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(54) Titre : DISPOSITIF POUR OTER LES ARETES DE LA LIGNE LATERALE DE FILETS DE POISSON
(54) Title: DEVICE FOR REMOVING PIN BONES FROM FISH FILLETS

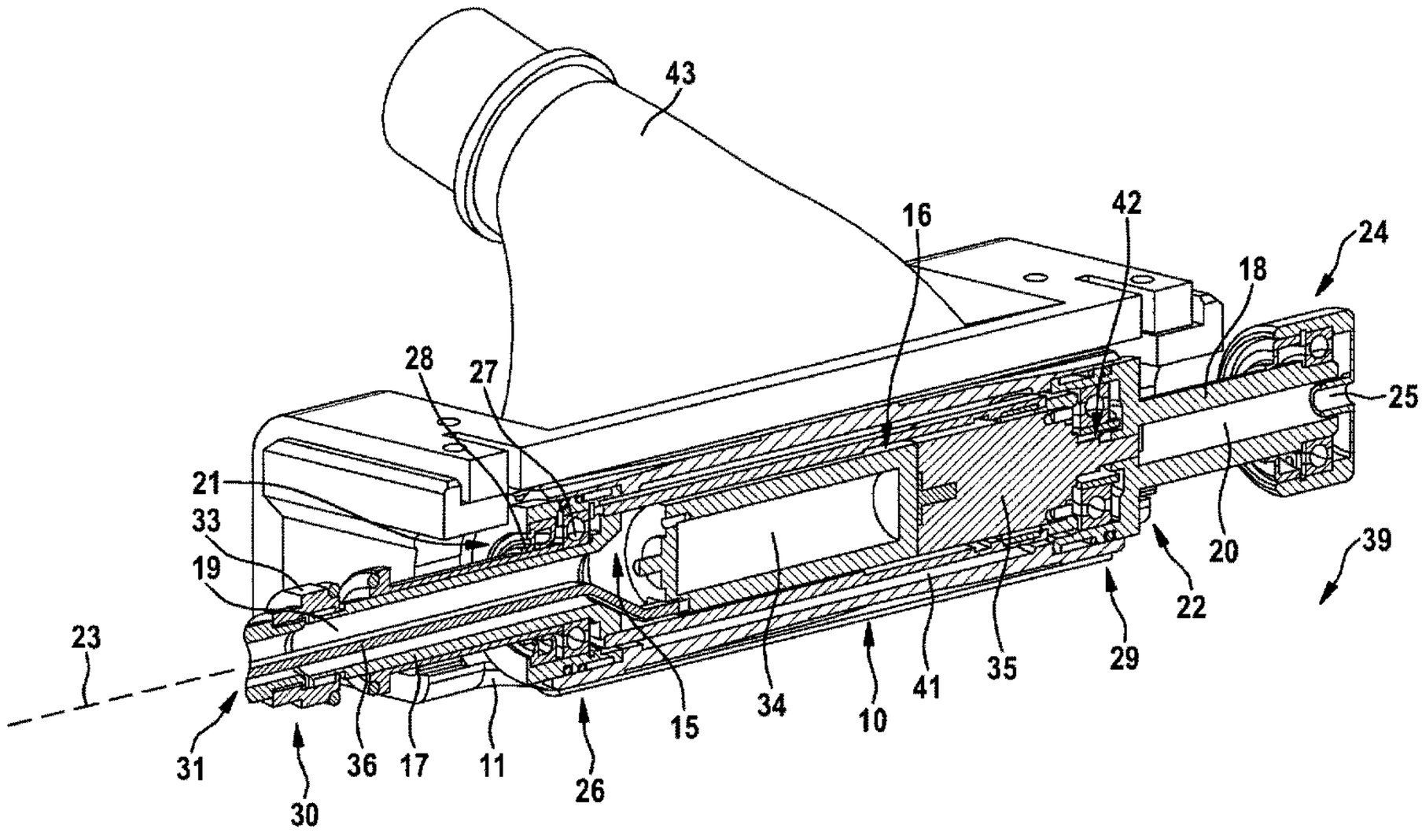


Fig. 4

(57) Abrégé/Abstract:
The invention relates to a device for removing pin bones from fish fillets, comprising at least one rotationally mounted, profiled roller unit (10) comprising a counter bearing element (11) forming a clamping gap (12), the roller unit (10) and the counter bearing element (11) are designed to detect the pin bones in the clamping gap (12) by clamping, and to remove from the fish fillet by applying force. Said device is characterized in that the roller unit (10) comprises an inner chamber (15) in which a drive unit (16) is arranged for rotationally driving the roller unit (10).

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(81) **Bestimmungsstaaten** *(soweit nicht anders angegeben, für jede verfügbare nationale Schutzrechtsart)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

