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DIVIDING ASSEMBLY FOR MOVING PORTIONS OF DOUGH

The invention relates to a weighing-out arrangement for conveying or moving dough portions with a weighing-out slide in a device for portioning and processing dough according to the preamble of claim 1.

Weighing-out slides are known from the prior art, wherein they are moved linearly by means of toggle mechanisms with springs. The weighing-out slide is directly driven by a drive via a toggle mechanism to slide dough portions towards a weighing-out drum. The springs of the toggle mechanism thereby apply a constant pressing force to the dough portions in the weighing-out drum. When changing the dough, the dough portions or dough quantities are changed by the springs due to the spring characteristics and the pressing force of the weighing-out slide and the spring path. It is therefore not possible to ensure constant pressing force on the dough through the weighing-out slide to the weighing-out drum for different doughs and dough portions. A variation of the pressing force results in the deviation of the amount of dough in the weighing-out drum by default, thereby changing the final weight of the cakes and pastries produced.

DE 30 11 863 A1 discloses a weighing-out arrangement for conveying or moving dough portions with a weighing-out slide in a device for portioning and processing dough, wherein the said arrangement comprises a pivotable connecting rod and a pivotally-mounted pivot lever.

The pivot lever carries an actuating extension for moving the weighing-out slide back and forth while the connecting rod can be pivoted about its pivot bearing by a drive.

The object of the invention is, therefore, to ensure a constant pressing force of the weighing-out slide in the weighing-out drum, regardless of the weighing-out quantity and dough consistency. Another object is to create a simply constructed and trouble-free weighing-out arrangement. The invention solves these tasks with a weighing-out arrangement of the aforementioned type with the characteristics specified in the characterising part of claim 1. It is inventively provided that an air bellows is arranged between the first pivot lever and the second pivot lever, wherein the volume and/or shape of the air bellows can be varied by compressed air in order to set the distance between the opposing lever arms of the two pivot levers.

Empty runs can be avoided and thus faster work cycles achieved when the first pivot lever and the second pivot lever can be applied against the air bellows, or at least one pivot lever is connected to the bellows.

In order to ensure constant filling of the air bellows and equal weighing-out of the dough portions, it is advantageous if the air bellows are connected to a compressed air source, preferably a pressurised vessel or compressor.

In order to keep the pressure in the air bellows approximately constant and to minimise pressure surges in the air bellows, a buffer volume is provided, wherein the air bellows are connected to a compressed air source, preferably a pressure vessel formed as a buffer volume.

In order to better adapt the weighing-out slide to changes in the amount of dough and dough composition, it is provided that the air bellows and/or the compressed air source have a pressure regulating unit for adjusting the pressure in the air bellows and, consequently, the volume and/or shape of the air bellows.

A space-saving, precise working embodiment of the invention provides that the first pivot lever and the second pivot lever are pivotally mounted on mutually parallel pivot axes, or that the first pivot lever and the second pivot lever are pivotally mounted on the same pivot axis with respect to one another.

A special embodiment of the invention of simple construction provides that a drive and a toggle lever are provided to rotate the first pivot lever, wherein the drive drives a short lever forming the toggle lever with a long lever, wherein the end of the long lever is connected with the first pivot lever.

Effective force transmission from the first pivot lever on the air bellows to the second pivot lever is achieved when the air bellows is at least partially arranged in the path or plane of the two pivot levers.

In order to effect symmetrical force transmission from the first pivot lever via the air bellows to the second pivot lever and to prevent tilting of the pivot lever, it is provided that the first pivot lever has two bearing parts via which it is mounted on the pivot axis and between which the second pivot lever is mounted on the pivot axis.

Advantageous force transmission to the second pivot lever is effected according to the invention, when the length of the lever arm of the second pivot lever in contact with the

bellows is greater than the length of the actuating extension, preferably by two to four times the length of the actuating extension.

Particularly good adjustment of the travel of the weighing-out slide is achieved if the filling pressure and the filling volume of the air bellows defines the opening angle between the first pivot lever and the second pivot lever.

In order to effectively adjust the weighing-out slide, it is provided that the opening angle between the pivot levers can be adjusted and set by the pressure in the air bellows.

An advantageous embodiment of the invention is achieved when, on pivoting of the first pivot lever by the toggle lever, the air bellows are subjected to pressure, while the second pivot lever can be deflected about the pivot axis by the bellows so that the weighing-out slide, coupled to the second pivot lever, is slidable along an output channel upon pivoting of the first pivot lever.

The weighing-out slide according to the invention works particularly effectively when the bellows determine the opening angle between the pivot levers and the rotation of the second pivot lever, and specifies the length of the travel path of the weighing-out slide and possibly the pressing force of a portion of dough into a radial receptacle opening of a weighing-out drum.

