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(54) Title: IMPROVED TELESCOPIC REEL

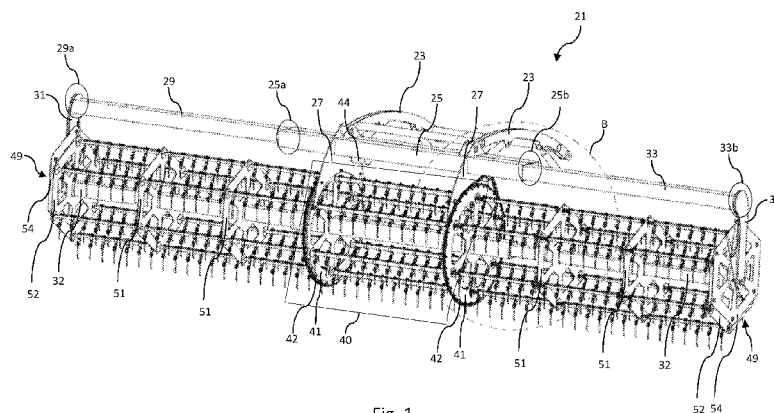


Fig. 1

(57) Abstract: An improved telescopic reel is described, which comprises a telescopic supporting frame and a central module comprising at least one bracket constrained to said supporting frame and connectable to bearing and/or guiding means through fastening means. The bearing and/or guiding means are adapted to bear and guide, during its rotary motion, at least one transversal intersection element of said reel; said bearing and/or guiding means being positioned on said at least one intersection element at a first distance from a longitudinal central shaft of the reel, said first distance being greater than or equal to a second distance between said central shaft and a crosspiece of the reel.



IMPROVED TELESCOPIC REEL

DESCRIPTION

The present invention relates to an improved telescopic reel.

By definition, a reel is that part of the cutting platform of a harvesting machine which is located at the front end thereof. The task of the reel is to accompany, lift from the ground and convey the product, during the harvest, towards the cutting part of the cutting platform for cereals, soy bean, rape, rice and other agricultural products. A reel
5 generally comprises a plurality of crosspieces whereto spring-loaded teeth used for lifting the crop are anchored.

Telescopic reels are known in the field of agricultural machinery; in particular, United States patent document US 3,561,198 discloses a telescopic reel wherein the cross-
10 members making up the reel are inserted into each other to allow the reel to take a retracted position and an extended position.

United States patent document US 5,350,020 discloses a crop lifting system including a reel connected to a frame supported by two hydraulically controlled arms. The frame is connected to the reel at its central shaft; therefore, the rotary motion of the reel, when in
15 operation, is directly imparted to the central shaft, in particular to both ends of the shaft.

United States patent document US 7,426,817 discloses a fixed reel, i.e. a non-telescopic one, comprising two reel parts connected to each other at a central point of the central shaft of the reel. Motion is imparted to the reel in the central region thereof, in particular directly to the central shaft of the reel.

20 However, such a configuration does not provide spatial continuity of the crosspieces, which leads to the problem that in the discontinuity zone there are no teeth for lifting the crop, resulting in poor crop lifting performance during the harvesting operations.

It is therefore one object of the present invention to provide an improved telescopic reel that allows lifting the crop more efficiently.

25 It is a second object of the present invention to provide an improved telescopic reel that allows improving the motion of the reel itself.

It is a further object of the present invention to provide an improved telescopic reel that may have any length, in particular greater than ten metres.

These and other objects of the invention are achieved through an improved telescopic reel as claimed in the appended claims, which are an integral part of the present description.

In brief, an improved telescopic reel is described, which comprises a telescopic
5 supporting frame and a central module comprising at least one bracket constrained to said supporting frame and connectable to bearing and/or guiding means through fastening means. The bearing and/or guiding means are adapted to bear and guide, during its rotary motion, at least one transversal intersection element of said reel; said bearing and/or guiding means being positioned on said at least one intersection element
10 at a first distance from a longitudinal central shaft of the reel, said first distance being greater than or equal to a second distance between said central shaft and a crosspiece of the reel.

