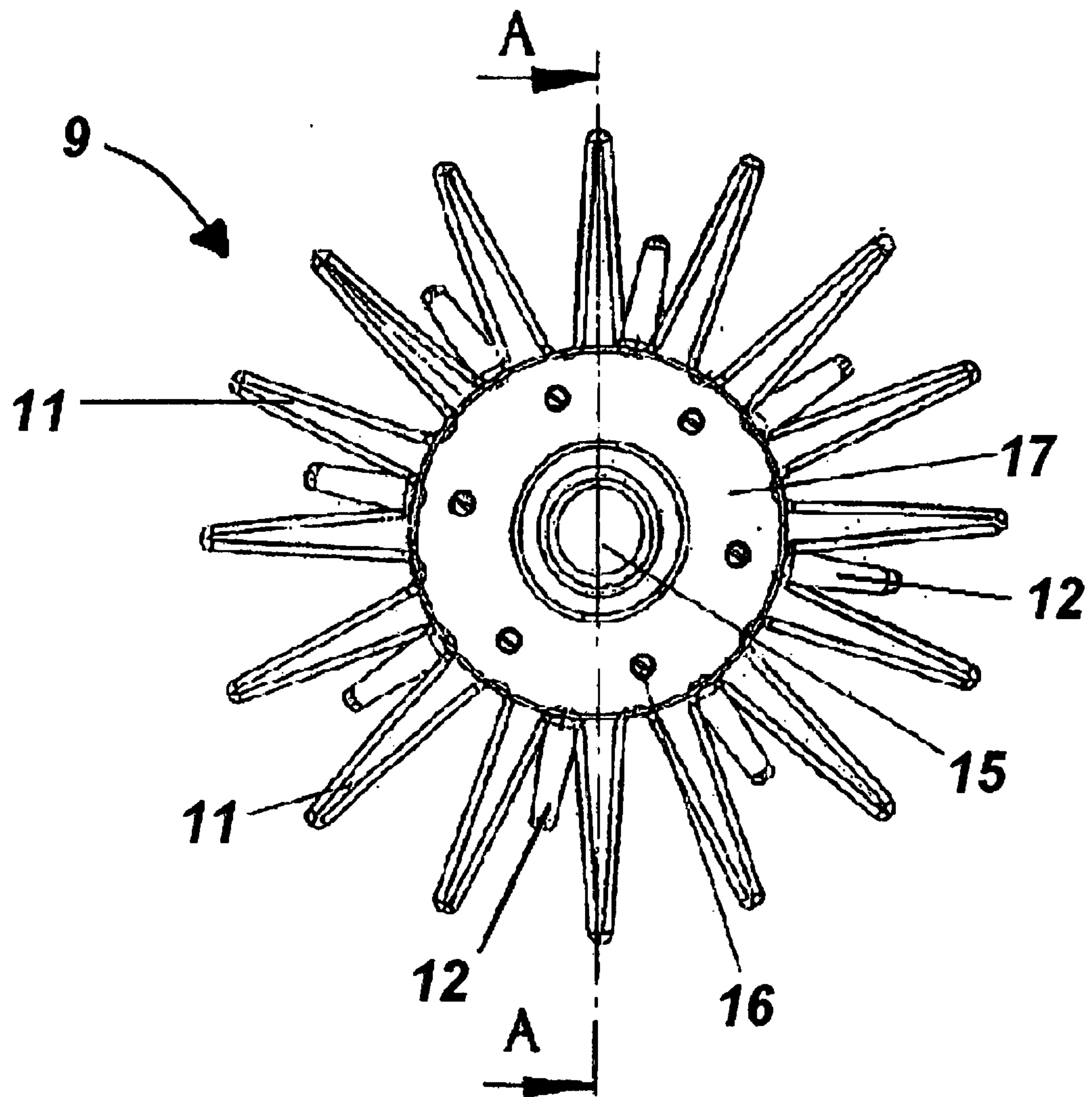


Fig. 4

