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(54) A WINDING DEVICE FOR A SUCTION TUBE

(57) A winding device for a suction tube, comprising:
a support carriage (2) provided with a first axle (3) comprising one or more wheels (31) and a second axle (4) comprising one or more wheels (41); said wheels (31, 41) being predisposed to engage with a profiled guide member so as to enable a translation of the carriage on a motion plane that is substantially horizontal, along an advancement direction (Y);
a suction conduit (5), associated to the carriage (2) and provided with an end fitting mouth (51) having an elongated

gate shape along the advancement direction (Y) and pre-disposed to connect to a suction channel;
a drum (6), rotating about a winding axis (X), provided with a first connector (61) for an end of a flexible suction tube, predisposed to connect to the suction conduit (5).

The carriage (2) comprises at least a first fork (7), to which the first axle (3) is associated, which can rotate about a rotation axis (Z), perpendicular to the motion plane of the carriage (2).

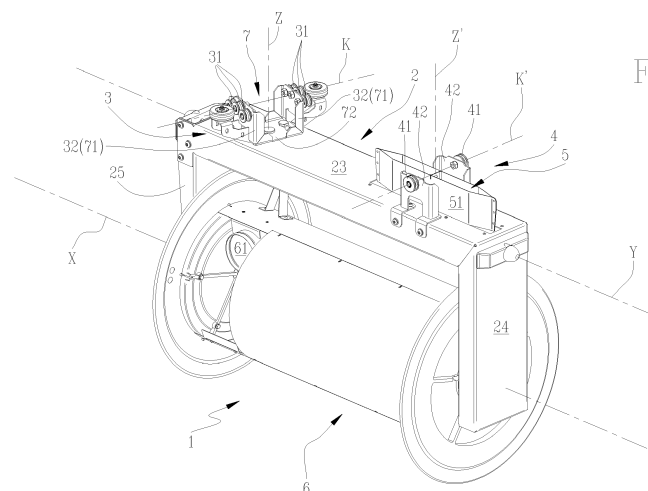


Fig.1

Description

[0001] The present invention relates to a winding device for a suction tube. In particular, the invention relates to a winding device for a suction tube of vehicle exhaust fumes.

[0002] The winding device according to the present invention is usefully applied in workshops where overhauling or maintenance of motor vehicles is carried out, during which there are periods when the motor is started up and allowed to run for some time.

[0003] The winding device is generally associated to a sliding carriage that is movable along a guide. The sliding carriages are provided with wheels and sliders, predisposed to engage with the profiled guide members, and a fitting mouth, facing upwards, predisposed to connect to a suction channel. The suction channel is set in communication with a suction source and comprises two flexible seal edges, partially overlapping one another. The fitting mouth inserts between the two seal edges and deforms them locally without compromising the seal. When sliding along its pathway, the support carriage supporting the winder pushes the fitting mouth along the suction channel. When passing, the fitting mouth locally deforms the seal edges.

[0004] According to the plan extension surface of the workshop, one or more suction channels are installed along straight direction lines.

[0005] In some cases the workshops can in fact have a plurality of automobile testing or maintenance stations arranged in rows that are not necessarily parallel to one another. In these cases each station row is served by a dedicated channel mounting several winders. In other words, there are no curved sections for joining of the straight sections and consequently it is not possible for the winders to transit from a straight section of channel to another.

[0006] This leads to an increase in maintenance costs for the lines, given the high number of channels and winders mounted for each linearly-extending channel.

[0007] The aim of the present invention is to provide a winder for a suction tube which obviates the drawbacks of the currently available winders.

[0008] Characteristics and advantages of the present invention will more fully emerge from the following detailed description of an embodiment of the invention, as illustrated in a non-limiting example in the accompanying drawings, in which:

- figure 1 shows a perspective view of a first embodiment of a winder made according to the present invention.
- figure 2 shows the winder of figure 1 in cross-section.
- figure 3 shows the winder of figure 1 in a front view.
- figure 4 shows a perspective view of a second embodiment of a winder made according to the present invention.
- figure 5 shows the winder of figure 4 in a front view.

- figure 6 shows the winder of figure 4 in cross-section.

[0009] The winding device according to the present invention comprises a support carriage (2) provided with a first axle (3) comprising one or more wheels (31) and a second axle (4) comprising one or more wheels (41).

[0010] Each wheel (31, 41) belonging to the relative axle (3, 4) is predisposed to engage with a profiled guide member so as to enable a translation of the carriage on a motion plane that is substantially horizontal, along an advancement direction (Y).

[0011] As can be seen in the appended figures, the first axle (3) is defined by a first pair of brackets (32), each provided with at least one wheel (31) able to engage with the profiled guide member. In other words, each bracket (32) is facing another one and has at least one wheel ideally connectable to the wheel of the other bracket by means of a first ideal axis (K).

[0012] In the same way, the second axle (4) is defined by a second pair of brackets (42), each provided with at least one wheel (41) able to engage on the profiled guide member. In other words each bracket (42) is facing the other and has at least one wheel ideally connectable to the wheel of the other bracket by means of a second ideal axis (K').