The above objects will become more apparent from the following detailed description of an improved telescopic reel according to the present invention, with particular reference
15 to the annexed drawings, wherein:

- Figure 1 shows one example of a telescopic reel according to the present invention in an open position;
- Figures 2A, 2B and 2C show some peculiar elements of a telescopic reel according to the present invention.

20 With reference to Fig. 1, there is shown one example of a reel 21 according to the present invention.

The reel 21 is connected to supporting forks 23, preferably consisting of a structure made up of two tubular pieces having a parabolic shape, connected to each other near two ends thereof by means of two crosspieces having a cylindrical cross-section. As an
25 alternative, said two crosspieces of the supporting forks 23 may have any cross-section.

Two hubs are welded to one end of the two tubular pieces to allow the reel 21 to be rotated or lifted on pins through the use of two hydraulic cylinders. The supporting forks 23, unlike the conventional solutions known in the art, are connectable in the central part of the reel 21. It must be pointed out that the supporting forks 23 do not
30 belong to the reel 21, but can be connected thereto; for instance, the supporting forks 23 can be the means of connection between the reel 21 and a harvesting machine.

The reel 21 comprises a telescopic supporting frame 25, which is preferably made up of two tubular elements coupled together by a longitudinal weld along the tubular elements themselves. In the upper part of the telescopic supporting frame 25 there is at least one anchoring bracket, to which a hub belonging to the supporting forks 23 can be
5 connected by means of pins.

At a first end 25a of the telescopic supporting frame 25 there is a first telescopic element 29, which preferably consists of a tubular element so sized as to be able to enter and slide on a suitable guide or slider within a portion of the telescopic supporting frame 25.

10 To a first end 29a of the first telescopic element 29 an anchoring bracket 31 is connected for supporting a central shaft 32 of the reel 21.

At a second end 25b of the telescopic supporting frame 25 there is a second telescopic element 33, which preferably consists of a tubular element so sized as to be able to enter and slide on a suitable guide or slider within a portion of the telescopic supporting
15 frame 25.

To a first end 33b of the second telescopic element 33 a first anchoring bracket 35 is connected for supporting the central shaft 32 of the reel 21.

In other words, the reel 21 is symmetrical with respect to its transverse axis of symmetry.

20 A peculiarity of the telescopic reel according to the present invention is that the reel 21 comprises the telescopic supporting frame 25 and a central module 40 comprising at least one bracket 27 constrained to said supporting frame 25 and connectable to bearing and/or guiding means 28 through fastening means 34. The bearing and/or guiding means 28 are adapted to bear and guide, during its rotary motion, at least one transversal
25 intersection element 41 of said reel 21; said bearing and/or guiding means 28 are positioned on said at least one intersection element 41 at a first distance from a longitudinal central shaft 32 of the reel 21, said first distance being greater than or equal to a second distance between said longitudinal central shaft 32 and a crosspiece 47 of the reel 21.

30 The at least one intersection element 41 comprises drive means 41 capable of receiving motion through motion transmission means 42 connected thereto. The motion

transmission means 42 are also connectable to a motor 44, and operate in proximity to the first distance.

The drive means 41 comprise at least one toothed wheel, disk, gear, pulley, thrust block, or the like. In a preferred embodiment of the invention, i.e. the one shown in Fig. 1, the drive means 41 comprise two toothed wheels 41 capable of receiving motion, or drive force, through the motion transmission means 42 connected thereto, e.g. a chain, a rubber belt, a gear, or the like.

Furthermore, the motion transmission means 42 operate in proximity to the first distance, i.e. near the perimeter of the at least one intersection element 41, in particular of the drive means 41.

In fact, with particular reference to Figures 2A, 2B and 2C, if we consider that the motion transmission means 42 comprise a chain and that the drive means 41 comprise the toothed wheels 41, it is clear that the chain will act upon the toothed part of the toothed wheel that is located at a first distance D1 greater than or equal to a second distance D2 between the central longitudinal shaft 32 and the outer part of the crosspiece 47 of the reel 21. The same will apply in case of pulley-belt, gear-chain, gear-gear, worm screw-gear or similar couplings.

In other words, the radius D1 of the drive means 41 is greater than or equal to the second distance D2 between the central shaft 32 and the outer side of the crosspieces 47 of the reel 21.