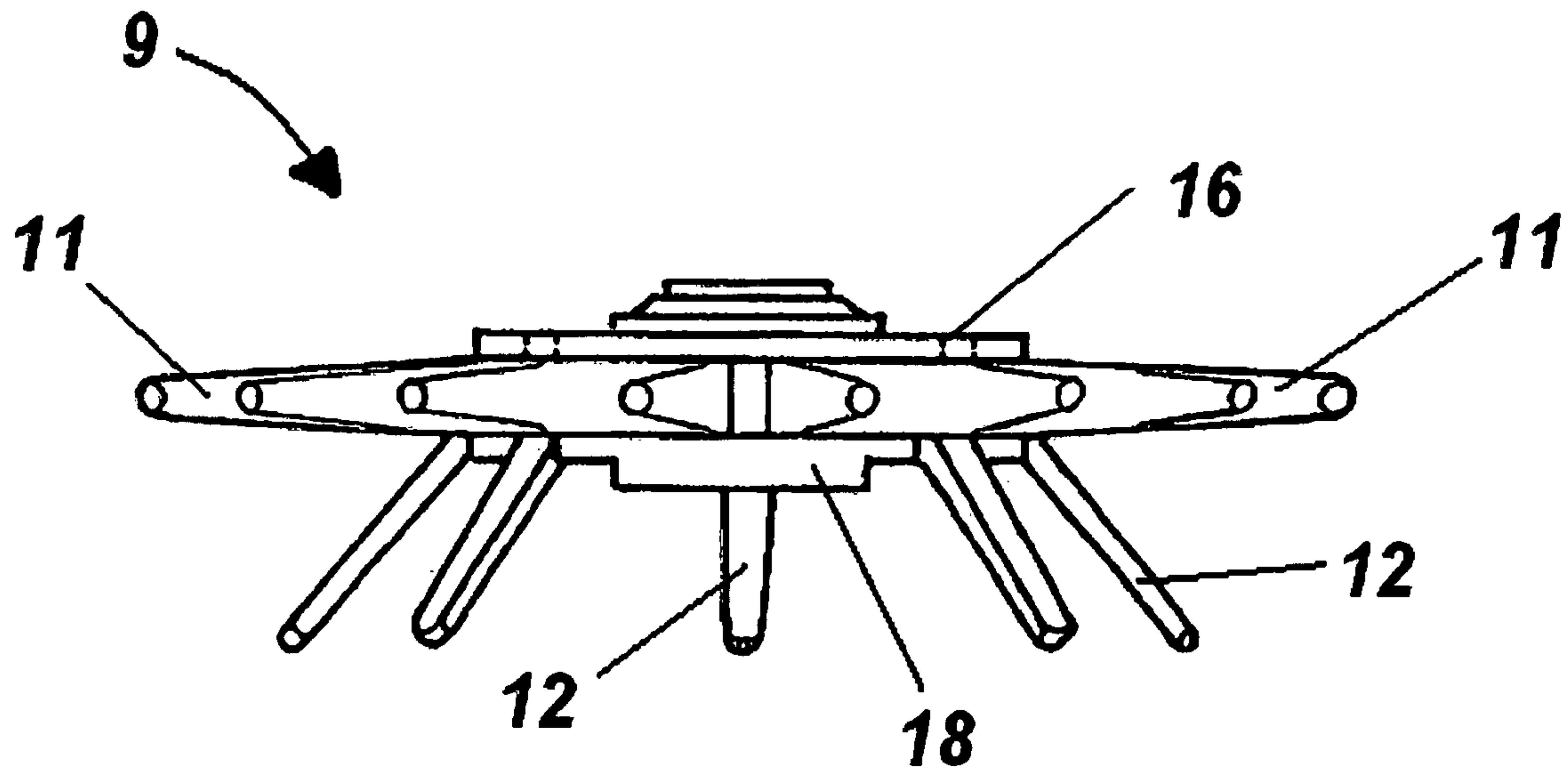


Fig. 5

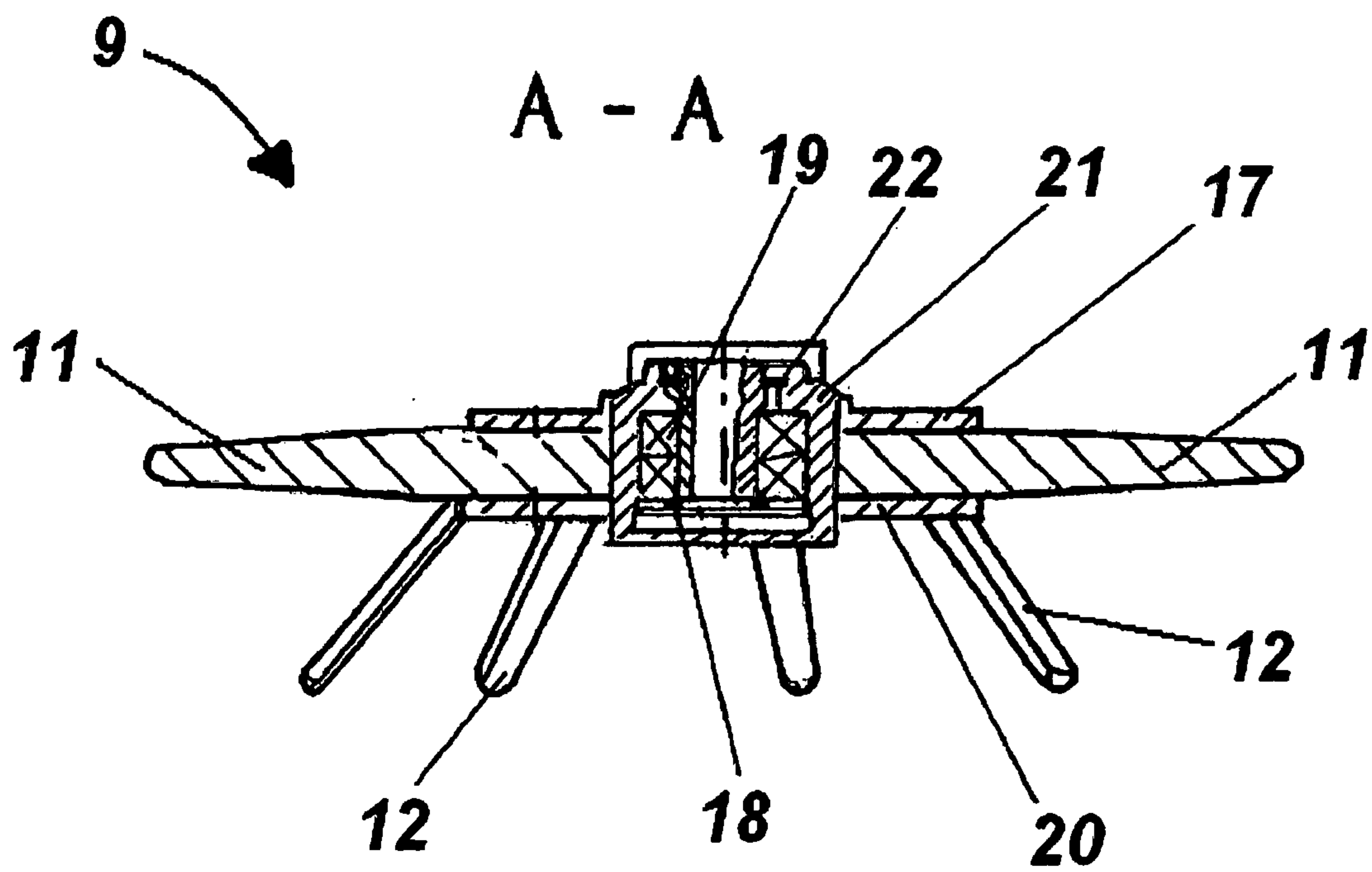