(54) **Title:** DEVICE FOR REMOVING PIN BONES FROM FISH FILLETS

(54) **Bezeichnung:** VORRICHTUNG ZUM ENTFERNEN VON STIFTGRÄTEN AUS FISCHFILETS

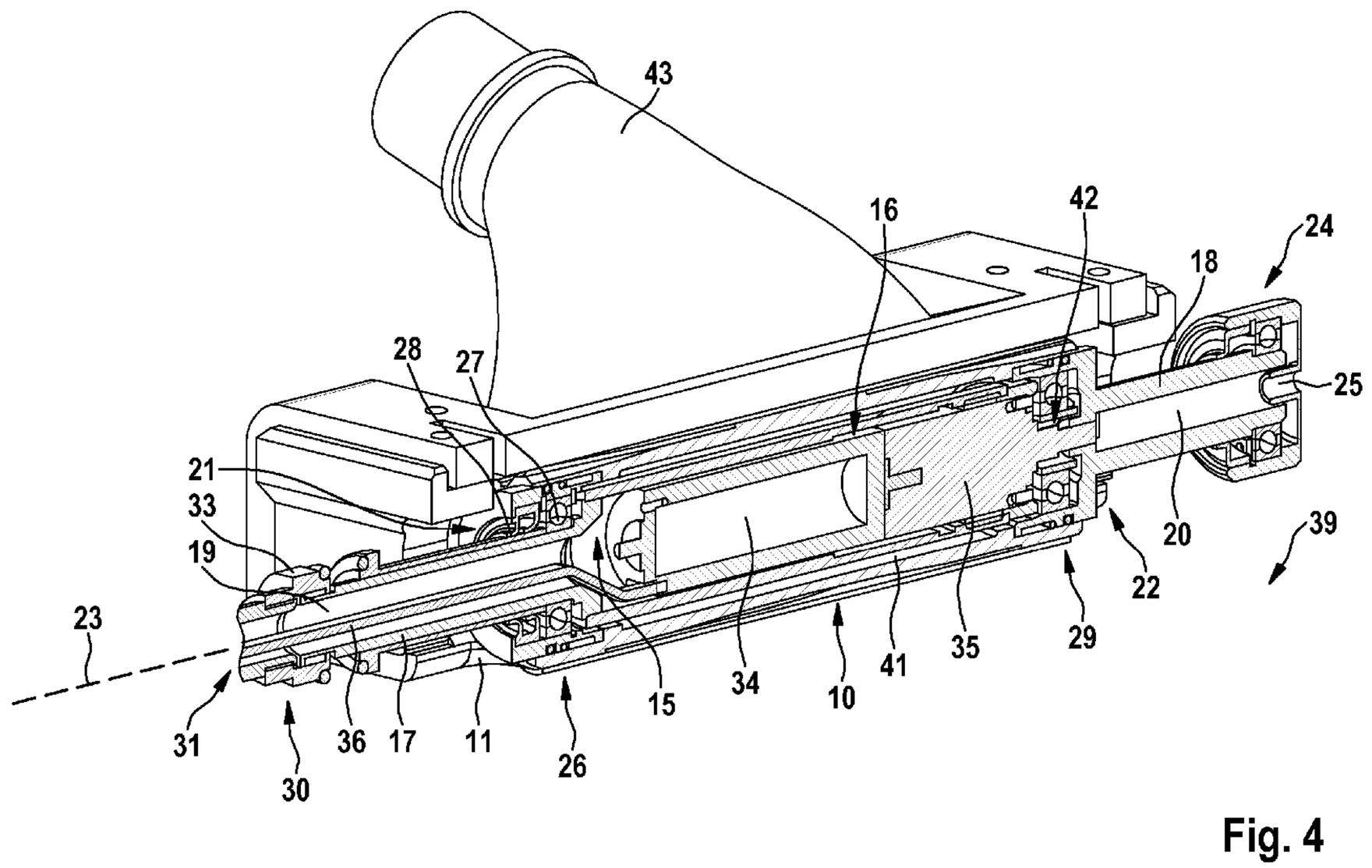


Fig. 4

(57) **Abstract:** The invention relates to a device for removing pin bones from fish fillets, comprising at least one rotationally mounted, profiled roller unit (10) comprising a counter bearing element (11) forming a clamping gap (12), the roller unit (10) and the counter bearing element (11) are designed to detect the pin bones in the clamping gap (12) by clamping, and to remove from the fish fillet by applying force. Said device is characterized in that the roller unit (10) comprises an inner chamber (15) in which a drive unit (16) is arranged for rotationally driving the roller unit (10).

(57) **Zusammenfassung:** Die vorliegende Erfindung betrifft eine Vorrichtung zum Entfernen von Stiftgräten aus Fischfilets, umfassend mindestens eine drehbar gelagerte, profilierte Walzeneinheit (10) mit einem einen Klemmspalt (12) bildenden Gegenlageelement

[Fortsetzung auf der nächsten Seite]

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Erklärungen gemäß Regel 4.17:

— *hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii)*

— *Erfindererklärung (Regel 4.17 Ziffer iv)*

Veröffentlicht:

— *mit internationalem Recherchenbericht (Artikel 21 Absatz 3)*

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(11), wobei die Walzeneinheit (10) und das Gegenlagenelement (11) eingerichtet sind, die Stiftgräten in dem Klemmspalt (12) durch Klemmung zu fassen und unter Zugkraftbeaufschlagung aus den Fischfilets zu entfernen und zeichnet sich **dadurch** aus, dass die Walzeneinheit (10) einen Innenraum (15) aufweist, in dem eine zum rotierenden Antreiben der Walzeneinheit (10) eingerichtete Antriebseinheit (16) angeordnet ist.

Device for removing pin bones from fish fillets

The present invention relates to an apparatus for removing pin bones from fish fillets, comprising at least one rotatably supported, profiled roller unit comprising a counter-bearing element forming a clamping gap, wherein the roller unit and the counter-bearing element are designed to grasp the pin bones in the clamping gap by clamping and to remove said bones from the fish fillets by applying tensile force.

Such apparatuses and methods are used in particular in the semi-automatic or fully automatic processing of fish, in particular for deboning fish fillets. During the processing process, the fish or the fish fillets produced therefrom are freed from bones, in particular from the firmly embedded pin bones.

Such an apparatus and a corresponding method for filleting slaughtered fish is disclosed, for example, in document WO 02/076220 A1. Removal of the pin bones is carried out by a double-profiled roller which grasps them by clamping and removes them from the flesh of the fish fillets. The fish products to be deboned are automatically fed to the double-profiled roller by means of a conveying device. Further apparatuses each with rotationally driven rollers for removing pin bones are disclosed, for example, by document WO 94/10848 and WO 2008/020786 A1.