[0013] The profiled guide member, not illustrated as it is known to the person skilled in the art, defines the path that the carriage (2) can follow, and can be located, as in present systems, above the carriage (2). For example, the profiled guide member can be associated to the ceiling of the workshop.

[0014] The profiled guide member can be shaped in such a way as to define a mixed pathway, provided with two or more straight sections joined to one another by curved sections. Generally, the profiled guide member lies on a motion plane that is substantially horizontal.

[0015] The carriage (2) is hung from profiled guide member by means of the first and second axle (3, 4). In other words the carriage (2) is hung from profiled guide member by the wheels (31, 41) distributed on the first and second axle (3, 4). Some of the several wheels can be provided with a horizontal rotation axis, others with a vertical rotation axis, in a way known to the person skilled in the art, so as to achieve a coupling with the profiled guide member which prevents the carriage (2) from displacing vertically and transversally with respect to the advancement direction (Y).

[0016] The winding device further comprises a suction conduit (5), associated to the carriage (2). The suction conduit is provided with an end fitting mouth (51) having an elongate shape along the advancement direction (Y) and predisposed to connect to a suction channel. The suction channel, not illustrated as it is known to the person skilled in the art, can be located in proximity of the profiled guide member, above the carriage (2). As in the present plants, the suction conduit is provided with two flexible seal edges, internally of which the fitting mouth (51) is inserted, deforming the seal edges and separating

them locally without compromising the overall seal. To facilitate the insertion and sliding between the seal edges, the fitting mouth (51) has an elongate shape along the advancement direction (Y), and is provided with tapered ends. The fitting mouth (51) is orientated upwards, in order to insert in the overlying suction channel.

[0017] In the appended figures the fitting mouth (51) preferably takes an ogival shape.

[0018] A drum (6) is associated to the carriage (2) so as to enable the winding of a flexible suction tube, destined to be coupled to the exhaust terminal of a vehicle. The drum (6) rotates about a winding axis (X). The winding axis (X) is advantageously parallel to the advancement direction (Y). This enables reducing the transversal dimension of the winding device.

[0019] The parallel arrangement of the axes (X) and (Y) makes the winding and unwinding operations of the tube easier.

[0020] In fact, for example, the traction of the tube is facilitated if it takes place along a direction tangential to the rotation direction of the drum rather than a direction incidental to the rotation centre of the drum (a typical operation that might take place if the X and Y axes were perpendicular to one another).

[0021] The arrangement of the winding axis (X) parallel to the advancement direction (Y) thus enables, in the traction operations of the tube, unwinding the tube without the displacement of the carriage from the position reached in the channel. Differently, with a perpendicular configuration of the axes (X, Y), in order not to move the carriage the user would be forced to unwind the necessary part of the tube by placing himself beneath the carriage in order then to move the unwound portion of tube into the required testing position.

[0022] The arrangement of the winding axis (X) parallel to the advancement direction (Y) still generates minimum stresses on the carriage that are easily tolerable. On the contrary, if these axes (X, Y) were perpendicular, forces could be imparted on the carriage, both during the winding and unwinding steps, such as to shift it out of position and even out of the guides of the channel.

[0023] The drum (6) is provided with a first connector (61) for an end of a flexible suction tube, predisposed to connect to the suction conduit (5).

[0024] The suction conduit (5) is advantageously at least partly arranged internally of the carriage (2), so as to contain the volume of the device.

[0025] In particular, the suction conduit (5) is at least partly afforded internally of the carriage (2).

[0026] For this purpose, the carriage (2) comprises a longitudinal portion (23), orientated substantially parallel to the winding axis (X), which is provided with an internal cavity. The internal cavity defines a first section (52) of the suction conduit (5). The carriage (2) further comprises a first abutment (24), in turn provided with an internal cavity which defines a second section (53) of the suction conduit (5), in communication with the first section (52). The fitting mouth (51) is connected to the longitudinal

portion (23) and is in communication with the first section (52) of the suction conduit (5). In particular, the fitting mouth (51) projects above the longitudinal portion (23) and opens internally thereof.

[0027] The carriage (2) further comprises a second abutment (25) defining, together with the first abutment (24) and the longitudinal portion (23), an overturned U-shaped configuration accommodating the drum (6) internally thereof.

[0028] The drum (6) is internally hollow and is set in communication with the first section (52) of the suction conduit (5) by means of the second section (53). In turn, the second section (53) is set in communication with the inside of the drum (6) by means of a hollow rotating joint (62).

[0029] The hollow rotating joint (62) enables fluid communication between the suction conduit (5), which also functions as a bearing frame of the carriage (2) and the first connector (61) and at the same time enables rotation of the drum (6) with respect to the carriage (2).

[0030] In a case in which the drum (6) is under vacuum, there exists a communication between the hollow rotating joint (62) and the connector (61). In this configuration the drum (6) defines a closed chamber.

[0031] Alternatively the hollow rotating joint (62) is directly connected to the connector (61) by means of an auxiliary tube illustrated in the appended figures with a broken line.