The distance between the two toothed wheels 41 may vary according to the desired dimensions of the reel 21.

The at least one bracket 27, the function of which is to follow and support the rotation of the reel 21, preferably has a semicircular shape that matches the shape of the drive means 41.

More in detail, the at least one bracket 27 is connectable to, or comprises, the supporting and/or guiding means 28 (see Fig. 2B), in particular bearings anchored to the at least one bracket 27 via the fastening means 34, e.g. bolts or the like. The supporting and/or guiding means 28 bear the drive means 41 in proximity to the first distance D1, which is calculated with respect to the position of the central shaft 32, or in proximity to an outer perimeter thereof, and further allow it to rotate, i.e. they guide the drive means

41 during their motion. More in detail, the supporting and/or guiding means 28 act upon, i.e. impart motion to, a protruding portion of the drive means 41. Such protruding portion is located, or associated, in proximity to the perimeter of the drive means 41, in particular a toothed wheel, and can be considered as an element integrated with the toothed wheel as one piece, or else it may be a separate element which is then associated with said toothed wheel.

The motion transmission means 42 are connected to a motor 44, which is preferably constrained to the telescopic supporting frame 25. The motor 44 may be electric/electronic, hydraulic, etc.

In an alternative configuration, it is conceivable that the supporting and/or guiding means 28 are connected to the motor 44, thus allowing the drive means 41 to rotate. In this case, one or more bearings 28 will be connected to the motor 44 via motion transmission belts, and therefore the same bearings 28 will support, guide and drive the entire reel 21.

With particular reference to Fig. 2A, there is shown an enlarged view of a portion B of the reel 21 of Fig. 1. The drive means 41 are fastened to the central shaft 32 of the reel 21. The central shaft 32 is telescopic, i.e. it is preferably made up of one or more tubular elements having a cavity into which further tubular elements can be inserted, in particular those belonging to the side modules of the reel 21. The central shaft 32 is preferably welded to the drive means 41 in a central position thereof.

The telescopic crosspieces 47 are shown in their open position, i.e. they are totally extended relative to each other. On the contrary, the crosspieces of the central module 40 are fixed and comprise a cavity for receiving the crosspieces 47 of the side modules of the reel 21.

Referring back to Figure 1, pins are secured, in particular welded by means of centering flanges internal to the tubular elements, to the outer ends 49 of the tubular elements of the side modules, which pins are adapted to enter into bearings arranged on the end of the first telescopic element 29 and second telescopic element 33.

To each one of the outer ends 49 of the tubular elements of the side modules a fixed flange 52, or disk, is secured, which preferably has a hexagonal shape and is provided with seats for fitting the bushing supports 45, in particular in proximity to the corners of

the hexagon (see in particular Figure 2A).

In other words, the reel 21 is telescopic because the crosspieces 47 of the side modules are adapted to enter into the crosspieces of the central module 40 and one into the other, so as to form a single telescopic body capable of transmitting a homogeneous rotary
5 motion over the entire width of the reel 21. Furthermore, as already mentioned, the central shaft 32 is telescopic as well.

The reel 21 further comprises sliding flanges 51, preferably hexagonal in shape, essentially equidistant in the space comprised between the central module 40 and the outer ends 49 of the reel 21.

10 Said sliding flanges 51 are characterized in that they can slide along the crosspieces 47 and the central shaft 32 as the reel 21 is opened or closed, while providing a supporting, driving and centering function when the reel is in operation. Near their respective outer corners, the sliding flanges 51 have coaxial seats for the bushing supports 45.

At the outer ends 49 there are also eccentric flanges 54 connected to the anchoring
15 brackets 31,35, and therefore to the telescopic supporting frame 25. Moreover, the eccentric flanges 54 are connected to the fixed flanges 52 by means of a linkage.

In the present description, the transversal intersection elements 41,51,52 of the reel 21 comprise the drive means 41, the sliding flanges 51 and the fixed flanges 52, in that they are arranged in a substantially transverse manner relative to the longitudinal axis of
20 the reel 21.

The features of the present invention, as well as the advantages thereof, are apparent from the above description.