The disadvantage is that driving of the profiled roller unit generally takes place either via a completely encapsulated electric motor, or the roller unit and electric motor are arranged spatially separate from each other. Encapsulation of the electric motors or spatial separation of the roller unit follows from a plurality of general requirements. On the one hand, the drive motor must be protected against contamination and moisture, on the other hand, hygienic standards must be observed. These requirements lead to a correspondingly complex apparatus that can only be cleaned with major effort. Encapsulation of the electric motor impedes the dissipation of heat losses and, due to the high resulting operating temperature, ultimately leads to shortening of the service life.

It is therefore the object of the present invention to propose an apparatus which is as compact as possible, which on the one hand is easy to clean, effectively protects the drive unit against the ingress of moisture and contamination and always ensures reliable operation by maintaining specified operating temperatures.

The object is achieved by an apparatus having the features referred to at the outset in that the roller unit has an inner space in which a drive unit configured to rotationally drive the roller unit is arranged. In other words, the roller unit is designed as a hollow roller in whose inner space the drive unit is arranged completely encapsulated from the outer space. In this way, a highly compact design of the entire roller unit is achieved, since the drive unit is integrated in the roller unit. On the one hand, the compact design makes cleaning of the apparatus according to the invention easier, on the other hand, in this way the drive unit is reliably protected against the ingress of moisture, water, contamination or the like.

With an expedient embodiment of the invention, it is provided that the inner space is designed for the passage of fluid. The ability of fluid to pass through the inner space ensures that both the drive unit and also the roller unit are always kept at a specified operating temperature or within a specified operating temperature range by the delivery and discharge of a fluid. The fluid is preferably designed as a coolant in order to absorb the waste heat produced by the drive unit and to dissipate it from the inner space. Advantageously, the drive unit is thus held at a specified operating temperature and, in any case, this prevents the temperature of the drive unit from being inadmissibly exceeded which can otherwise lead to premature wear and/or shortening of the service life of the drive unit. A further advantage is that not only the temperature of the drive unit can be influenced by the fluid, but also the temperature of the roller unit can be adjusted within a further temperature range via the fluid supplied. Here, in particular, this prevents inadmissible heating of the roller unit due to the waste heat produced by the drive unit under any circumstances. Thus it is also advantageously possible with the apparatus according to the invention to remove pin bones – from refrigerated fish fillets for example – without any superficial heating of the fish fillets occurring.

According to a preferred development of the invention, the roller unit comprises at least one delivery element for delivering a fluid into the inner space and at least one discharge element for discharging the fluid from the inner space. This ensures that fluid flows continuously through the inner space. Consequently, the roller unit is designed such that the fluid is supplied to the inner space via the at least one delivery element and then leaves it again via the at least one discharge element. The fluid serves as a heat transfer medium in order to absorb heat from the drive unit or the roller unit and to

dissipate it from the inner space. Alternatively, depending on the desired temperature level, heat is supplied via the fluid as a heat transfer medium. Preferably air or compressed air is used as the fluid. Optionally, liquid media are used, in particular electrically non-conductive liquid media.

One expedient embodiment of the invention is characterised in that the at least one delivery element is designed as a first end side wall through-bearing and the at least one discharge element as a second end side wall through-bearing of the roller unit. Thus a compact design of the apparatus according to the invention is achieved.

According to an especially preferred embodiment of the invention, it is provided that the delivery element and/or the discharge element are part of the axis of rotation of the roller unit. The delivery element or the discharge element therefore each fulfil a dual function. Thus, on the one hand, they are designed as the axis of rotation of the roller unit and, on the other hand, to conduct the fluid into the inner space and out thereof. This offers the advantage that the apparatus according to the invention is particularly easy to clean due to its compact design and therefore meets the high hygiene requirements in the food processing sector.

An advantageous development of the invention is characterised in that the delivery element comprises an adapter element having a non-rotatably designed fluid connection for receiving a fluid delivery line. The adapter element is designed as a type of transition element which connects the fluid delivery line fluid-impermeably to the delivery element. The fluid is routed into the inner space via the fluid delivery line using the adapter element and the delivery element.

According to an advantageous development of the invention, the drive unit comprises at least one electric motor. The electric motor is further preferably designed as a brushless direct-current motor. The at least one electric motor is configured in particular as an internal or external rotor. If an external rotor electric motor, that is an electric motor with non-rotatably arranged stator and a rotor forming the external rotor, is used, the external rotor preferably forms the roller unit at the same time. If an internal rotor electric motor is used, that is a motor with external non-rotatably arranged stator and an internal rotor connected to the motor shaft, the electric motor is connected directly to the roller unit by its shaft as a direct drive. Further preferably, the electric

motor is configured as a geared motor. In this case, the electric motor is connected to the roller unit via a gearing mechanism.

According to a preferred development of the invention, a motor connecting line for providing the electrical drive energy for the electric motor is guided from the inner space of the roller unit through the fluid connection and the fluid delivery line. This offers the advantage that, due to its internal arrangement, the motor connecting line is completely encapsulated in relation to the outer space by the fluid delivery line, the fluid connection and the delivery element. This supports the compact design of the apparatus according to the invention and makes cleaning of the apparatus according to the invention considerably easier. In addition, the electric motor is arranged so as to be protected against the ingress of moisture or contamination.

According to a further expedient embodiment of the invention, it is provided to connect the fluid delivery line with the motor connecting line guided therein to a separating device, wherein the separating device is configured to guide the motor connecting line into the outer space by means of a fluid-impermeable adapter element. In other words, the separating device is configured to supply the roller unit with the fluid and to couple the motor connecting line for providing the electrical drive energy fluid-impermeably out into the outer space. Compressed air is preferably used as the fluid. Alternatively, other gaseous or liquid substances are used as the fluid.