[0032] As illustrated in the appended figures, the hollow rotating joint (62) assumes, in all the configurations, a pivot function for the rotation of the drum (6).

[0033] The carriage (2) advantageously comprises at least a first fork (7), to which the front wheels (31) are associated, which fork can rotate about a rotation axis (Z), perpendicular to the motion plane of the carriage (2).

[0034] As can be seen in the appended figures 1-6, the first fork (7) comprises two abutments (71) substantially parallel to the rotation axis (Z) and associated to the first axle (3) provided with one or more wheels (31) and with a connecting element (72).

[0035] In other words, the two abutments (71) of the first fork (7) coincide with the pair of brackets (32) of the first axle (3).

[0036] The fork (7) thus enables steering the wheels (31), so that they can align to the trajectory defined by the profiled guide member of the carriage (2) independently of the carriage (2). In this way, the spacing between the first axle (3) and the second axle (4) can be lengthened, without compromising the ability of the carriage (2) to follow curved trajectories, where a greater spacing enables orientating the winding axis (X) parallel to the advancement direction (Y).

[0037] In the first embodiment illustrated in figures 1-3, the second axle (4) is fixed. In other words, the second pair of brackets (42) of the second axle (4) is directly connected to the second carriage (2) without any interposition of rotating elements. More precisely, the pair of brackets (42) of the second axle (4) is directly connected

to the longitudinal portion (23) of the carriage (2).

[0038] As can be seen in figures 1-3, the wheels (41) of the second axle (4) are non-steering.

[0039] The fitting mouth (51) is advantageously located in proximity of the second axle (4). This positioning enables orientating the fitting mouth (51) in a direction substantially tangential to the trajectory followed by the rear wheels. In this way, the fitting mouth (51) remains constantly within the volumes of the profiled guide members of the curved section and inserts, again optimally, between the seal edges of the suction channel, in the initial straight sections located at the end of the curved section. Preferably, though not necessarily, the fitting mouth (51) is located in an intermediate position with respect to the second axle (4), so as to maximise the above-described advantages. In this preferred embodiment, visible in figure 1, the fitting mouth (51), located above the longitudinal portion (23), is arranged between the second pair of brackets (42).

[0040] In a second embodiment, illustrated in figures 4-6, the carriage comprises a second fork (8).

[0041] As with the first fork, the second fork (8) also comprises two abutments (81) substantially parallel to the rotation axis (Z') and associated to the second axle (4) provided with one or more wheels (41), and a connecting element (82).

[0042] In other words, the two abutments (81) of the second fork (8) coincide with the second pair of brackets (42) for the second axle (4).

[0043] The second fork (8), in collaboration with the first fork (7), enables steering and therefore allowing the carriage (2) to follow curved trajectories with a narrower degree of curvature.

[0044] In this variant the fitting mouth (51) is located between the first and the second axle (3, 4). The fitting mouth (51) is preferably located internally of the space defined between the first and second pair of brackets (32, 42), i.e. internally of the first and second ideal axis (K, K') while maintaining the lie thereof always above the longitudinal portion (23) of the carriage (2).

[0045] This lie, like the previously-described lie, enables the fitting mouth (51) remaining constantly within the volumes of the profiled guide members of the curved section and inserting, again optimally, between the seal edges of the suction channel, in the initial straight sections located at the end of the curved section.

[0046] The winding device according to the present invention further comprises at least one motorised wheel (9), predisposed to engage with a profiled guide member of the carriage (2), so as to enable an autonomous movement of the carriage (2) along the profiled guide member. The motorised wheel (9) can be located in proximity of the one or more wheels (31) or the one or more wheels (41). In a way known to the person skilled in the art, the motorised wheel (9) is provided with a gear motor, associated to the carriage (2).

[0047] The presence of the motorised wheel (9) enables moving the carriage (2) along the mixed trajectory,

without the operator drawing the carriage along the desired direction.

[0048] The above-mentioned motorised wheel (9) is preferably activated by a motor with the interposition of a reversible reduction gear which enables the operator to displace the carriage (2) manually even in the absence of motor power supply.

10 Claims

1. A winding device for a suction tube, comprising:

a support carriage (2) provided with a first axle (3) comprising one or more wheels (31) and a second axle (4) comprising one or more wheels (41); said wheels being predisposed to engage with a profiled guide member so as to enable a translation of the carriage on a motion plane that is substantially horizontal, along an advancement direction (Y);

a suction conduit (5), associated to the carriage (2) and provided with an end fitting mouth (51) having an elongate shape along the advancement direction (Y) and predisposed to connect to an channel;

a drum (6), rotating about a winding axis (X), provided with a first connector (61) for an end of a flexible suction tube, predisposed to connect to the suction conduit (5);

characterised in that the carriage (2) comprises at least a first fork (7), to which the first axle (3) is associated, which can rotate about a rotation axis (Z), perpendicular to the motion plane of the carriage (2).

2. The winding device according to claim 1, further comprising a second fork (8), to which the second axle (4) is associated, which can rotate about a rotation axis (Z'), perpendicular to the motion plane of the carriage (2).