Fig. 6

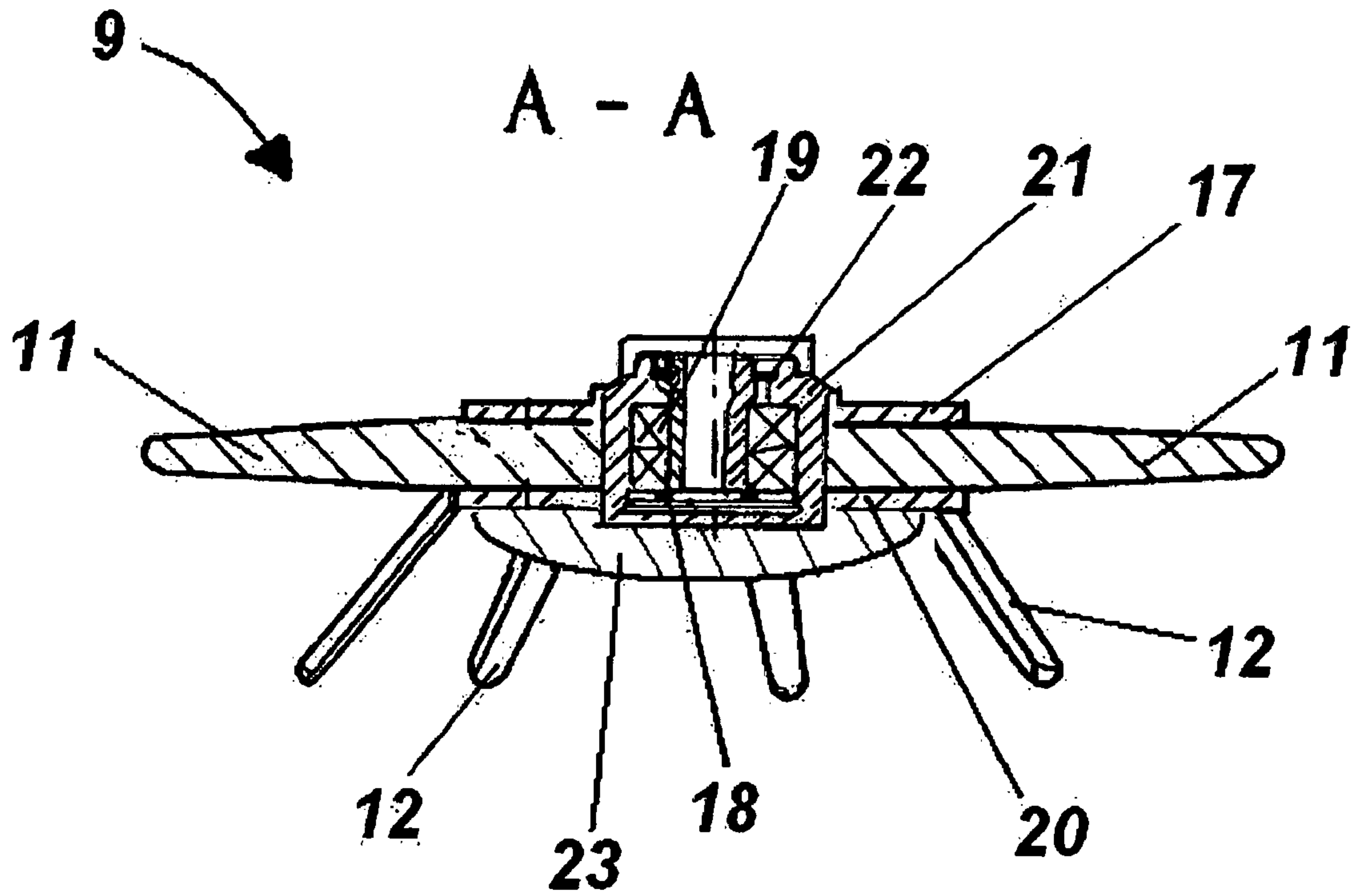


Fig. 7

