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(54) FRICTION SYSTEM FOR ROTATABLE EXTENSIONS OF SUCTION ARMS

(57) A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms comprising, a first abutment (101, 201, 301), abutment means (102, 202, 302), first friction means (103a, 203a, 303a) and second friction means (103b, 203b, 303b) compressed between the first abutment (101, 201, 301) and the abutment means (102, 202, 302) by clamping means (104; 204a, 204b; 304) impressing a selectively modulated couple. The friction system (100, 200, 300) also comprising a mousse gasket (105, 205, 305) configured to ensure the aeraulic tightness and elasticity on said clamping means (104; 204a, 204b; 304).

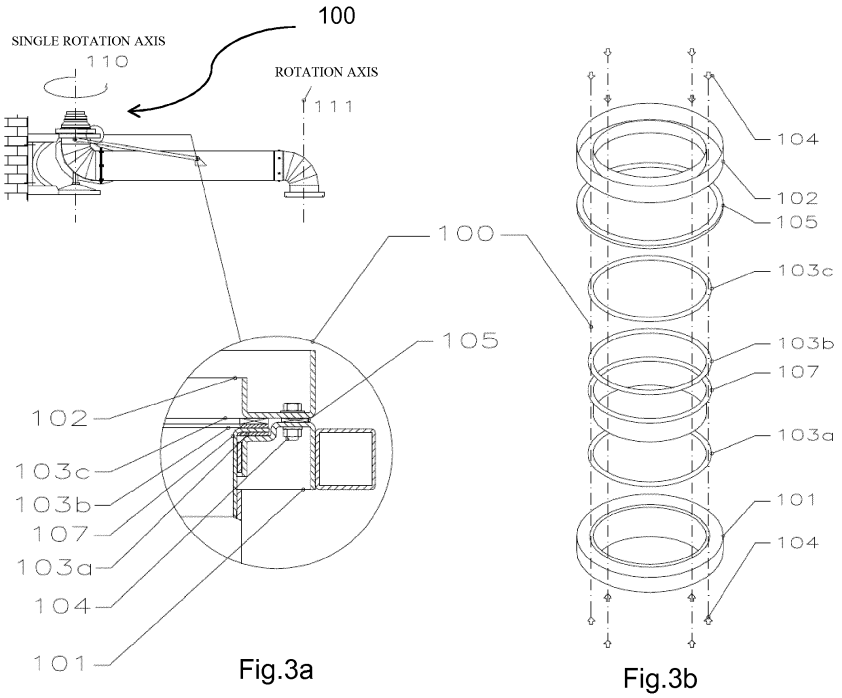

Fig.3a

Fig.3b

Fig.3

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Description

[0001] The present invention relates to a friction system for rotatable extensions of suction arms.

[0002] In particular, the present invention relates to a friction system for rotatable extensions of suction arms, of the horizontal type which can be combined with localized collection devices, such as the suction arms, in the context of air intake systems.

[0003] As it is known, the localized collection systems are air suction systems, for example of mobile suction arms with possible extensions subject to tilting, or to a horizontal rotation movement, during use. Examples are shown in Figures 1 and 2, in which a horizontal boom extension has a free axis rotation system consisting of a lower rotating support, with or without thrust bearing, and of an upper guide referred to the air conveying section (figure 1), namely to the upper part of the structural body not conveying the air (figure 2).

[0004] The problem of these localized collection systems, or air intake systems composed by Bracket-Extension-Arm-Hood, is that, during the use by an operator acting from the Hood, it is impossible to know which horizontal joint will be released first after the rotation between the joint Bracket-Extension axis (110-210-310) and the joint Extension-Arm axis (111-211-311). Therefore, it is necessary to establish a rotation priority of the individual horizontal joints Bracket-Extension axis (110-210-310) and Extension-Arm axis (111-211-311), so that the rotation progression of the single horizontal joint can be selectively determined.

[0005] The object of the present invention is to provide a friction system for the horizontal joint Bracket-Extention axis (110-210-310) of rotatable extensions of suction arms capable of adjusting the sliding friction of the rotation, both in the static and in the dynamic component, and to modulate the force to be used for rotation at will, thus having characteristics such as to exceed the limits of the friction systems for horizontal joints of rotatable extensions of known suction arms.

[0006] According to the present invention, there is provided a friction system for the horizontal joint Bracket-Extension axis (110-210-310) of rotatable extensions of suction arms, as defined in claim 1.

[0007] For a better understanding of the present invention, a preferred embodiment is now described, purely by way of nonlimiting example, with reference to the attached drawings, in which:

- Figures 1a-1b and 1d-1e show side and top two-dimensional schematic views of a system for capturing the air rotating around a free axis, respectively in a single joint configuration Bracket-Extension and in configuration with an appendage or arm Bracket-Extension-Arm-Hood, having the air conveying system coinciding with the rotating structural body and Figures 1c and If show their respective fixed friction systems, according to the prior art;
- Figures 2a-2b and 2d-2e show two-dimensional side and top schematic views of a system Bracket-Extension for capturing the air rotating around a free axis respectively in a horizontal single-joint configuration and in configuration Bracket-Extension-Arm-Hood with an appendage or arm, having the air conveying system separated from the rotating structural body and Figure 2c shows the fixed friction system of the system of Figure 2a, according to the prior art;
- Figures 3a-3b respectively show a schematic two-dimensional lateral view and an exploded three-dimensional view of a first embodiment of a Bracket-Extension friction system for horizontal joints of rotatable extensions of suction arms of an air collection system, according to the invention;
- Figures 4a-4b respectively show a schematic two-dimensional lateral view and an exploded three-dimensional view of a second embodiment of the Bracket-Extension friction system for horizontal joints of rotatable extensions of suction arms of an air collection system, according to the invention;
- Figures 5a-5b respectively show a schematic two-dimensional lateral view and an exploded three-dimensional view of a third embodiment of the Bracket-Extension friction system for horizontal joints of rotatable extensions of suction arms of an air collection system provided with an autonomous ventilation system (on board fan), according to the invention;
- Figure 6 shows schematic views of the phases of use of an air collection system Bracket-Extension-Arm-Hood with a rotatable extension and suction arm comprising the Bracket-Extension horizontal joint friction system of figure 3, according to the invention;
- Figure 7 shows schematic views of the phases of use of an air collection system Bracket-Extension-Arm-Hood with a rotatable extension and suction arm comprising the Bracket-Extension horizontal joint friction system of Figure 4, according to the invention.

[0008] With reference to these figures and, in particular, to Figures 3, 4 and 5, a Bracket-Extension horizontal joint friction system for Bracket-Extension-Arm-Hood rotatable extensions of suction arms, according to the invention, is shown. In particular, Figure 3 shows a first embodiment of the horizontal joint friction system 100 for the system Bracket-Extension of rotatable extensions of suction arms comprising a horizontal joint Bracket-Extension, comprise a first abutment 101, a flanged metal duct 107, abutment means 102, a first friction mean 103a and a second friction mean 103b, and third friction means 103c compressed between the first abutment 101 and the abutment means 102.

[0009] The horizontal joint friction system 100 also comprises a mousse gasket 105 made in rubber and able to counteract elastically to the third friction means 103c.

[0010] According to an aspect of the invention, the abutment means 102 are a counter flange.

[0011] According to an aspect of the invention, the friction means 103a, 103b, 103c are compressed between the first abutment 101 and the counter flange 102 by clamping means 104, comprising screws, flat washers and nuts.

[0012] In this case, the ventilating unit of the collection system, that is a machine driven by an electric motor that allows the intake of air axially, putting in depression the whole upstream configuration (swivelling boom and suction arm), is in support and one of its conveyor flange also acts as an abutment means for the clamping means 104.

[0013] Advantageously according to the invention, the tightening torque of the clamping means 104 can be modulated by the operator on the basis of the selectivity to be obtained with respect to possible Extension-Arm front joints . In fact, advantageously, in the case in which there are more joints along the direction of use, the selectivity of each joint with respect to the others can be determined by the operator.

[0014] According to another aspect of the invention, the mousse gasket 105 ensure the air tightness and elasticity of the clamping means 104.

[0015] According to an aspect of the invention, the friction means 103a, 103b and 103c are a toroidal-shaped clutch made in a low friction factor technopolymer, or whenever needed in a conductive metal material.

[0016] Figure 4 shows a second embodiment of the Bracket-Extension horizontal joint friction system 200 for rotatable extensions of suction arms. In the second embodiment, the first abutment 201 is a rotary disk keyed on the rotation axis 50 of the structure of the system 200 and integral with the axis 50. The friction system 200 also comprises an abutment means 202, which also acts as a support, consisting of a support bracket.

[0017] Also, in the system 200, the first friction means 203a and the second friction means 203b are compressed between the first abutment 201 and the abutment means 202 by clamping means 204a and 204b.

[0018] The clamping means 204a are clamps and the clamping means 204b are screws, flat washers and nuts. Their tightening torque can be advantageously modulated by the operator on the basis of the selectivity to be obtained with respect to possible front joints.

[0019] According to an aspect of the invention, the first and second friction means 203a, 203b comprise a pair of toroidal-shaped clutches made of technopolymer or of conductive metal material.

[0020] Also, the system 200 comprises a mousse gasket 205 to ensure elasticity on the clamping means 204a, 204b. In fact, greater tightening will produce a stronger torque with a higher value, giving the operator a progressive selection of rotations.

[0021] The friction system 200 in the second embodiment, as shown in figure 4 is placed on the rotation axis 50, being able to control and brake the rotation.

[0022] Figures 6 and 7 show, in fact, how the operator can have a progressive selection of the rotations, respectively using the first or the second embodiment of the horizontal joint friction system Bracket-Extension registered according to the invention.

[0023] Figure 5 shows a third embodiment of the friction system 300 for rotatable extensions of suction arms comprising a horizontal joint Bracket-Extension, composed by first abutment means 301, first friction means 303a and second friction means 303b, a flanged metal duct 107, abutment means 302 and third friction means 303c compressed between the first abutment 301 and the abutment means 302. According to an aspect of the invention, the abutment means 302 is a conveyor flange 302 of the ventilation unit of the collection system.

[0024] According to an aspect of the invention, the friction means 303a, 303b and 303c are compressed between the first abutment 301 and the conveying flange 302 by clamping means 304, comprising screws, flat washers and nuts.

[0025] Advantageously according to the invention, the tightening torque of the clamping means 304 can be modulated by the operator on the basis of the selectivity to be obtained with respect to possible Extention-Arm front joints.

[0026] According to another aspect of the invention, the system 300 also comprises a calibrated mousse gasket 305 to ensure both the aeraulic seal towards the outside and the elasticity of the clamping system since its purpose is to minimize the inertial effect due to the mass of the fan unit resting on the clamping system itself.