Further preferred and/or expedient features and embodiments of the invention emerge from the dependent claims and the description. Especially preferred embodiments are explained in greater detail with reference to the attached drawing. The drawing shows:

Fig. 1 a schematic representation of the apparatus according to the invention in a perspective view,

Fig. 2 a view of the apparatus according to the invention viewed in the conveying direction,

Fig. 3 a lateral view of the apparatus according to the invention

and

Fig. 4 a detailed view of the apparatus according to the invention with the roller unit shown in section.

Fig. 1 shows the apparatus according to the invention schematically in a perspective view. The apparatus according to the invention is designed to remove pin bones from fish fillets fully automatically. For this purpose, the fish fillets – not shown in the drawing – are fed in continuously by a suitable conveying device of the apparatus according to the invention for the removal of pin bones. For the sake of clarity, such a conveying device is not shown in the drawing.

The apparatus according to the invention comprises at least one rotatably supported, profiled roller unit 10. The roller unit 10 with a counter-bearing element 11 forms a clamping gap 12. The roller unit 10 and the counter-bearing element 11 are configured to grasp the pin bones in the clamping gap 12 and to remove said pin bones from the fish fillets by applying tensile force. Preferably, the apparatus according to the invention comprises a holding-down clamp 13 with which the fish fillets conveyed in the conveying direction 14 to the apparatus according to the invention are pressed down in such a manner onto the conveying device 14 – not shown in the drawing. Thus the pin bones protruding in each case on the surface of the fish fillets are grasped by means of clamping in the clamping gap 12 between the roller unit 10 and the counter-bearing element 11 and pulled out of the fish fillets by the rotating movement of the profiled roller unit 10.

As can be seen in Fig. 4, which shows a detailed illustration of the apparatus according to the invention with roller unit 10 in section, the roller unit 10 comprises an inner space 15 in which a drive unit 16 is arranged that is configured to drive the roller unit 10. In other words, the drive unit 16 is encapsulated by means of the roller unit 10. The roller unit 10 with drive unit 16 forms a compact inherently encapsulated structural unit.

The inner space 15 is preferably configured for the passage of fluid. In this way, a fluid flows around the drive unit 16 to dissipate waste heat. Both gaseous and liquid media are suitable as the fluid. The ability of fluid to pass through the inner space 15 serves not only to dissipate lost heat generated by the drive unit 16 but optionally can also be used to heat or cool the roller unit 10. Preferably, the apparatus according to the invention is configured in such a way that the fluid flows continuously or discontinuously through the inner space 15.

For this purpose, the roller unit 10 advantageously comprises at least one delivery element 17 for delivering the fluid into the inner space 15 and at least one discharge element 18 for discharging the fluid from the inner space 15. As shown in Fig. 4, the delivery element 17 and the discharge element 18 are designed in particular as a hollow shaft. The fluid is delivered to the inner space 15 via the inner pipes 19, 20 formed by the delivery element 17 and the discharge element 18 respectively, flowing through the inner space 15 in order to finally leave it again via the discharge element 18 and its inner pipe 20. The delivery element 17 and the discharge element 18 therefore form a first end side wall through-bearing 21 and a second end side wall through-bearing 22 of the roller unit 10.

The delivery element 17 and the discharge element 18 are preferably part of the axis of rotation 23 of the roller unit 10. It is also possible that in each case only the delivery element 17 or the discharge element 18 forms a part of the axis of rotation 23.

According to the advantageous embodiment shown in Fig. 4, the profiled roller unit 10, the second end side wall through-bearing 22 and the discharge element 18 are formed in one piece. The discharge element 18 is preferably rotatably supported by means of a first bearing element 24 such that the profiled roller unit 10 driven by the drive unit 16 is configured to be rotatable about the axis of rotation 23.

The first bearing element 24 has a first inner through-bearing 25 which is continuously connected to the inner pipe 20. In contrast, the delivery element 17 is arranged non-rotatably as is the first end side wall through-bearing 21. The delivery element 17 and the first end side wall through-bearing 21 are preferably formed in one piece. A bearing element 26 on the delivery side is arranged in the region of the first end side wall through-bearing 21. The bearing element 26 on the delivery side comprises a bearing ring element 27 by means of which the roller unit 10 is rotatably supported. The bearing element 26 on the delivery side further comprises a sealing element 28 which offers protection against the ingress of water or undesirable contamination into the bearing element 26 on the delivery side. In addition, the roller unit 10 is rotatably supported via a bearing element 29 on the discharge side.

The present invention, however, is not limited to the embodiment shown in Fig. 4. Alternatively, it is provided to arrange the discharge element 18 non-rotatably, while the

delivery element 17 is configured rotatably with the first end side wall through-bearing 21 and the roller unit 10, such that the aforementioned parts are configured to co-rotate with the roller unit 10.

Advantageously, it is provided that the delivery element 17 comprises an adapter element 30 with a non-rotatably designed fluid connection 31 for receiving a fluid delivery line 32. The adapter element 30 comprises, for example, a coupling bush 33, by means of which the adapter element 30 is arranged fluid-impermeably on the delivery element 17. In the case of the previously described embodiment with delivery element 17 not designed non-rotatably, the coupling bush 33 is configured as a transition element between the non-rotatable adapter element 30 and the delivery element 17 co-rotating with the roller unit 10.

The drive unit 16 comprises at least one electric motor, in particular a brushless direct-current motor. The electric motor is preferably designed as an external rotor – not shown in the drawing – in which advantageously the roller unit 10 simultaneously forms the external rotor.

The preferred embodiment of the present invention shown in Fig. 4 comprises an internal rotor electric motor. The electric motor 34 is preferably connected to the roller unit 10 via a gearing mechanism 35. The gearing mechanism 35 is preferably arranged for this purpose on the face side of the electric motor 34.