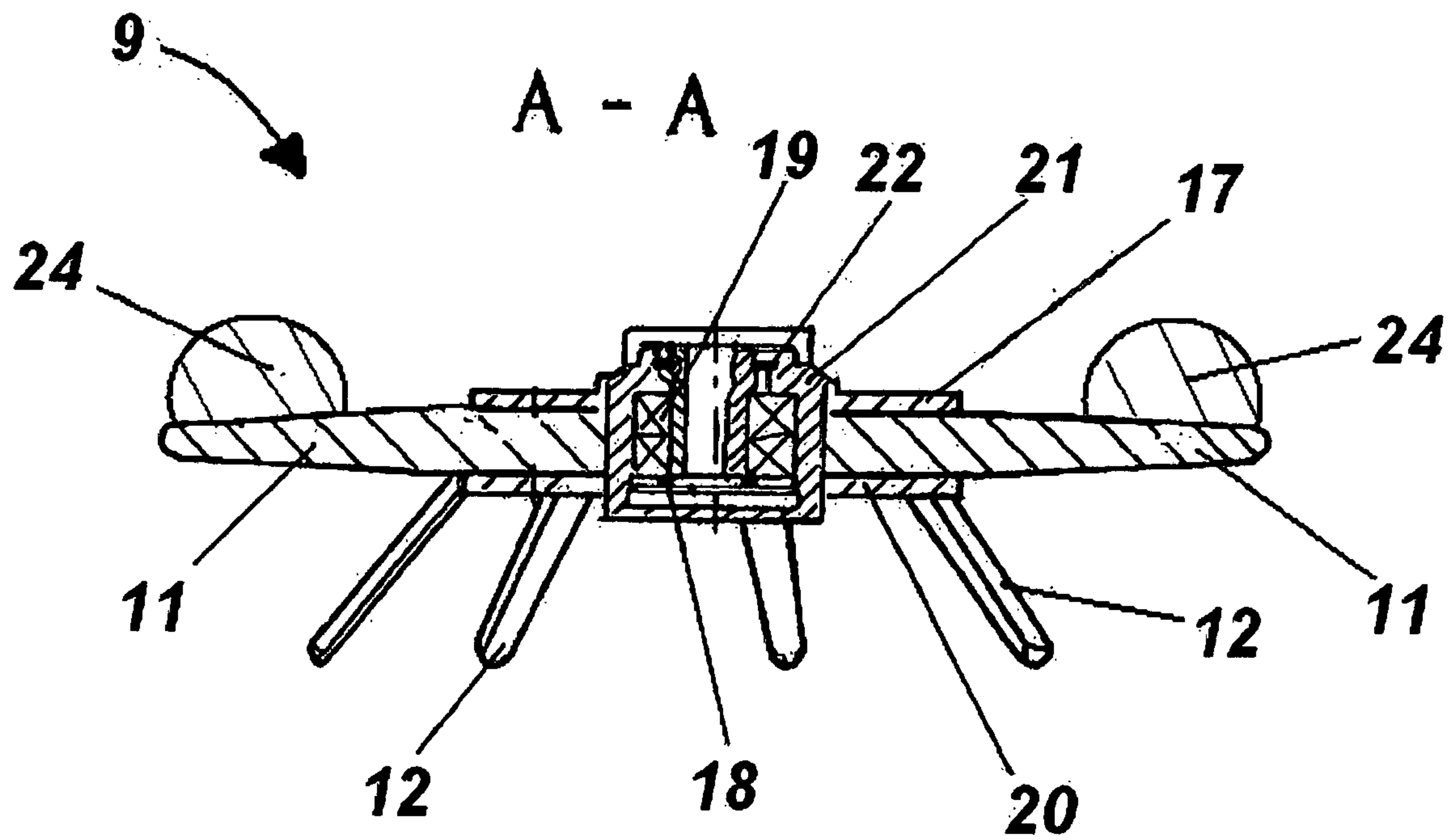


Fig. 8