[0027] According to an aspect of the invention, the friction means 303a, 303b and 303c are toroidal-shaped clutches made of a low friction factor technopolymer, or of a conductive metallic material.

[0028] Therefore, the friction system 100, 200, 300 for horizontal joint of Bracket-Extension of rotatable extensions of suction arms according to the invention allows a continuous regulation of the friction resistance.

[0029] Another advantage of the friction system 100, 200, 300 for horizontal joint of Bracket-Extension of rotatable extensions of suction arms according to the invention is to be simple to manufacture.

[0030] Another advantage of the friction system 100, 200, 300 for horizontal joint of Bracket-Extension of rotatable extensions of suction arms according to the invention is to allow the adjustment of the force on the individual extensions.

[0031] Advantageously, the friction system 100, 200, 300 according to the invention, allows to know which horizontal joint will be released first after the rotation between the joint Bracket-Extension axis (shown in figures 3, figure 4 and figure 5 as 110-210-310) and the joint Extension-Arm axis (shown in figures 3, figure 4 and figure 5 as 111-211-311) during the use by an operator acting from the Hood. Therefore, the friction system according to the invention allows to establish a rotation priority of the individual horizontal joints Bracket-Extension axis

(110-210-310) and Extension-Arm axis (111-211-311), so that the rotation progression of the single horizontal joint can be selectively determined.

[0032] Advantageously, the present invention provides a friction system for the horizontal joint Bracket-Extention axis (shown in figures 3, figure 4 and figure 5 as 110, 210, 310) of rotatable extensions of suction arms capable of adjusting the sliding friction of the rotation, both in the static and in the dynamic component, and to modulate the force to be used for rotation at will.

[0033] Finally, it is clear that modifications and variations can be made to the friction system for horizontal joint of Bracket-Extension of rotatable extensions of suction arms described and illustrated herein without departing from the scope of the present invention, as defined in the attached claims.

Claims

1. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms comprising, a first abutment (101, 201, 301), abutment means (102, 202, 302), first friction means (103a, 203a, 303a) and second friction means (103b, 203b, 303b) **characterized in that** the first friction means (103a, 203a, 303a) and the second friction means (103b, 203b, 303b) are compressed between the first abutment (101, 201, 301) and the abutment means (102, 202, 302) by clamping means (104; 204a, 204b; 304) impressing a selectively modulated couple, and in comprising at least one mousse gasket (105, 205, 305) configured to ensure the aeraulic tightness and elasticity on said clamping means (104; 204a, 204b; 304) .

2. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to claim 1 **characterized in** comprising a flanged metal duct (107, 307) and a third friction means (103c, 303c) compressed between the first abutment (101, 301) and the abutment means (102, 302) by clamping means (104, 304).

3. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to claim 2, **characterized in that** the third friction means (103c, 303c) consist in at least one clutch of toroidal shape made of low resistance factor technopolymer or, if necessary, of a conductive metallic material.

4. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to any of the preceding claims, **characterized in that** the abutment means (102) are a counterflange.

5. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to any one of claims 1-4, **characterized in that** the abutment means (202) are a support bracket.

6. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to any of the preceding claims, **characterized in that** the first abutment (201) is a rotary disk keyed on an axis of rotation (50) of the friction system (200) and integral with the axis 50.

7. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to any of claims 1-6, **characterized in that** the abutment means (302) are the conveyor flange of a ventilation unit of a capture system.

8. A friction system (100, 200, 300) for horizontal joints of rotatable extensions of suction arms according to claim 1, **characterized in that** the first friction means (203a) and second friction means (203b) are toroidal-shaped clutches made of technopolymer or of a conductive metal material.

9. Horizontal joint Bracket-Extension of rotatable extensions of suction arms comprising a friction system according to any of claims 1-8.