To provide the required electrical drive energy for the electric motor 34, a motor connecting line 36 is guided from the inner space 15 through the fluid connection 31 and the fluid delivery line 32. The motor connecting line 36 therefore extends, starting from the electric motor 34 in the inner space 15 through the delivery element 17, via the adapter element 30 and the fluid delivery line 32 to a separating device 37. The fluid delivery line 32 with the motor connecting line 36 guided thereon is thus connected to the separating device 37. The separating device 37 is configured to transfer the motor connecting line 36 into the outer space 39 by means of a fluid-impermeable adapter element 40. The separating device 37 is designed, for example, as a cylindrical hollow body and comprises a further connection, namely a fluid delivery 38, via which the fluid is supplied from outside. The fluid delivery 38 is preferably arranged on the face end of the separating device 37, while the fluid-impermeable adapter element 40 is arranged laterally.

The motor connecting line 36 is guided through the fluid-impermeable adapter element 40 – not shown in the drawing – into the outer space 39. Compressed air is preferably used as the fluid such that a uniform flow of cooling air flows through the inner space 15. For this purpose, it is provided that the drive unit 16 arranged in the inner space 15 is at least partially surrounded by an annular gap 41 such that the fluid can flow substantially freely between the inside of the roller unit 10 and the drive unit 16. However, as illustrated only schematically in Fig. 4, corresponding circumferential recesses 42 are preferably provided which are designed to ensure the ability of fluid to pass through the inner space 15.

Optionally, the apparatus according to the invention comprises a suction device 43, via which pin bones or flesh residues and/or contamination removed by the roller unit 10 are extracted by application of negative pressure.

Claims

1. Apparatus for removing pin bones from fish fillets, comprising

at least one rotatably supported, profiled roller unit (10) comprising a counter-bearing element (11) forming a clamping gap (12), wherein the roller unit (10) and the counter-bearing element (11) are designed to grasp the pin bones in the clamping gap (12) by clamping and to remove said bones from the fish fillets by applying tensile force,

characterised in that

the roller unit (10) comprises an inner space (15) in which a drive unit (16) designed for rotary driving of the roller unit (10) is arranged.

2. Apparatus according to claim 1, characterised in that the inner space (15) is designed for the passage of fluid.

3. Apparatus according to claim 2, characterised in that the roller unit (10) comprises at least one delivery element (17) for delivering a fluid into an inner space (15) and at least one discharge element (18) for discharging the fluid from the inner space (15).

4. Apparatus according to claim 3, characterised in that the at least one delivery element (17) is designed as a first end side wall through-bearing (21) and the at least one discharge element (18) as a second end side wall through-bearing (22) of the roller unit (10).

5. Apparatus according to one of claims 3 or 4, characterised in that the delivery element (17) and/or the discharge element (18) are part of the axis of rotation (23) of the roller unit (10).

6. Apparatus according to any one of claims 3 to 5, characterised in that the delivery element (17) comprises an adapter element (30) with a non-rotatably designed fluid connection (31) for receiving a fluid delivery line (32).

7. Apparatus according to any one of claims 1 to 6, characterised in that the drive unit (16) comprises at least one electric motor (34).

8. Apparatus according to claim 7, characterised in that the electric motor (34) is connected to the roller unit (10) via a gearing mechanism (35).

9. Apparatus according to claim 7, characterised in that the electric motor (34) is an external rotor motor and the external rotor is formed by the roller unit (10).

10. Apparatus according to any one of claims 6 to 9, characterised in that a motor connecting line (36) for providing the electrical drive energy for the electric motor (34) is guided from the inner space (15) of the roller unit (10) through the fluid connection (31) and the fluid delivery line (32).

11. Apparatus according to claim 10, characterised in that the fluid delivery line (32) with the motor connecting line (36) guided therein is connected to a separating device (37), wherein the separating device (37) is designed to guide the motor connecting line (36) into an outer space (39) by means of a fluid-impermeable adapter element (40).