3. The winding device according to claim 1 or 2, comprising at least one motorised wheel (6), predisposed to engage with a profiled guide member of the carriage (2), so as to enable an autonomous movement of the carriage (2) along the profiled guide member.

4. The winding device according to claim 1, wherein the fitting mouth (51) is located in proximity of the second axle (4); said second axle (4) having one or more non-steering wheels (41).

5. The winding device according to claim 4, wherein said fitting mouth (51) is located in an intermediate position with respect to the second axle (4).

6. The winding device according to claim 2, wherein

the fitting mouth (51) is located in an intermediate position between the first and the second axle (3, 4).

7. The winding device according to claim 1, wherein the fitting mouth is entirely contained internally of the plan projection of the carriage (2). 5
8. The winding device according to claim 1, wherein the winding axis (X) is parallel to the advancement direction (Y). 10
9. The winding device according to claim 1, wherein the suction conduit (5) is at least partly arranged internally of the carriage (2). 15
10. The winding device according to claim 9, wherein the carriage (2) comprises a longitudinal portion (23), provided with an internal cavity which defines a first section (52) of the suction conduit (5), and an abutment (24), in turn provided with an internal cavity which defines a second section (53) of the suction conduit (5), in communication with the first section (52); the fitting mouth (51) is connected to the longitudinal portion (23) and is in communication with the first section (52) of the suction conduit (5). 20 25
11. The device according to claim 10, wherein said fitting mouth (51) is located above said longitudinal portion (23). 30