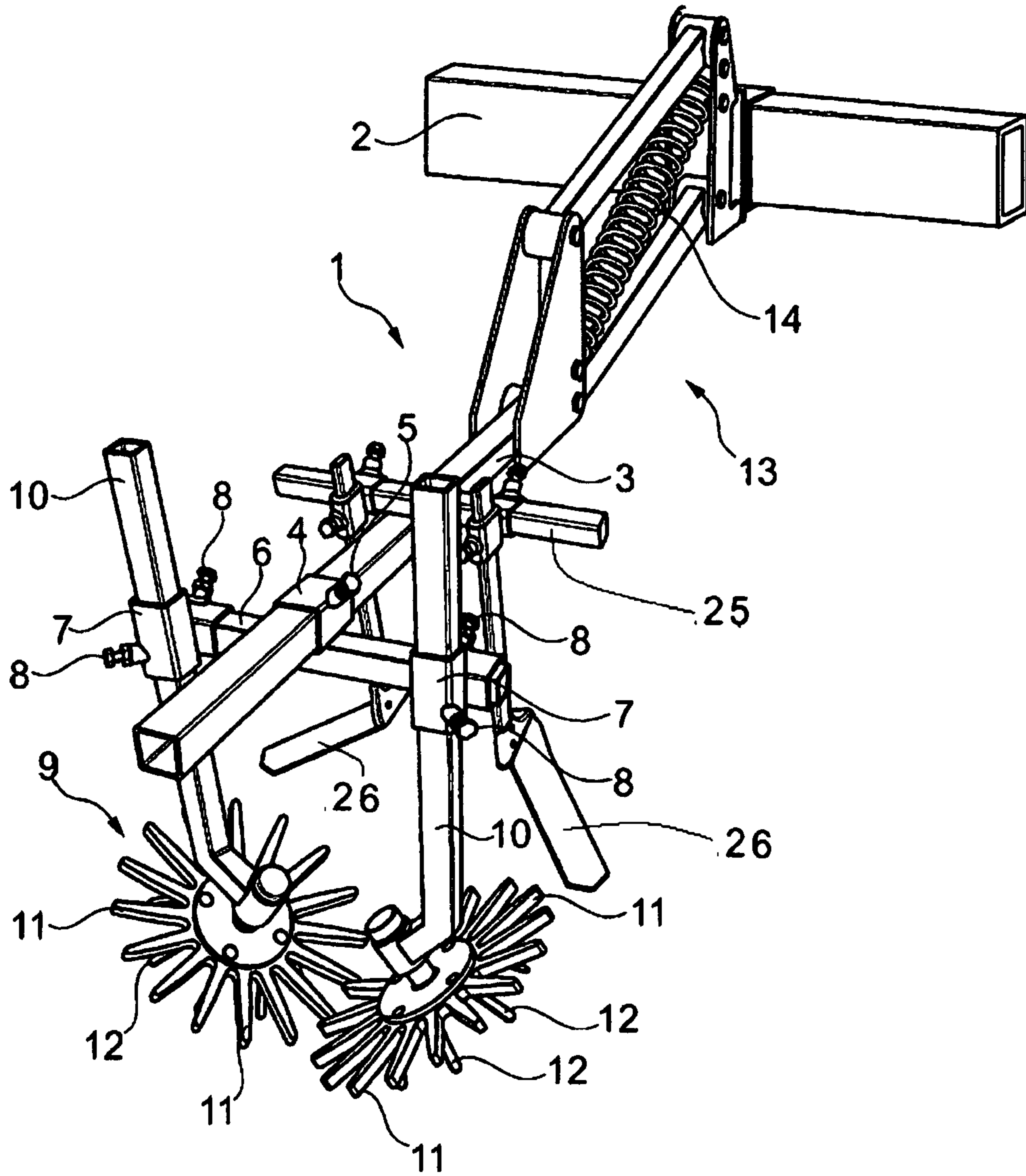
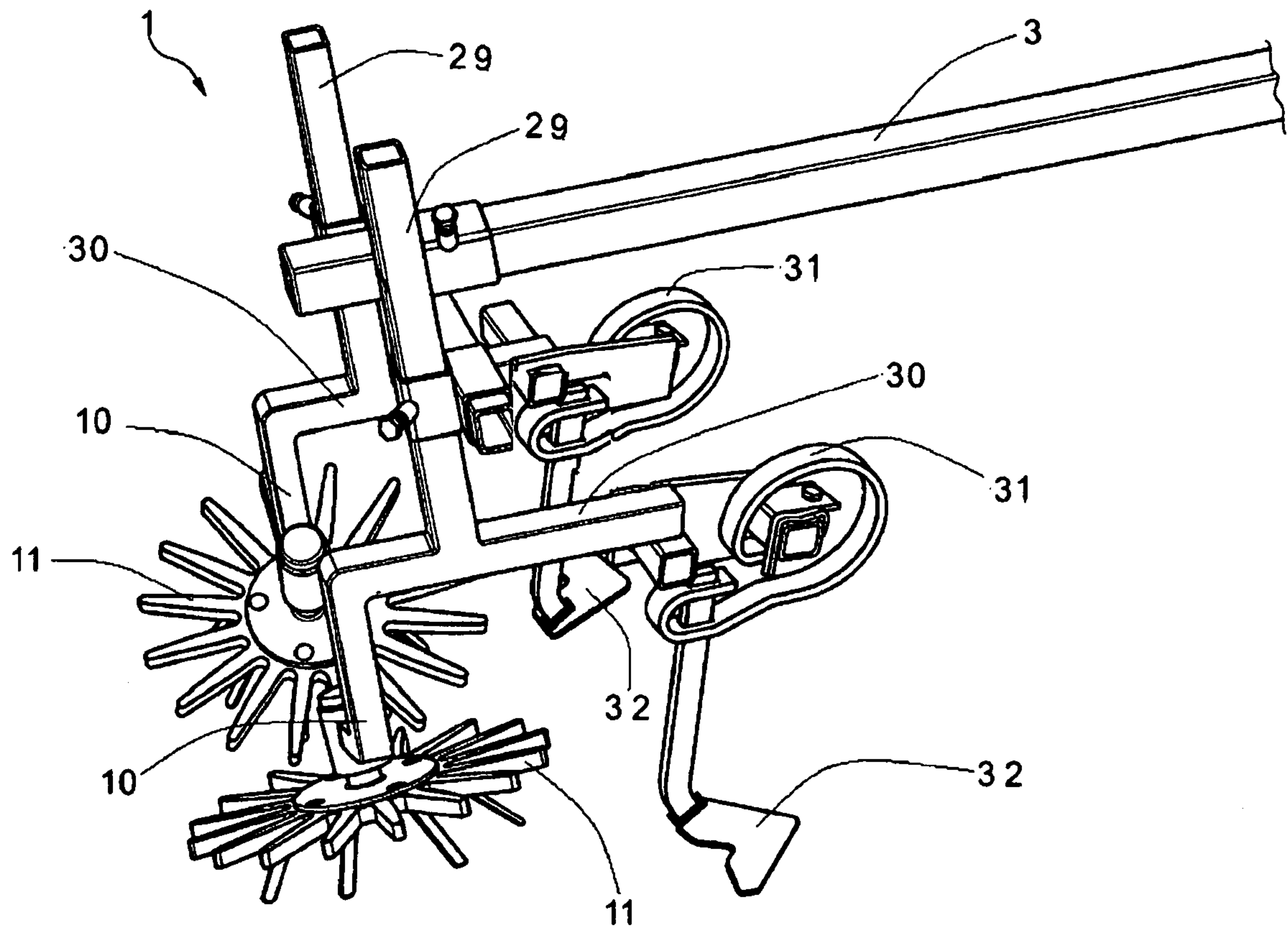