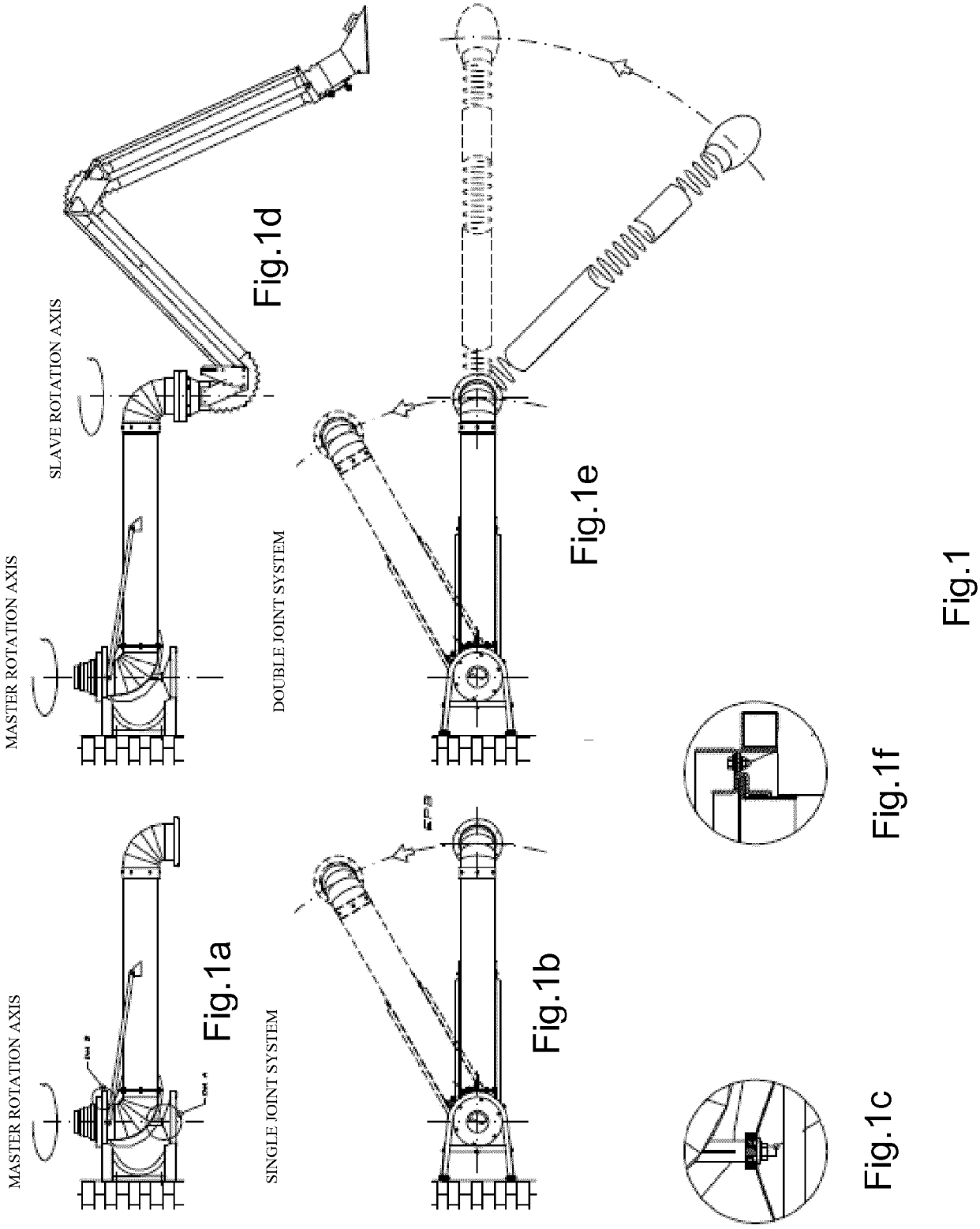


Fig.1a

Fig.1b

Fig.1c

Fig.1d

Fig.1e

Fig.1f

Fig.1

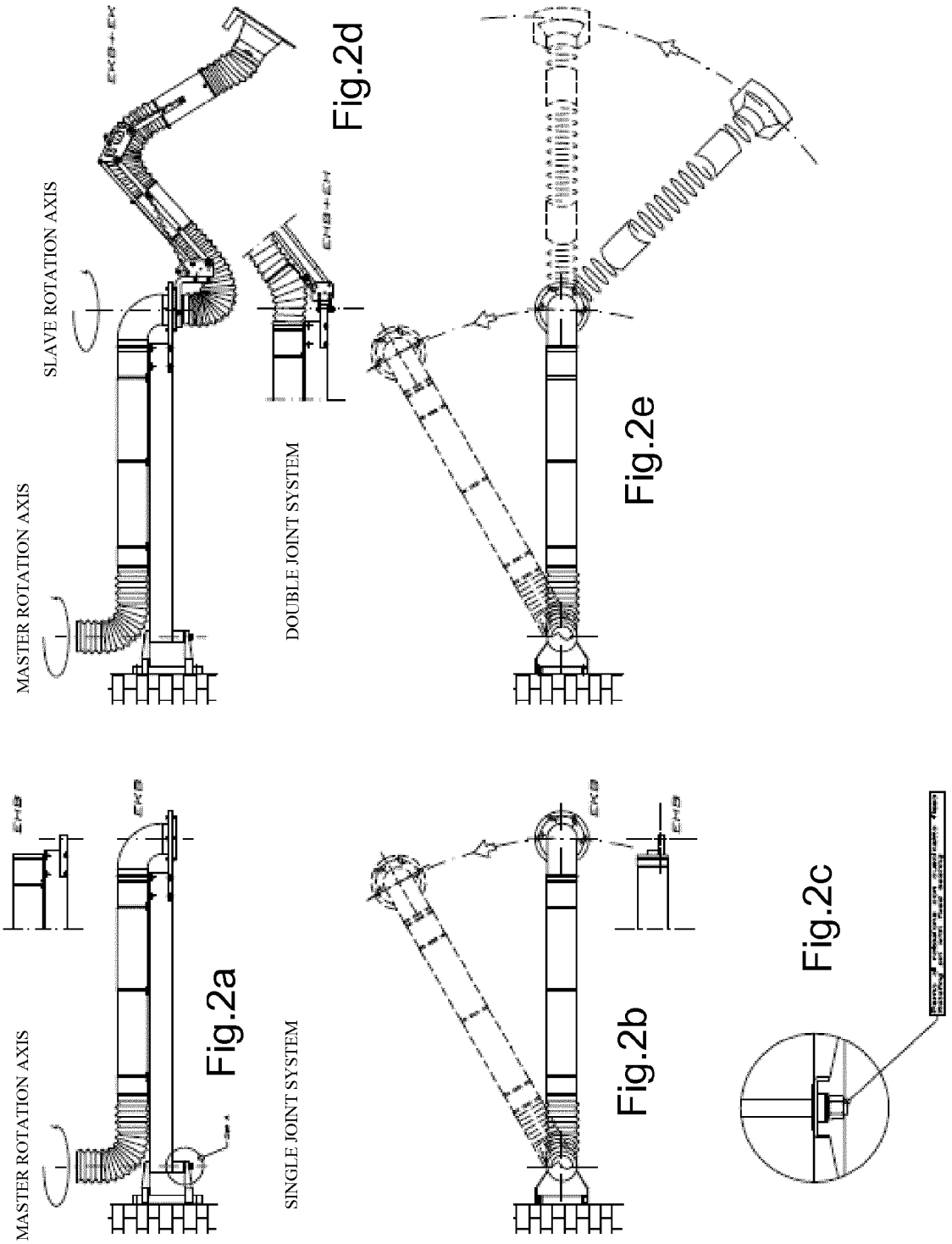


Fig.2a

Fig.2b

Fig.2c

Fig.2d

Fig.2e

Fig.2

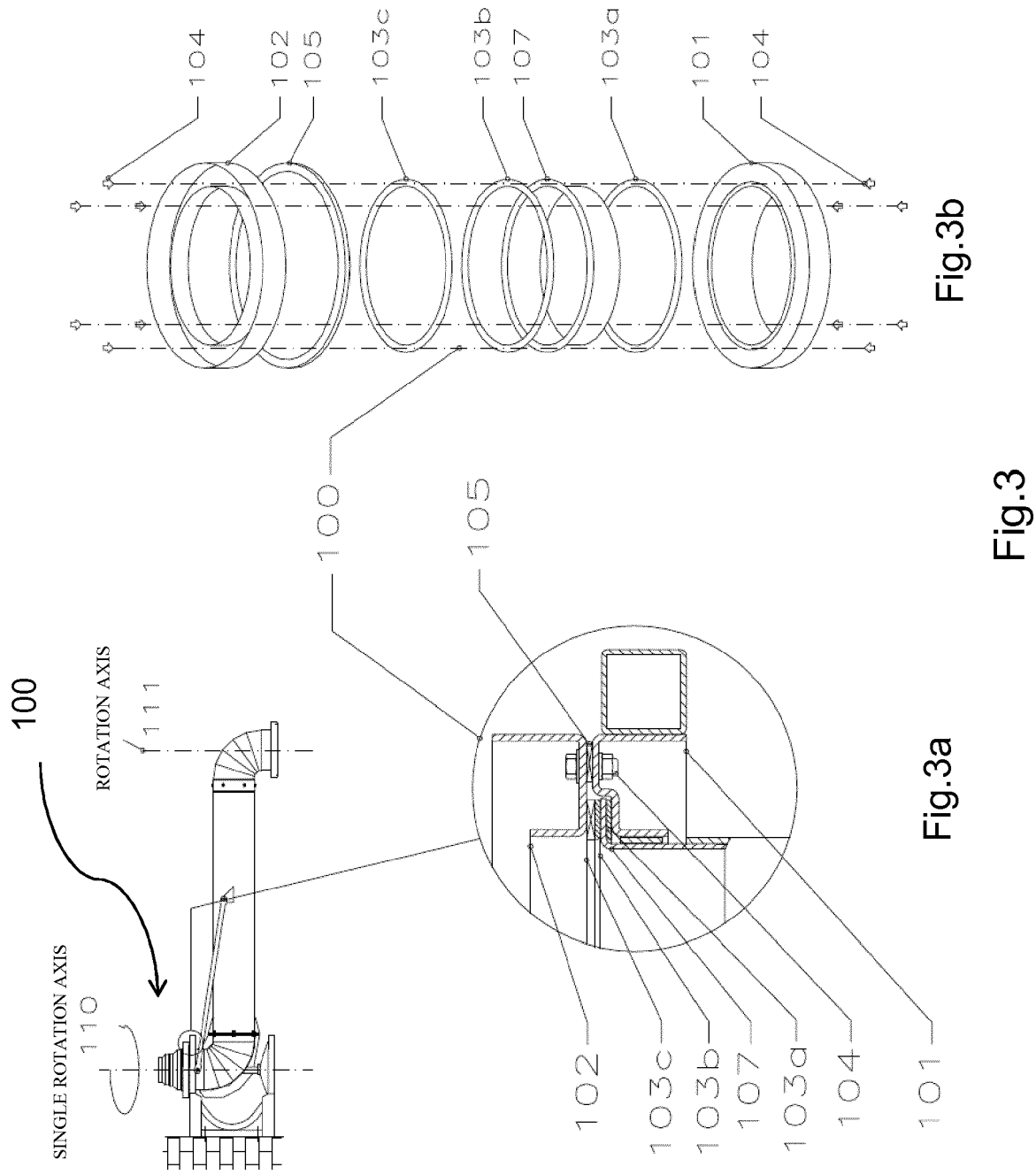


Fig.3a

Fig.3b

Fig.3