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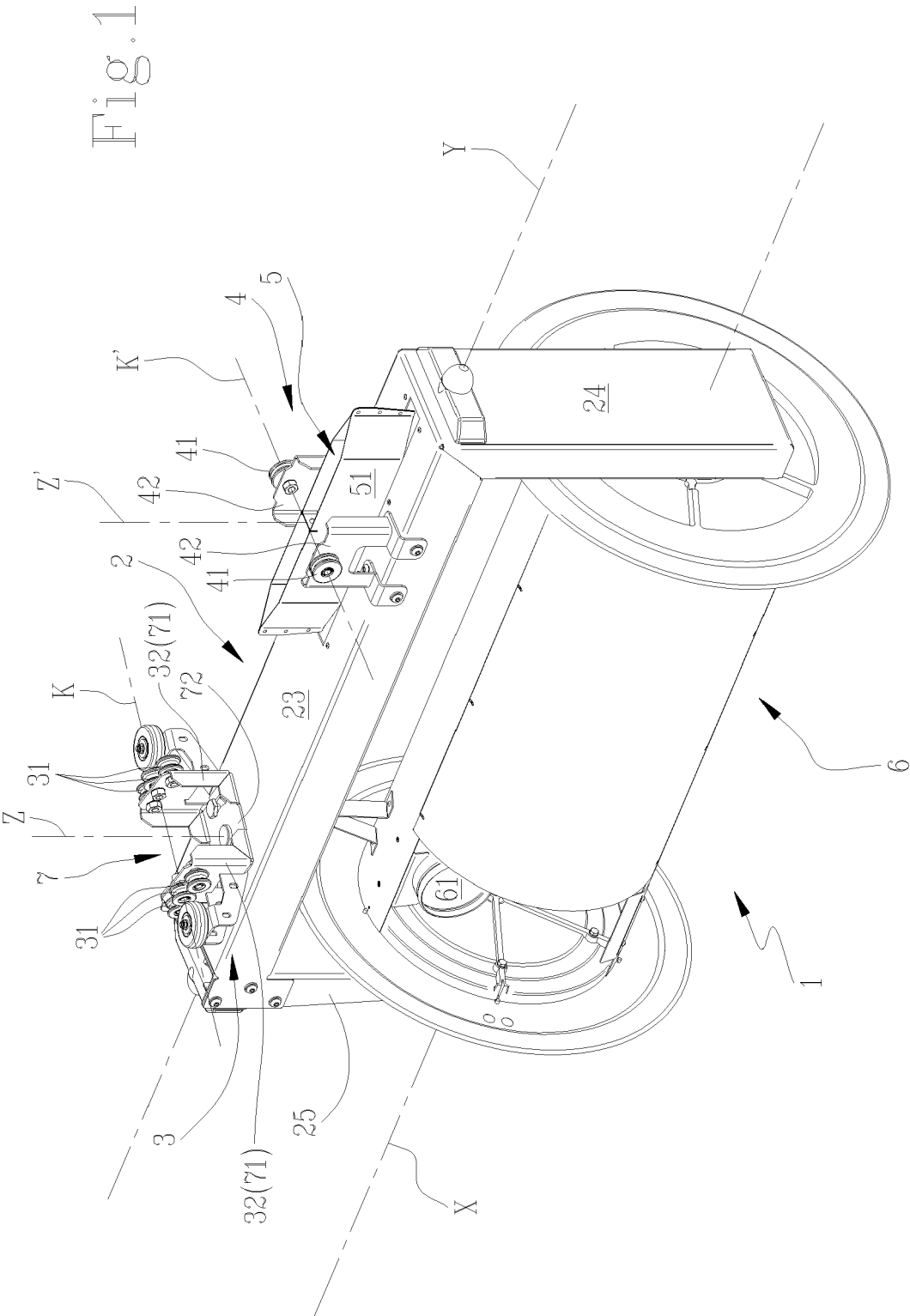