Fig. 9

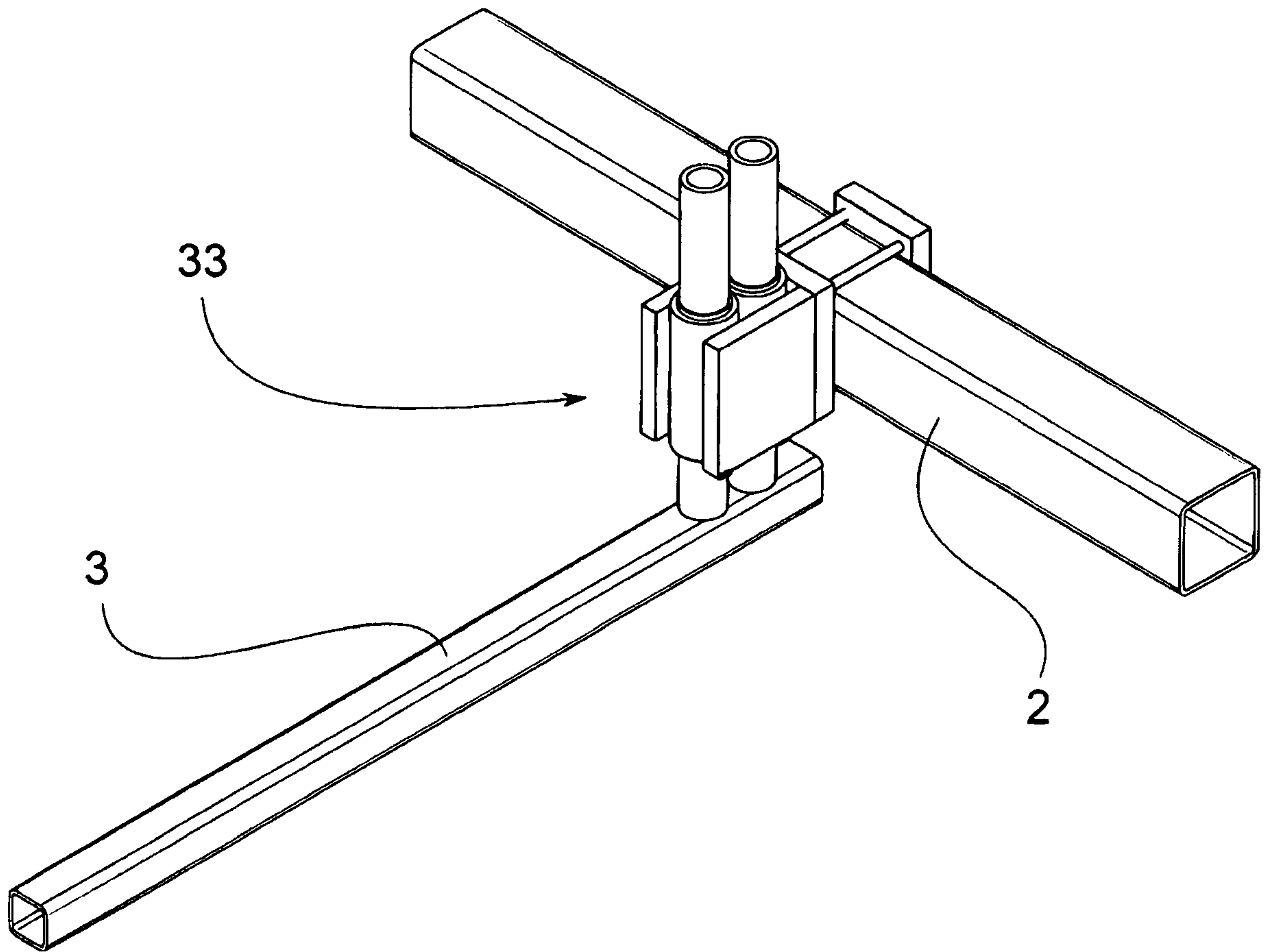


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Fig. 10

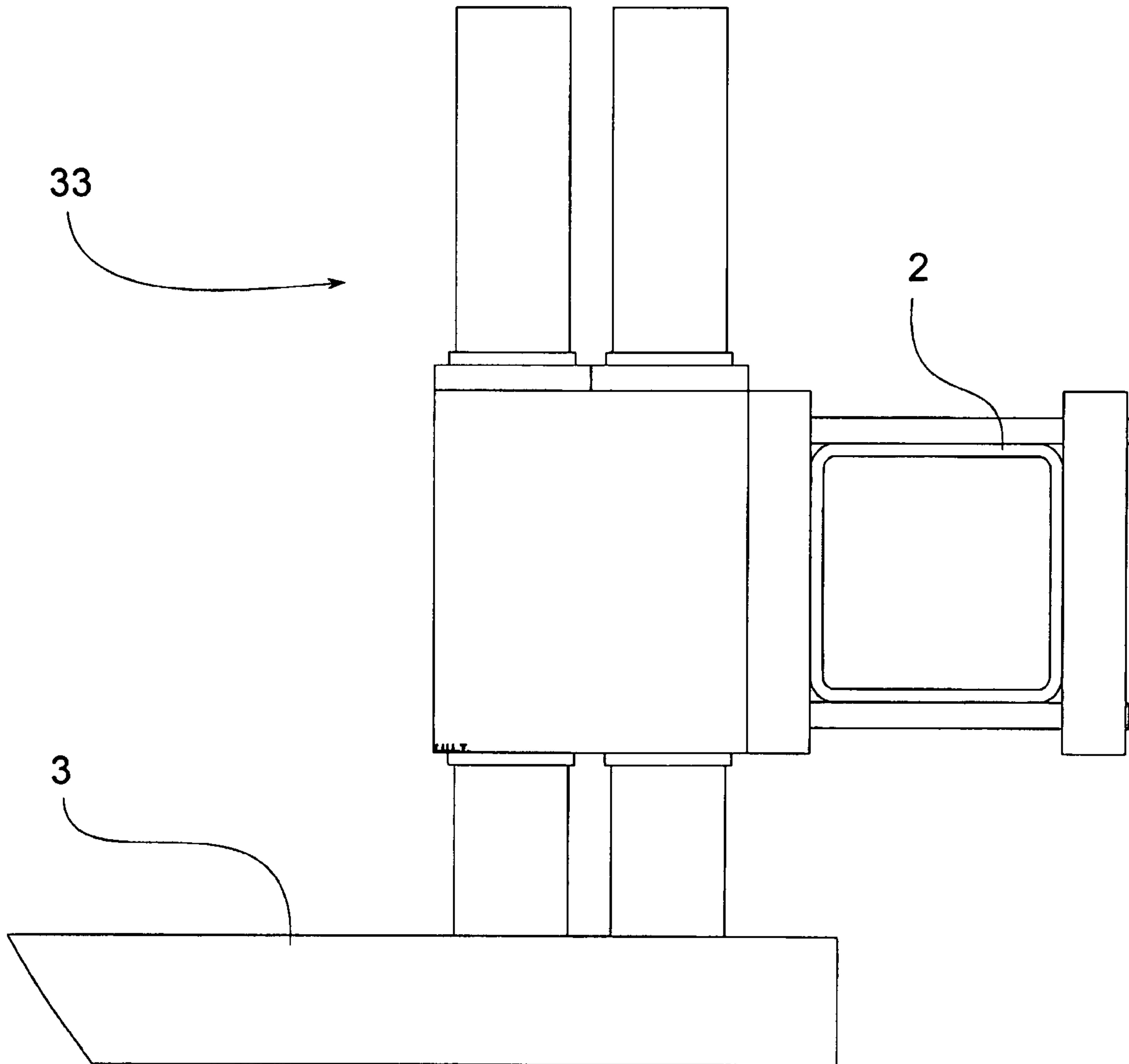