12. Apparatus according to one of claims 3 to 11, characterised in that the fluid is compressed air.

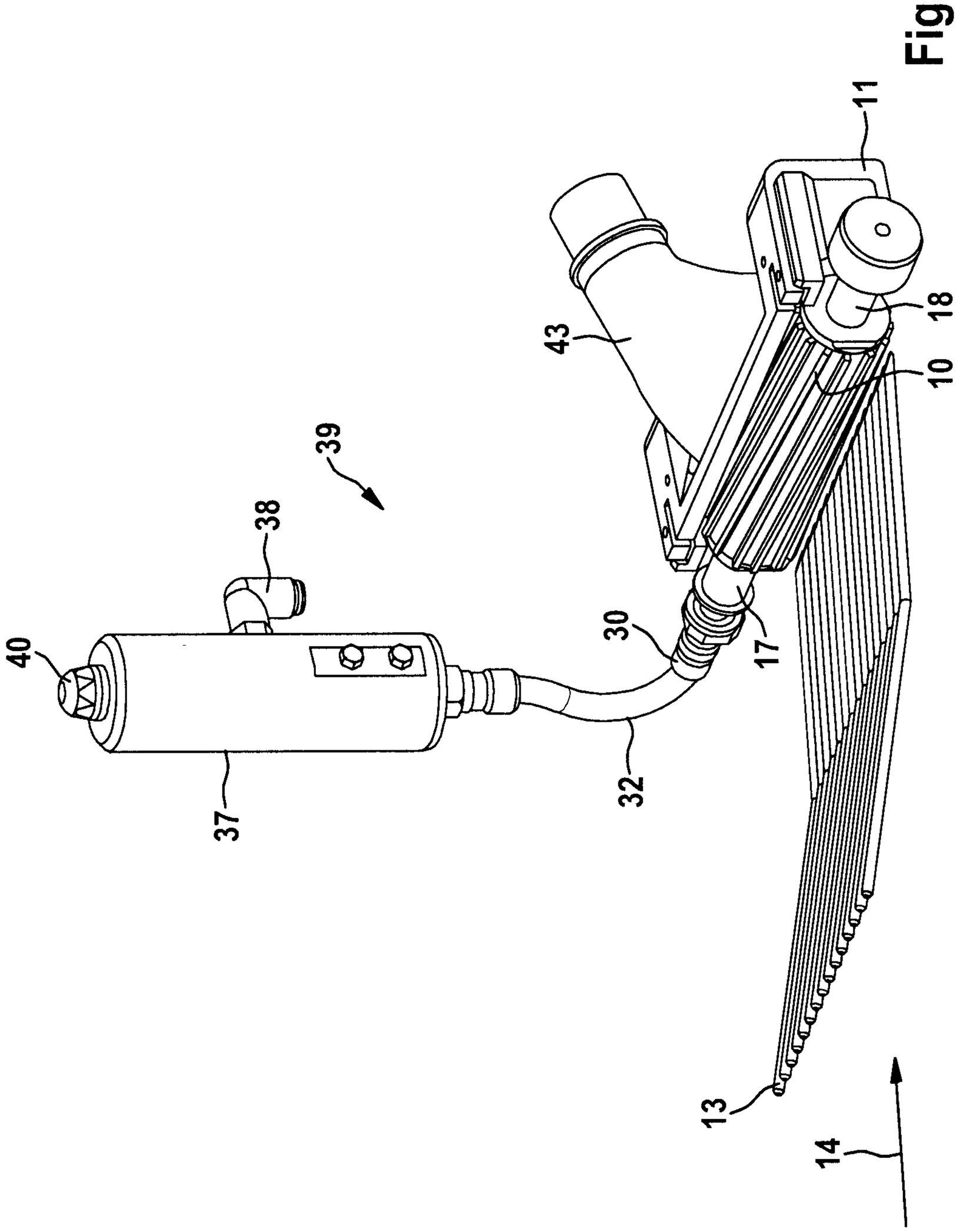


Fig. 1