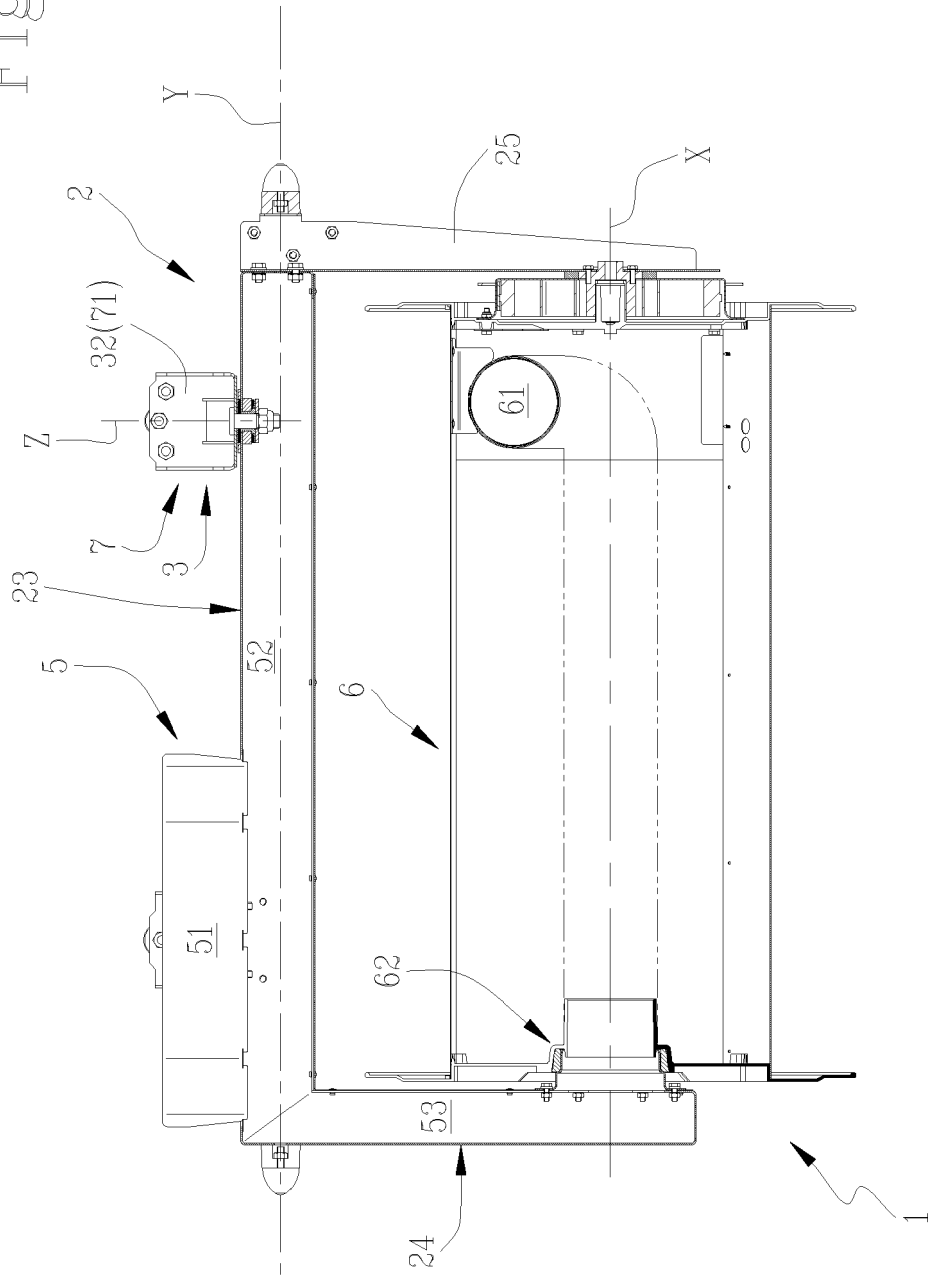
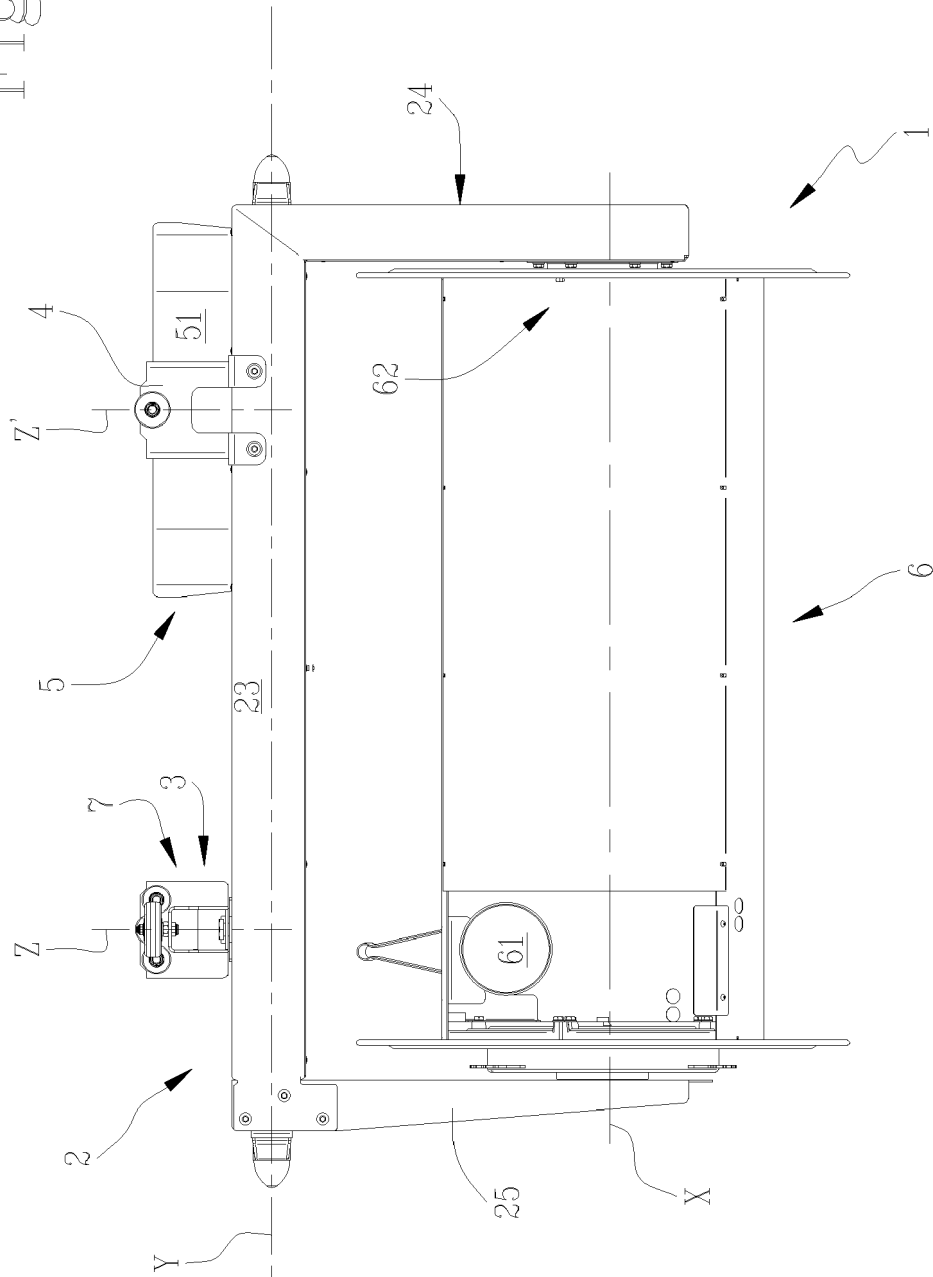