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Fig. 11

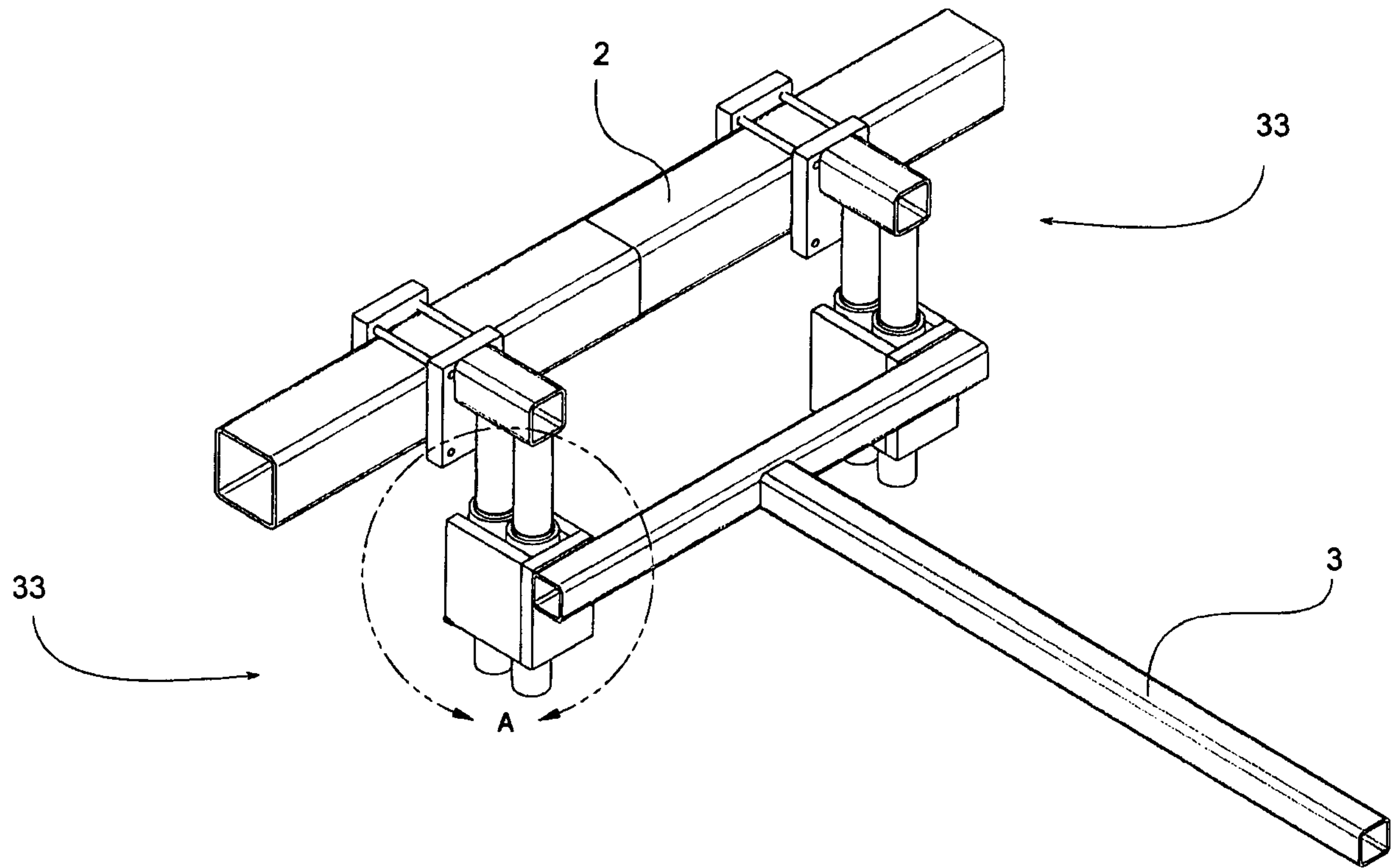


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