A first advantage of the present invention is that it ensures better crop lifting performance, because the spring-loaded teeth are arranged along the whole usable
25 surface of the crosspieces and there is no discontinuity.

A second advantage of the present invention is that it improves the motion of the reel itself.

A further advantage of the present invention is that the telescopic reel may have any length, in particular greater than ten metres.

30 The improved telescopic reel according to the present invention may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is

also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

It can therefore be easily understood that the present invention is not limited to the above-described improved telescopic reel according to the present invention, but may be

5 subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the novelty spirit of the inventive idea, as clearly specified in the following claims.

CLAIMS

1. Telescopic reel (21) comprising a telescopic supporting frame (25) and a central module comprising at least one bracket (27) constrained to said supporting frame (25) and connectable to bearing and/or guiding means (28) through fastening means (34), said bearing and/or guiding means (28) being adapted to bear and guide, during its rotary motion, at least one transversal intersection element (41) of said reel (21); said bearing and/or guiding means (28) being positioned on said at least one intersection element (41) at a first distance (D1) from a longitudinal central shaft (32) of said reel (21), said first distance (D1) being greater than or equal to a second distance (D2) between said central shaft (32) and a crosspiece (47) of said reel (21).
2. Telescopic reel (21) according to claim 1, wherein said at least one intersection element (41) comprises drive means (41) capable of receiving motion through motion transmission means (42) connected thereto; said motion transmission means (42) being connectable to a motor (44) and acting upon said drive means (41) in proximity to said first distance (D1).
3. Telescopic reel (21) according to claim 1, wherein said bearing and/or guiding means (28) are connected to a motor (44) and allow the rotation of said at least one intersection element (41).
4. Telescopic reel (21) according to one or more of the preceding claims, wherein said drive means (41) comprise at least one element selected from the group including: a toothed wheel, a disk, a gear, a pulley, a thrust block.
5. Telescopic reel (21) according to one or more of the preceding claims, wherein said motion transmission means (42) comprise at least one element selected from the group including: a chain, a rubber belt, a gear.
6. Telescopic reel (21) according to one or more of the preceding claims, wherein said bearing and/or guiding means (28) comprise bearings.
7. Telescopic reel (21) according to one or more of the preceding claims, wherein said fastening means (34) comprise bolts.
8. Telescopic reel (21) according to one or more of the preceding claims, wherein said intersection elements (41,51,52) comprise said drive means (41), sliding flanges (51) and fixed flanges (52).