Fig. 2





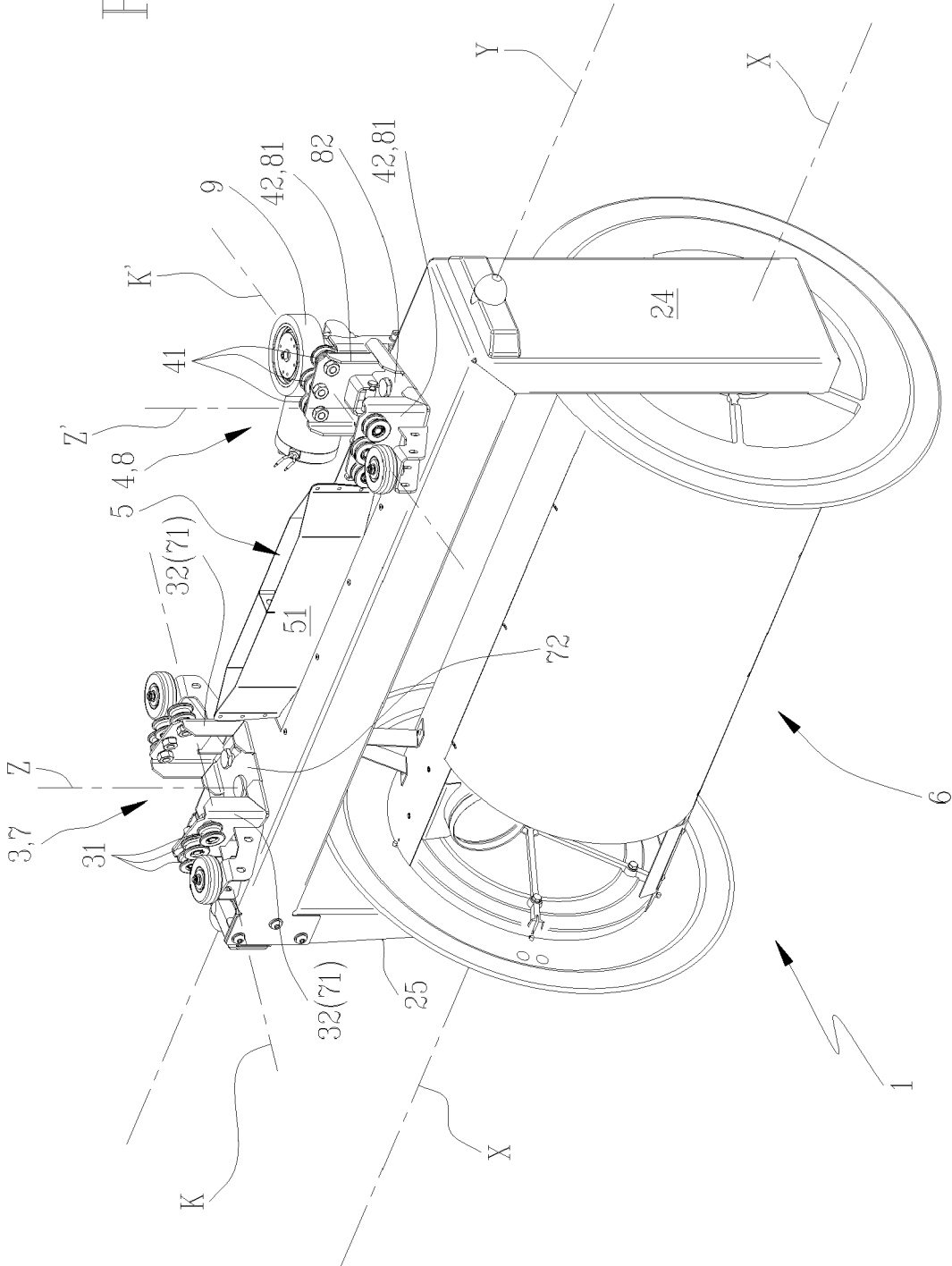
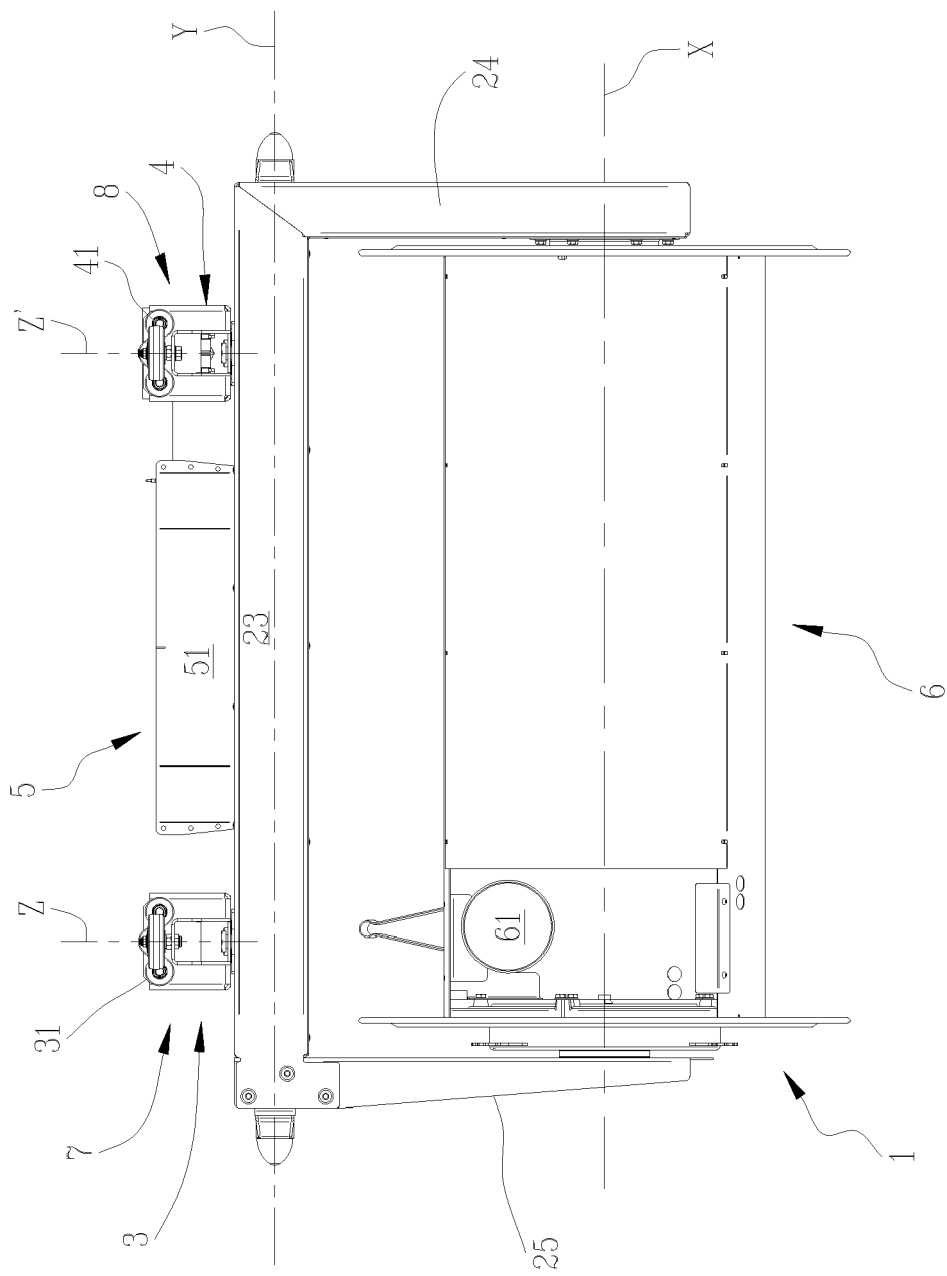
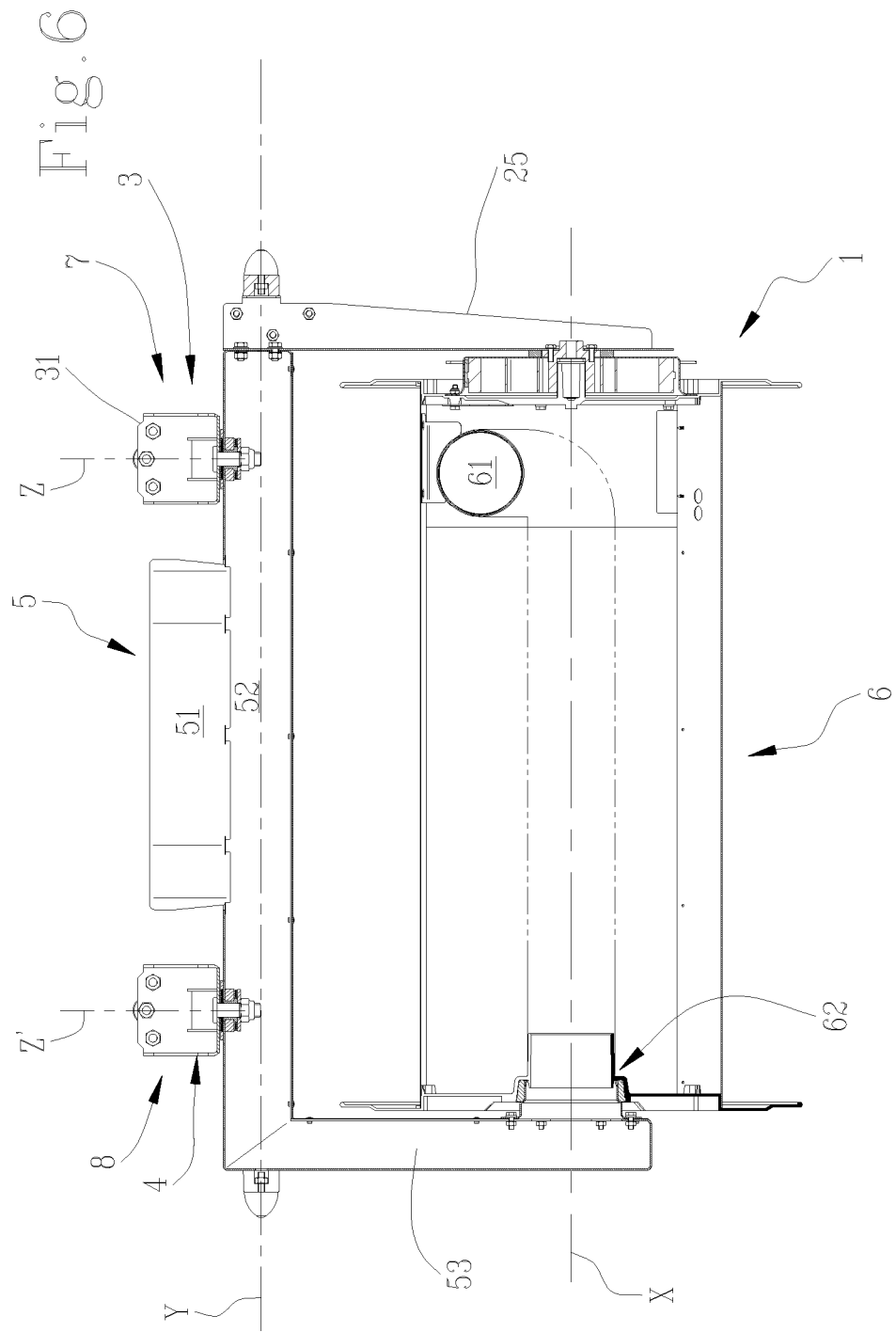


Fig. 4







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Application Number
EP 18 17 2974

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 September 2018	Examiner Lemmen, René
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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