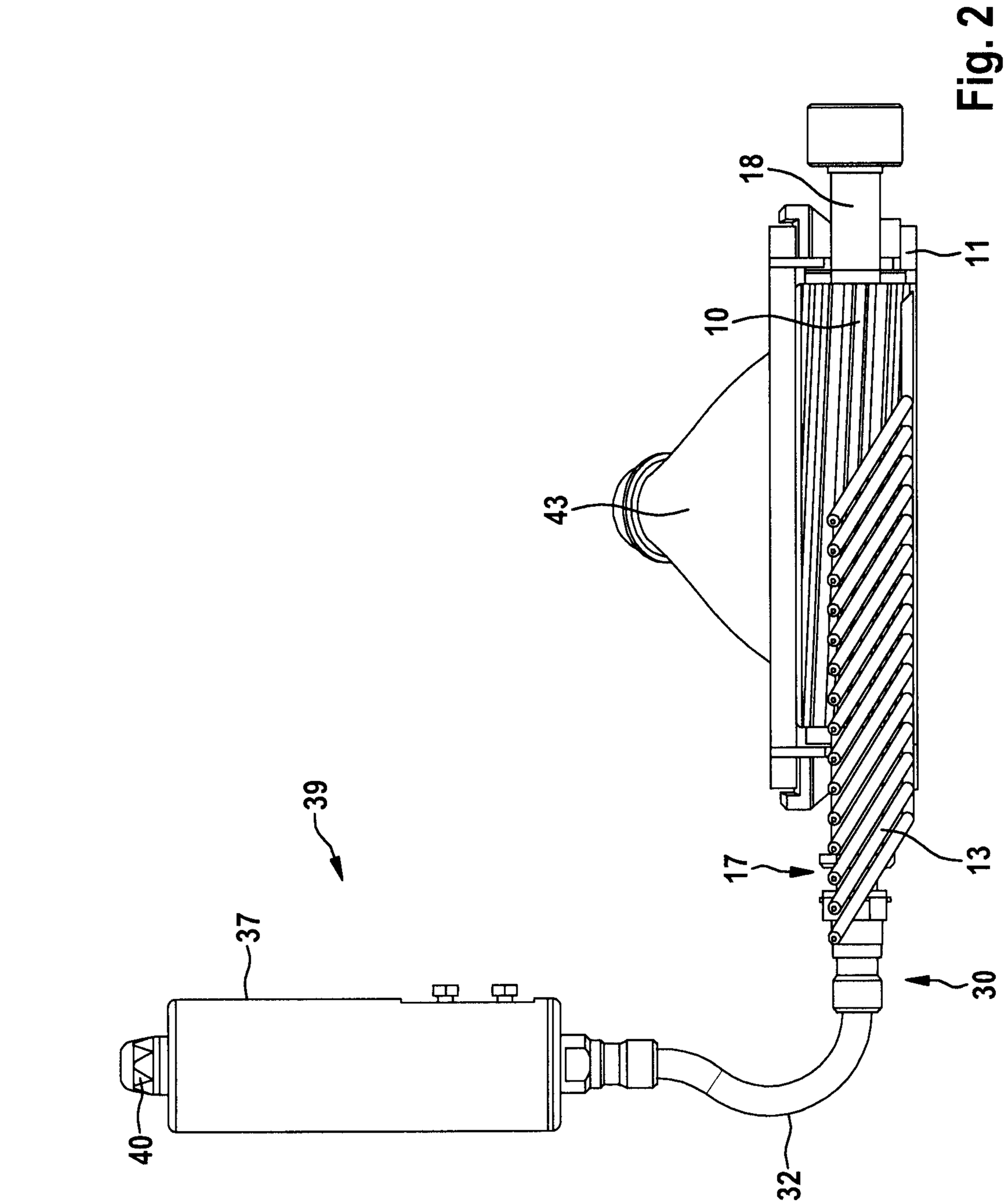


Fig. 2

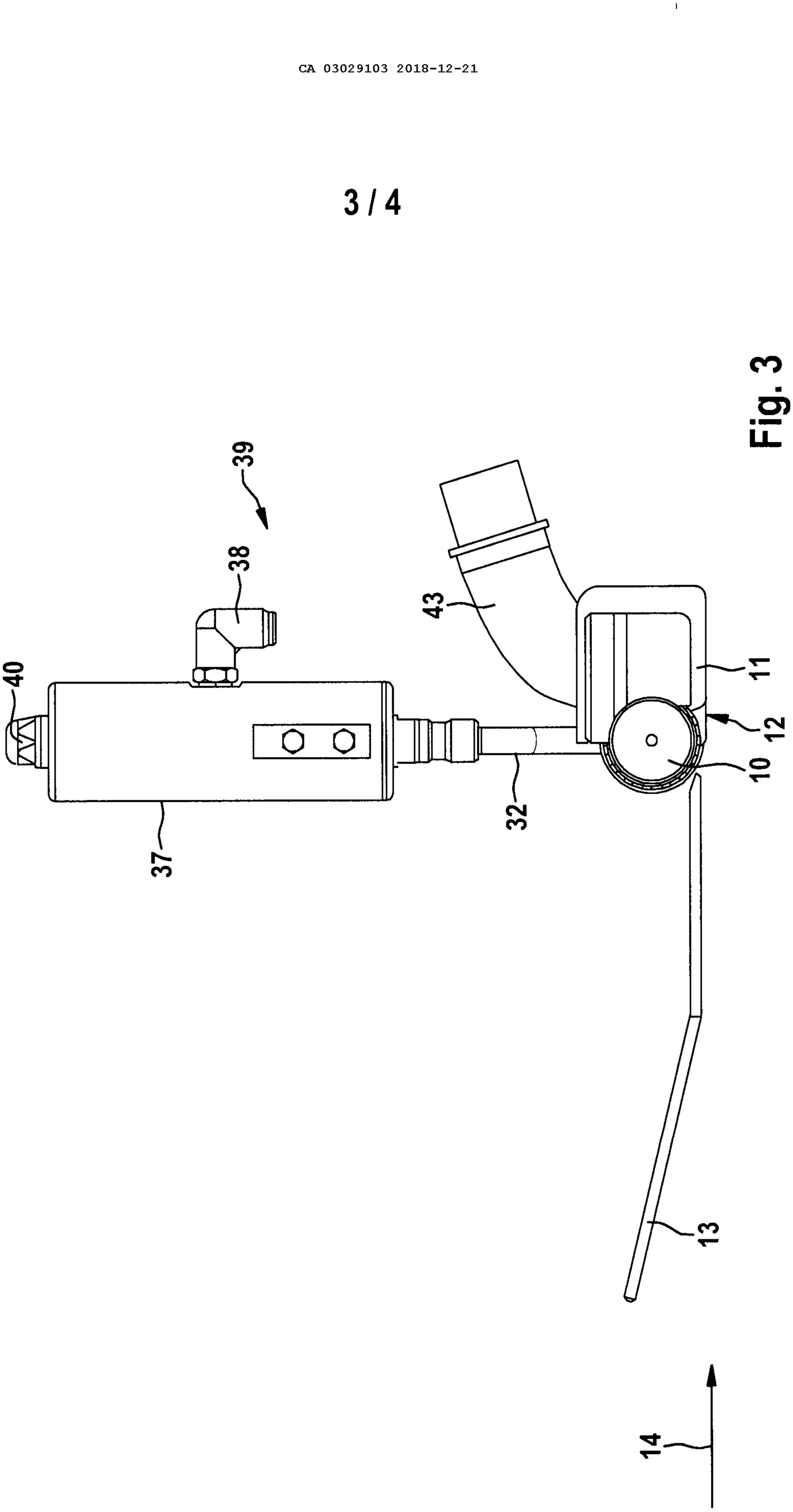


Fig. 3

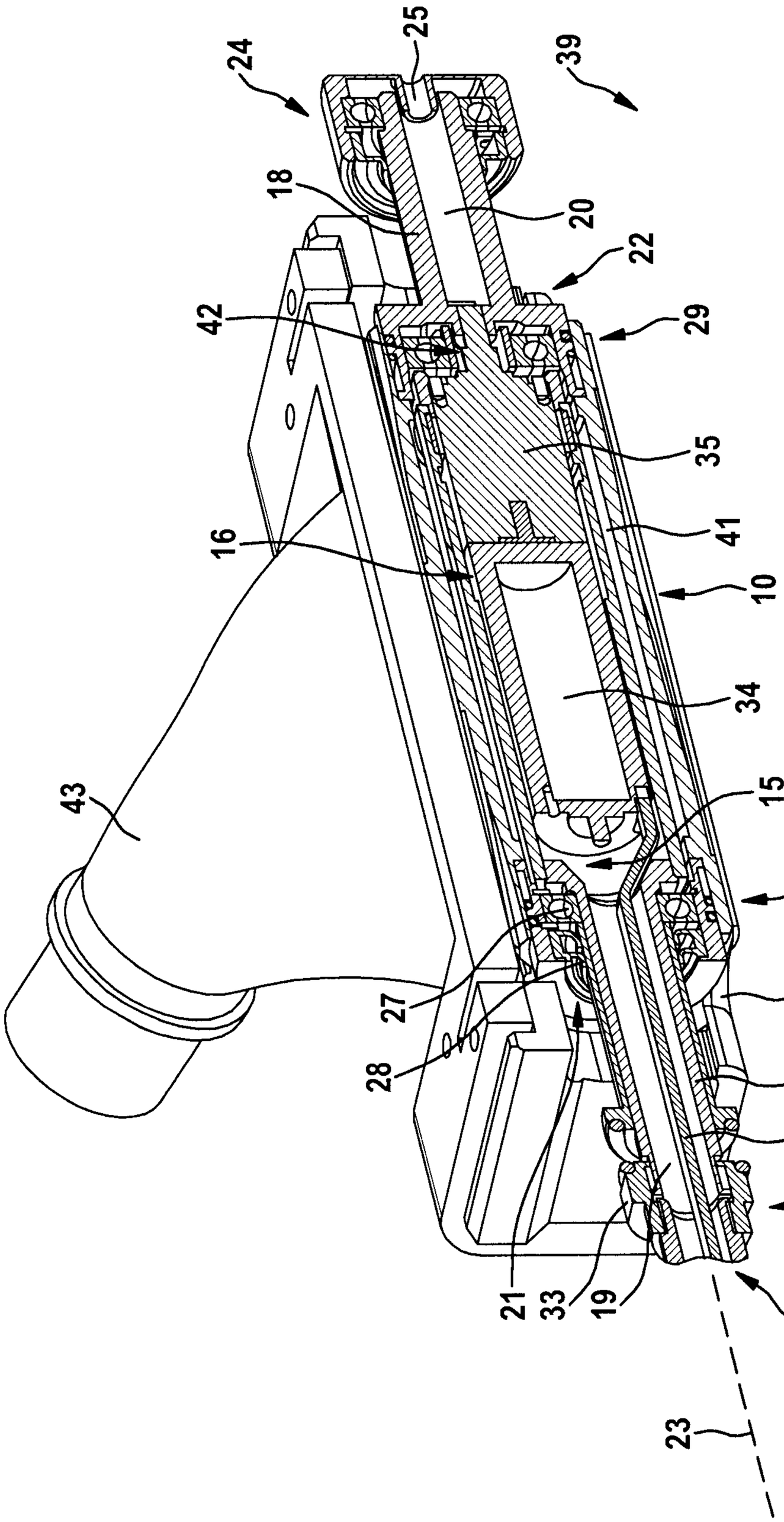