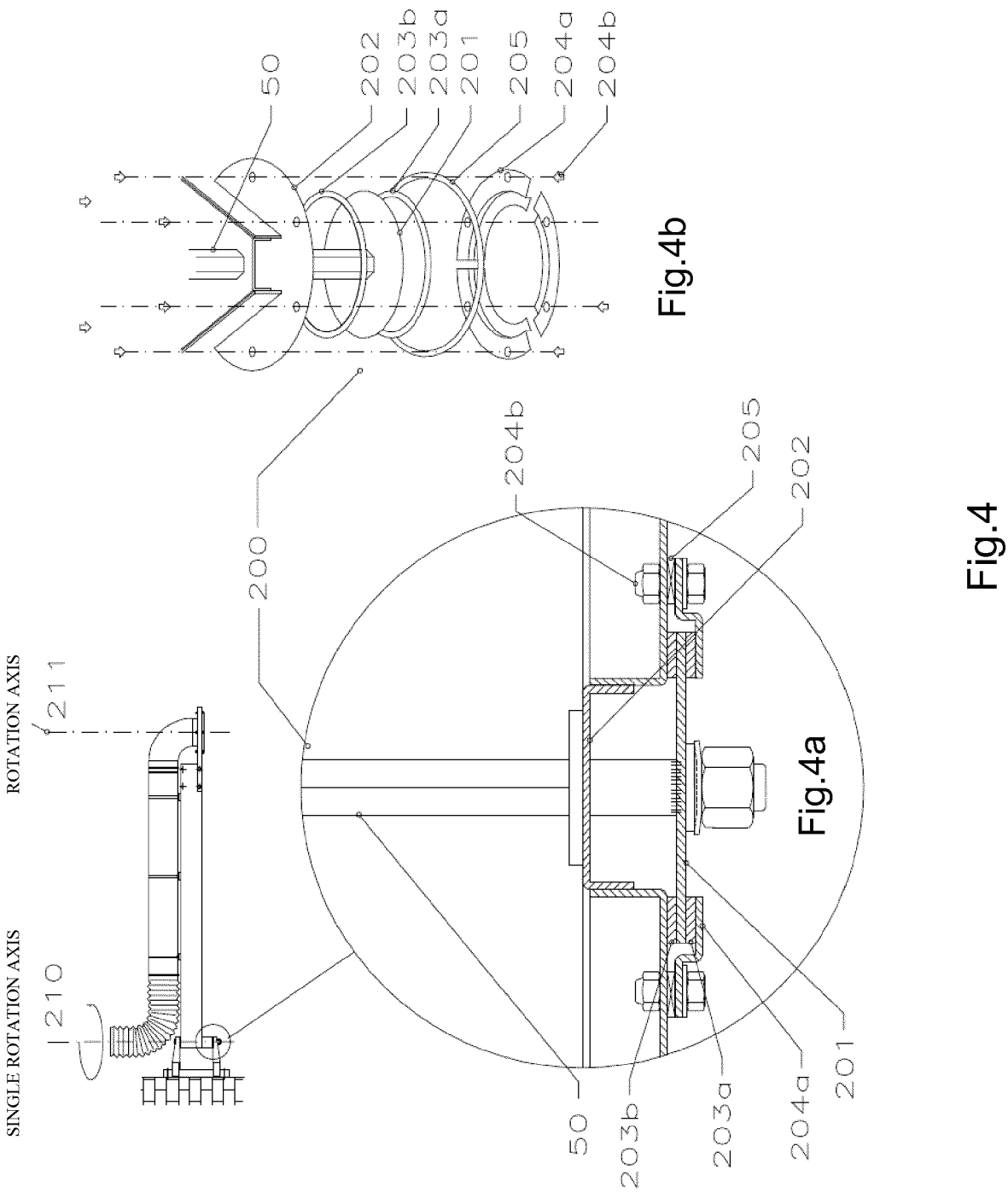


Fig.4b

Fig.4a

Fig.4

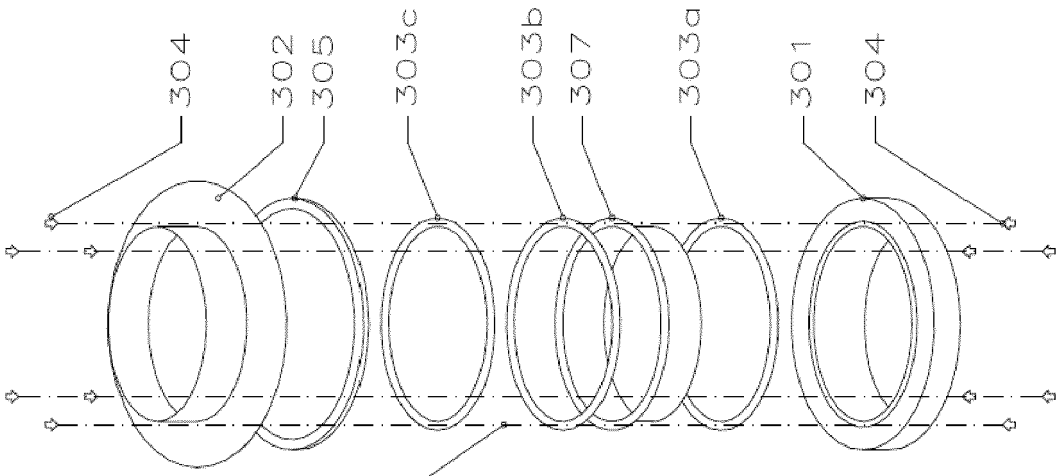


Fig.5b

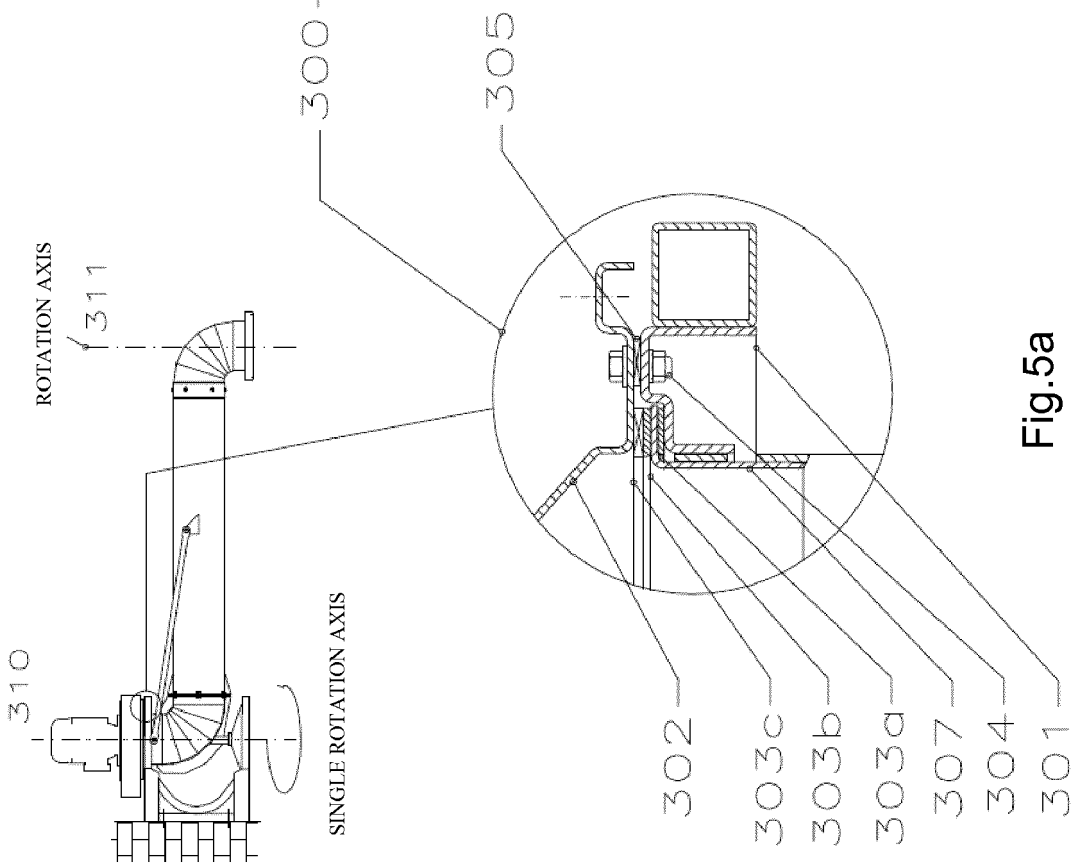


Fig.5a

Fig.5

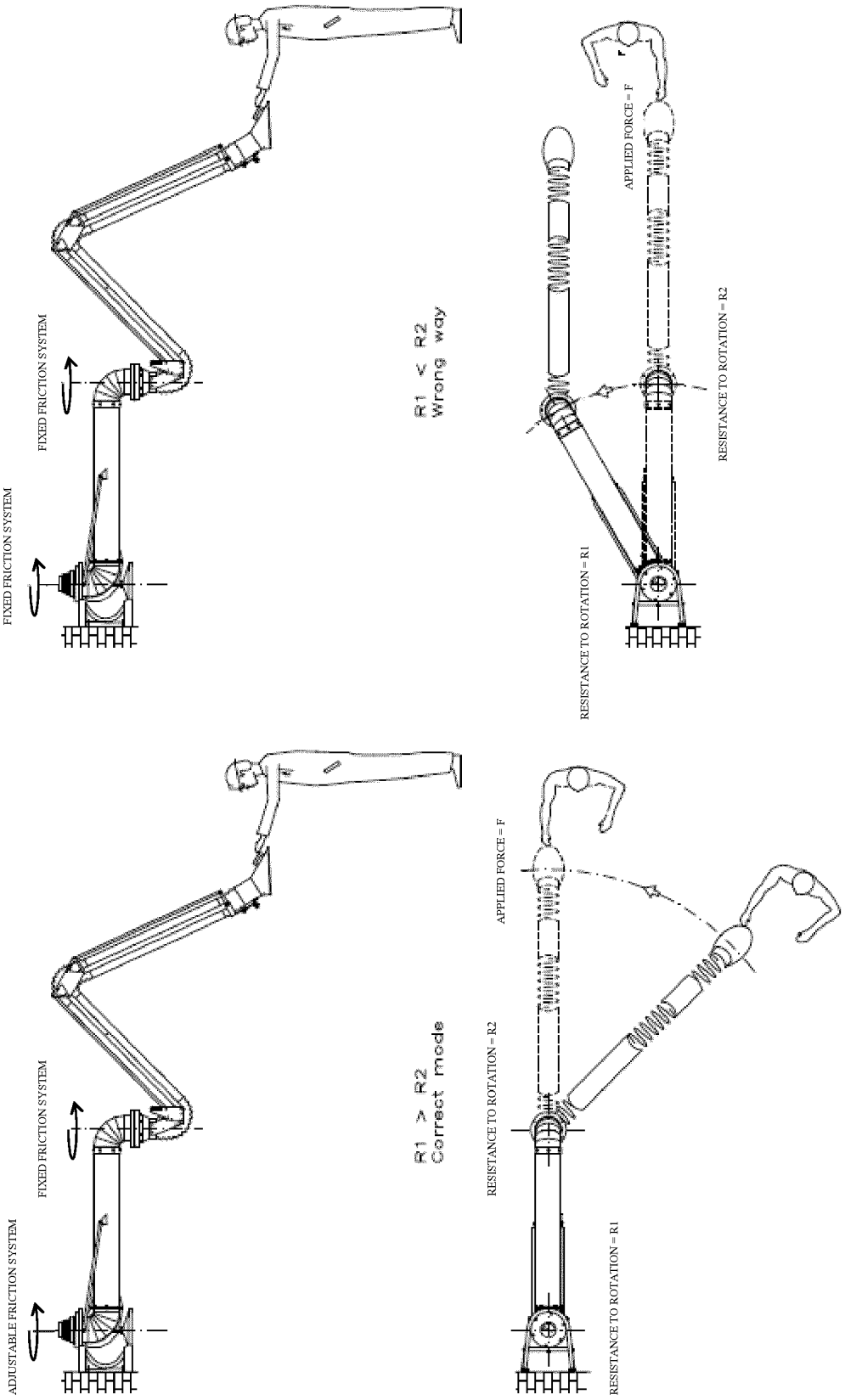
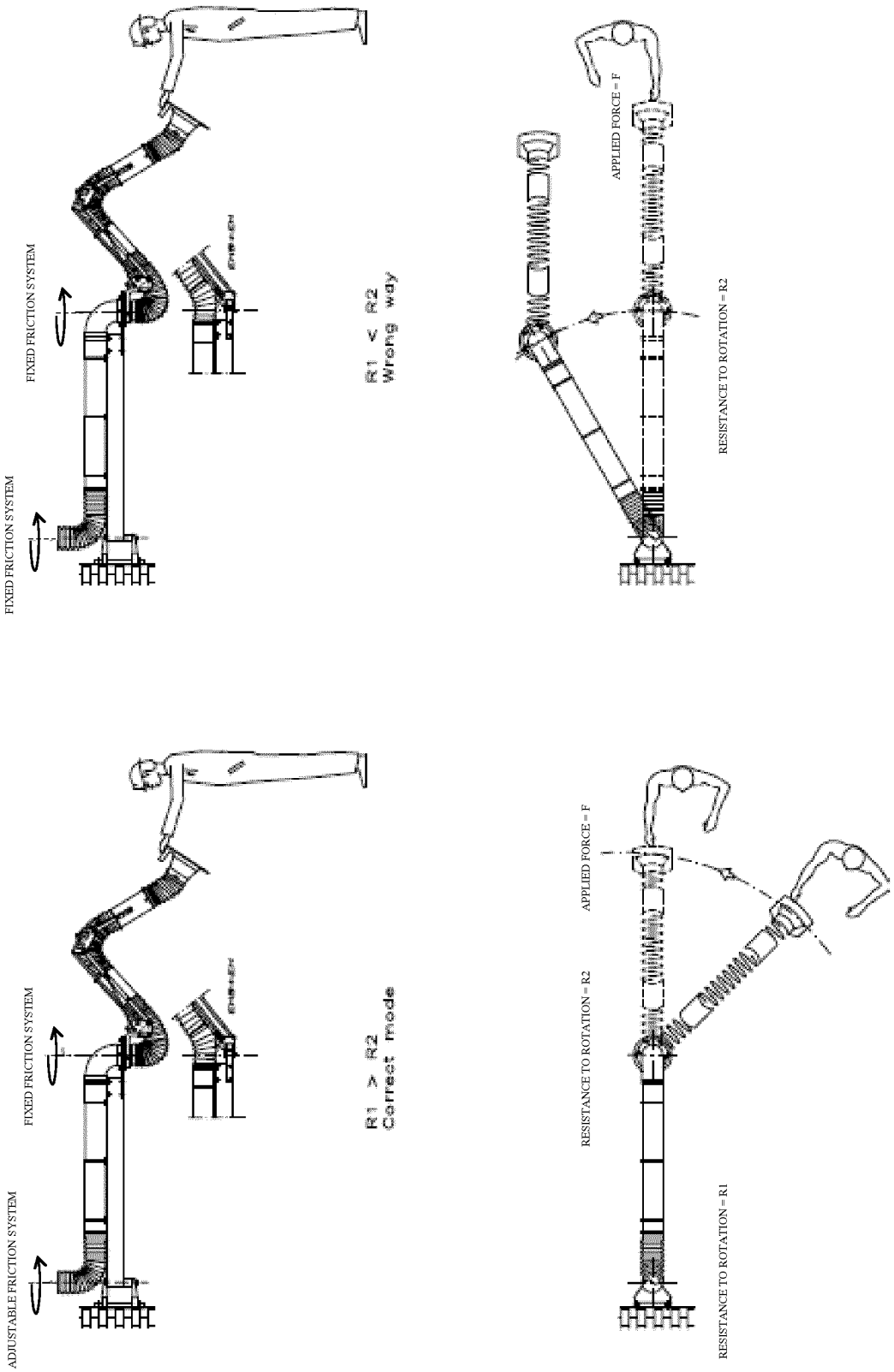

FIXED FRICTION SYSTEM
FIXED FRICTION SYSTEM
R1 < R2
Wrong way
APPLIED FORCE = F
RESISTANCE TO ROTATION = R2
RESISTANCE TO ROTATION = R1
ADJUSTABLE FRICTION SYSTEM
FIXED FRICTION SYSTEM
R1 > R2
Correct mode
APPLIED FORCE = F
RESISTANCE TO ROTATION = R2
RESISTANCE TO ROTATION = R1

Fig.6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ADJUSTABLE FRICTION SYSTEM
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R1 > R2
Correct mode
APPLIED FORCE = F
RESISTANCE TO ROTATION = R2
RESISTANCE TO ROTATION = R1

Fig.7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 19 8400

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 February 2019	van der Zee, Willem

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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