Fig. 12



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11/11

Fig. 13

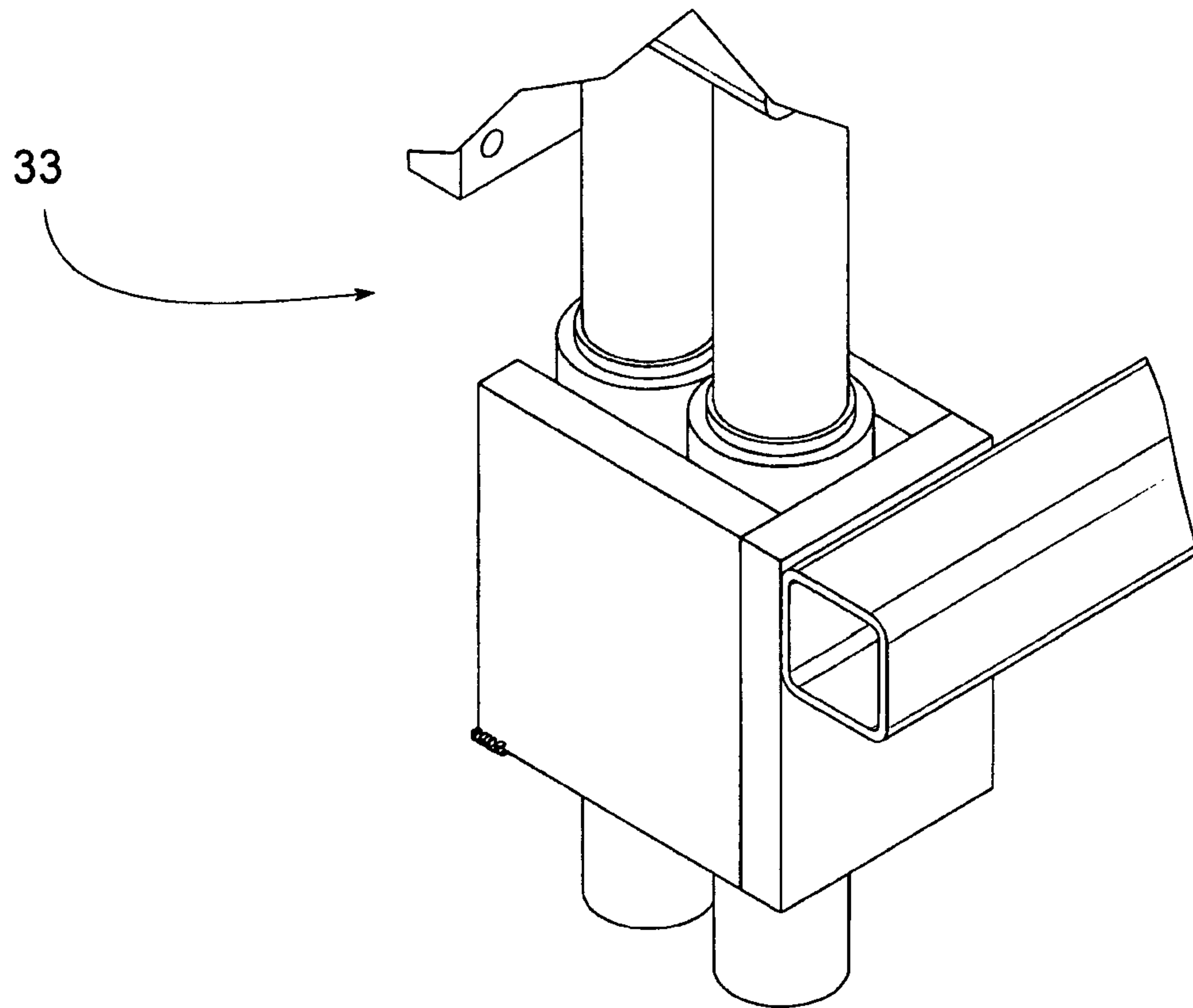


Fig. 1