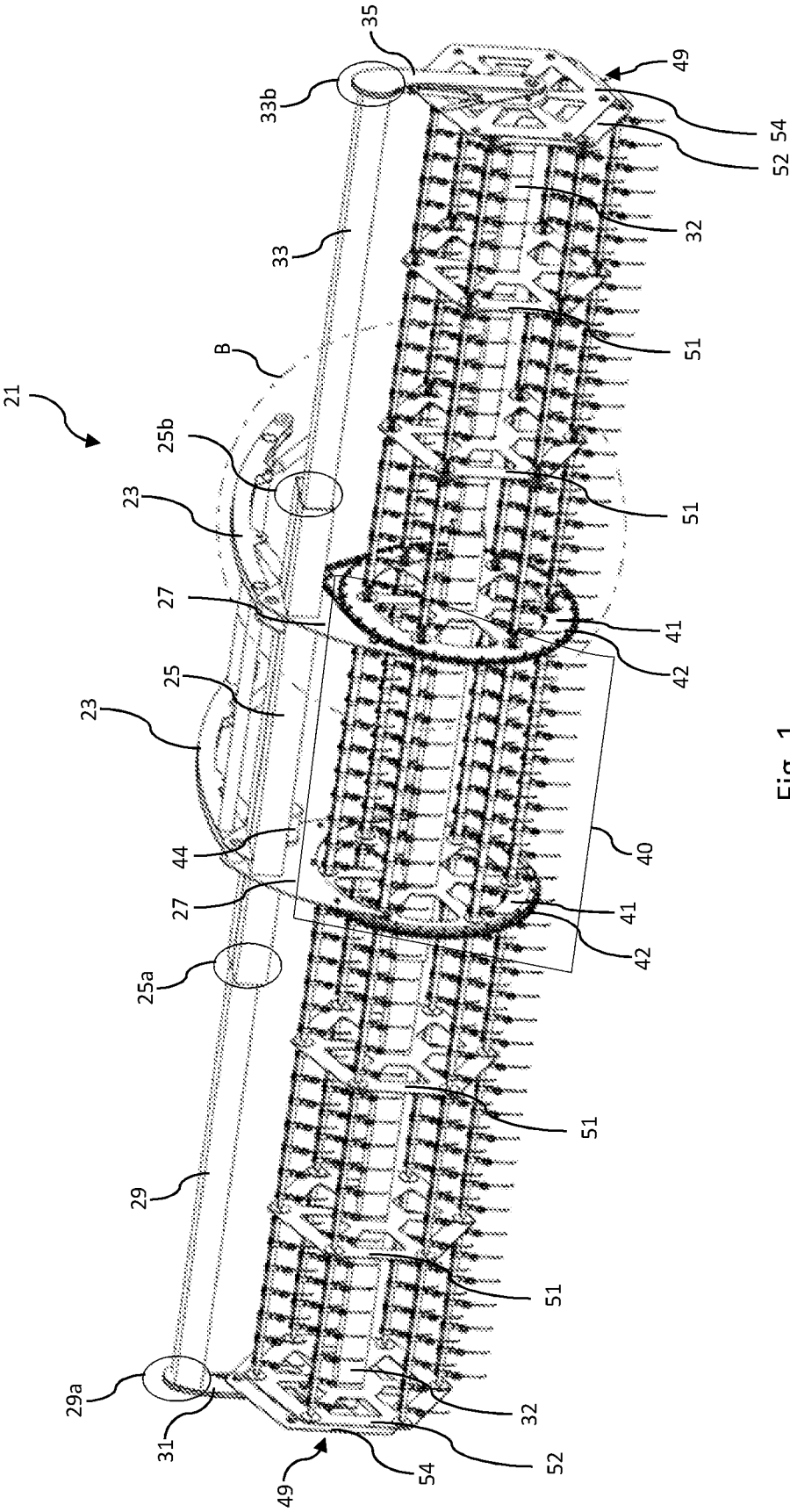


Fig. 1

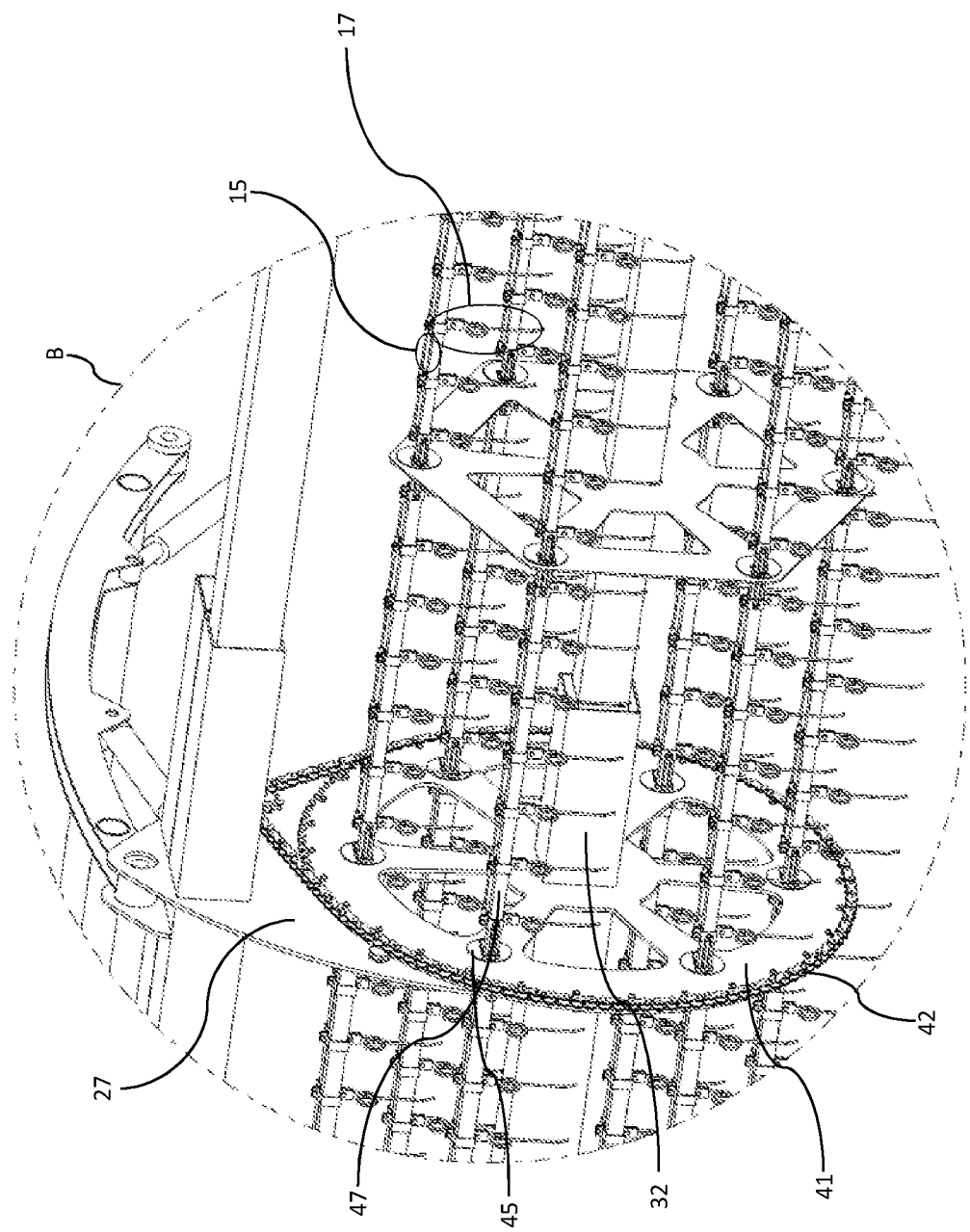


Fig. 2A

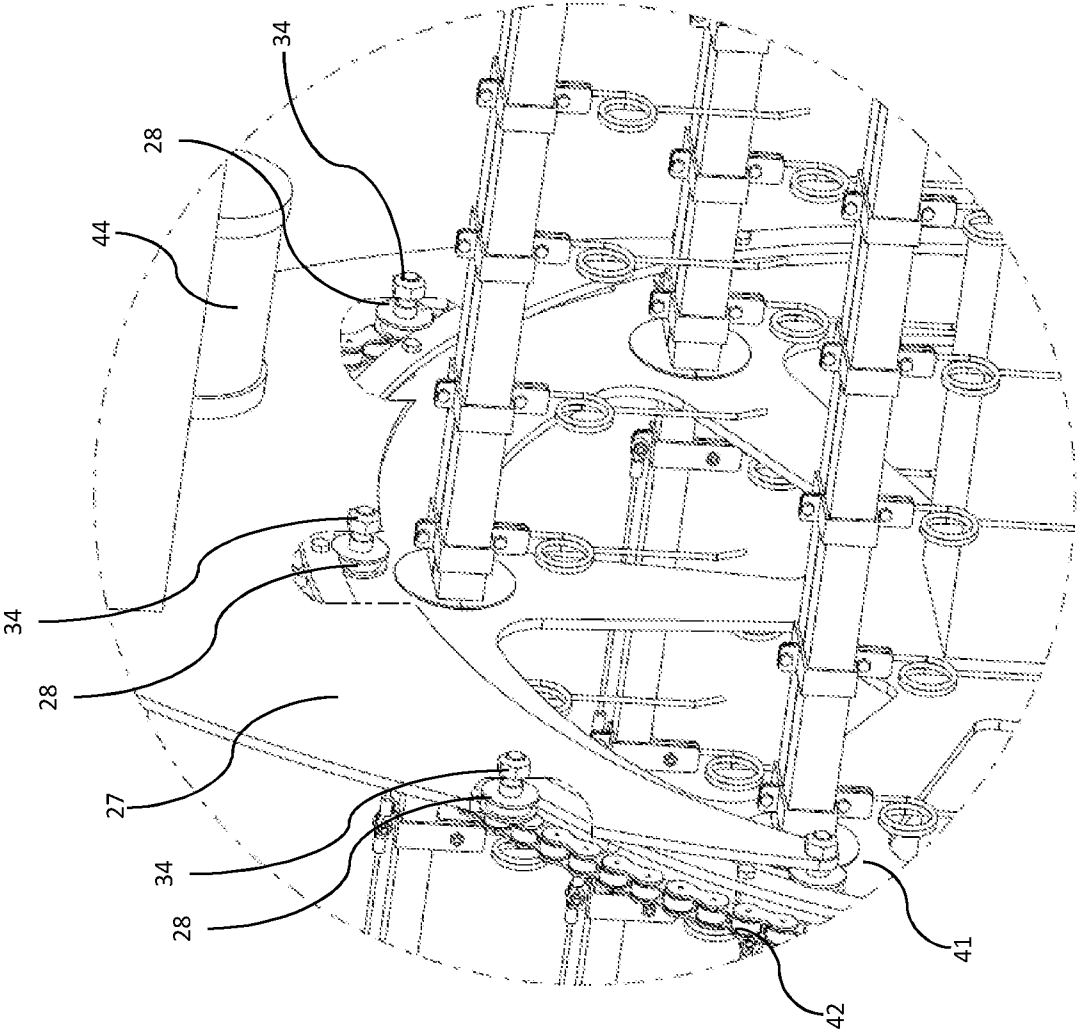


Fig. 2B

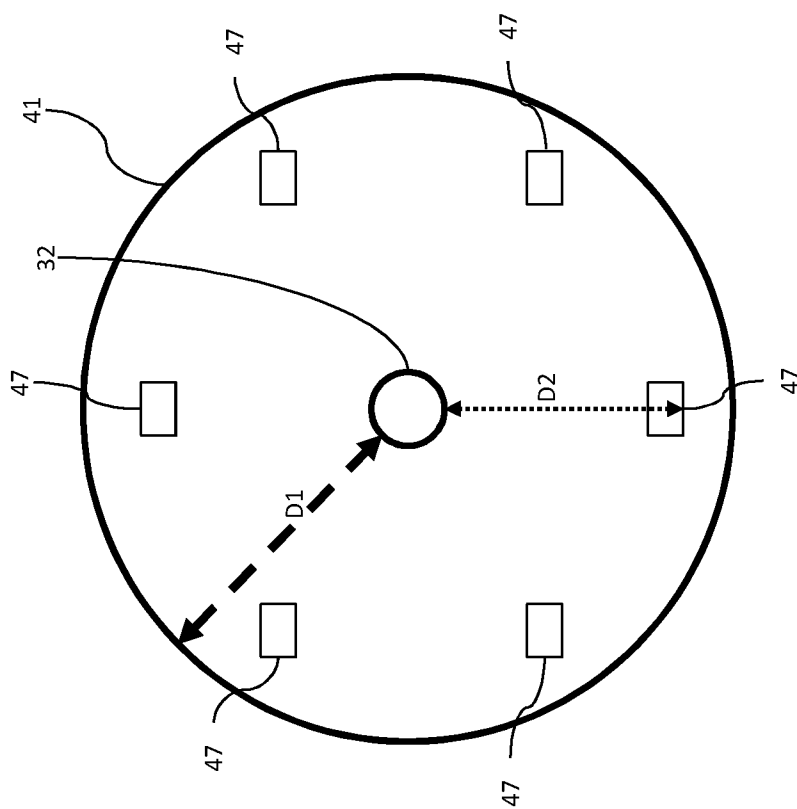


Fig. 2C

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/053411

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01D57/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 7 426 817 B2 (COERS BRUCE A [US]) 23 September 2008 (2008-09-23) cited in the application the whole document -----	1-8
A	US 2013/160418 A1 (SAUERWEIN CHRISTOPHER T [US] ET AL) 27 June 2013 (2013-06-27) figure 3 -----	1-8
A	US 5 350 020 A (VANDEVER BILLIE C [US] ET AL) 27 September 1994 (1994-09-27) cited in the application the whole document ----- -/--	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/053411

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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