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Fig. 4

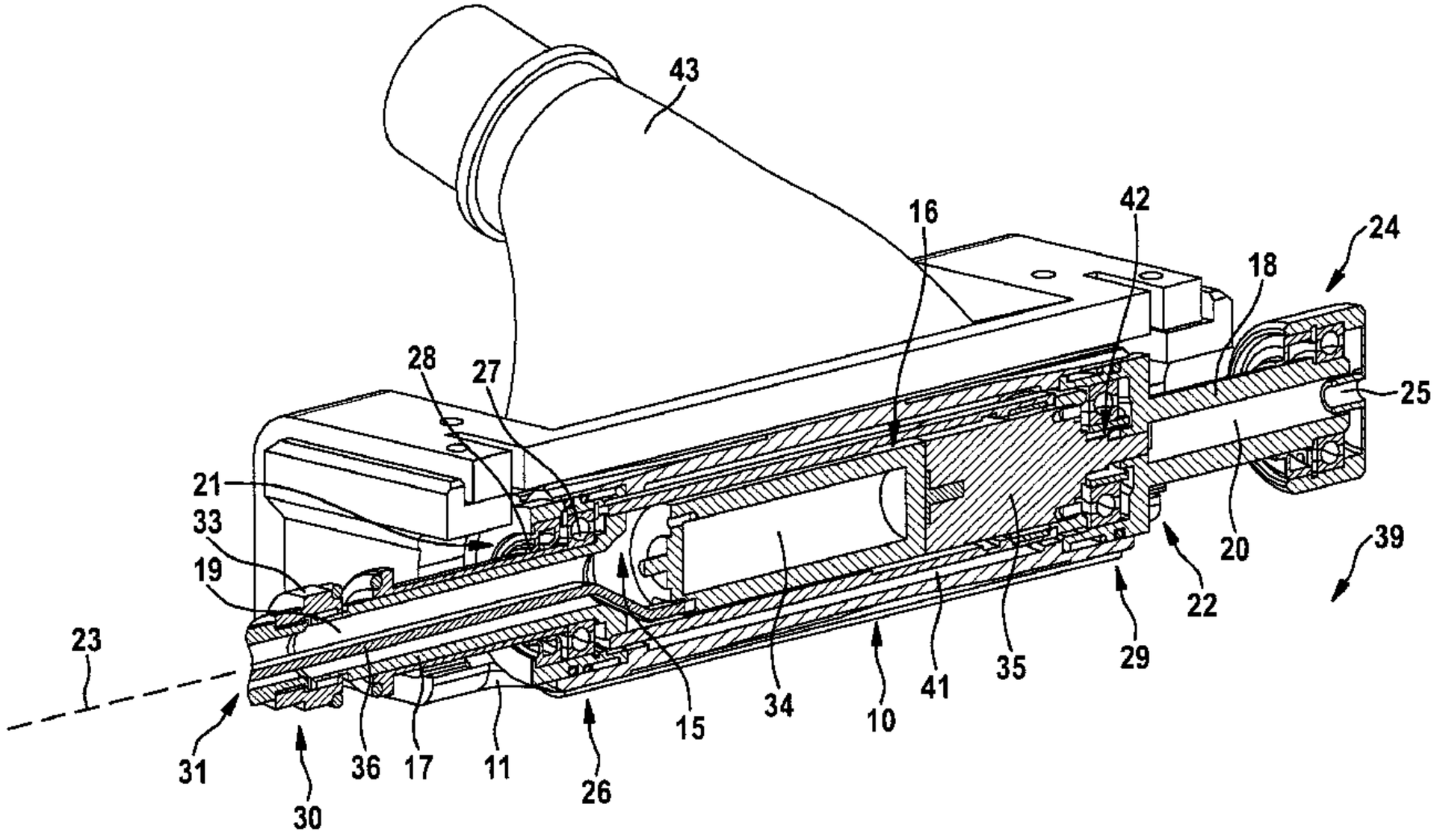

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Fig. 4