A simple transmission of force from the second pivot lever on the weighing-out slide is achieved when the weighing-out slide has a recess into which the second pivot lever engages, preferably with a rotatably-mounted roller at the free end of the actuating extension.

In order to prevent unnecessary expansion of the bellows and to support the resetting of the second pivot lever, it is advantageous if a stop is provided to limit the opening angle and to prevent over-expansion of the air bellows, wherein the stop comprises a pin and a related stop surface, wherein, optionally, the stop surface of the stop is formed on the first pivot lever and the pin on the second pivot lever.

The invention provides that the weighing-out slide is incorporated in a device for the portioning and processing of dough.

One embodiment of the device provides for the device to have a drive for actuating the first pivot lever and/or a weighing-out drum is connected to the output path of the weighing-out slide or to the output channel and/or that the output channel opens into an output channel of a pre-portioning device.

A practical accurately-working device is created when a drive lever is hinged to a lever that is rotated by the drive, and on which the short arm of the toggle lever and a cantilever are pivotably articulated, whereby the cantilever arm drives the weighing-out drum.

Preferred embodiments of the invention are explained below with reference to Fig. 1 to Fig. 4.

Shown schematically:

Fig. 1 shows a weighing-out arrangement with a weighing-out slide in the starting position,

Fig. 2 shows a weighing-out arrangement with a weighing-out slide in the end position according to Fig. 1,

Fig. 3 shows a weighing-out arrangement in a perspective view, and

Fig. 4 shows a weighing-out arrangement in a perspective view according to Fig. 3.

Fig. 1 and Fig. 2 respectively show a schematic front view of a weighing-out arrangement according to the invention for sliding dough portions 13 in a device for portioning and processing the dough. In this way, the dough 53 is pre-portioned in a pre-portioning device 19 and is output as a dough portion 13 through an output channel 6 by a weighing-out slide 2 into a radial receptacle opening 9 of a weighing-out drum 8.

The weighing-out arrangement comprises a first pivot lever 11 and a second pivot lever 12, which are mounted to rotate about a pivot axis 3. The two pivot levers 11 and 12 are pivoted about the pivot axis 3 by a toggle lever 7 connected to a drive 50. The toggle lever 7, which has a short lever 22 and a long lever 21, is extended by the drive 50 which rotates the short lever 22. The long lever 21 acts on the first pivot lever 11 to cause pivoting of the first pivot lever 11 about the pivot axis 3 by the extension of the toggle lever 7.

Air bellows 4 are used as a pressure pad between the two pivot levers 11, 12. The two pivot levers 11, 12 lie on opposite sides of the air bellows 4 and are optionally connected to the air bellows 4. The starting positions of the first pivot lever 11, the air bellows 4 and the second pivot lever 12 are advantageously in a direction perpendicular to the plane of the pivot axis 3. The first pivot lever 11 may – as shown - have bearing parts 28 and 29 lying on both sides of the second pivot lever 12 or be doubled. The second pivot lever 12 is located between the bearing parts 28 and 29. This results in symmetrical force transmission and requires no guide against tilting.

In Fig. 4, the course of the second bearing part 29 of the first pivot lever 11 is indicated by dashed lines. A stop 14, which is designed as a pin on the second pivot lever 12 and a stop surface on the first pivot lever 11, limits the maximum opening angle φ between the first pivot lever 11 and the second pivot lever 12 with respect to one another and prevents over-inflation and over-expansion of the air bellows 4.

The air bellows 4 are connected via a compressed air line 25 with a pressure vessel 5. The pressure vessel 5 serves as a buffer volume, thus avoiding an excessive increase in pressure when compressing the bellows 4. The aim is to exert an approximately constant force on the weighing-out slide 2. The distance between the first pivot lever 11 and the second pivot lever 12 and thus the opening angle φ are determined through the filling pressure and the filling volume of the air bellows 4 with the pressure vessel 5.

There is an actuating extension 18 on the second pivot lever 12, which extends the second pivot lever 12 in order to develop and transmit a force from the second pivot lever 12 to the weighing-out slide 2. The actuating extension 18 may be in the form of a rod and carry a roller 16 at its free end. On extension of the weighing-out slide 2, the roller 16 lies against the surface facing away from the weighing-out drum 8, while on resetting the weighing-out slide 2, the roller 16 lies against the surface of the weighing-out slide 2 facing the recess 17 of the weighing-out drum 8.

Upon displacement of the second pivot lever 12 about the pivot axis 3, the actuating extension 18 with the roller 16 thus causes a translation of the weighing-out slide 2 in the output channel 6, and causes the translation of the pivoting movement of the pivot levers 11, 12 about the pivot axis 3 into a translation of the weighing-out slide 2 in the output channel 6. The weighing-out slide 2 displaces the dough portion 13 in the direction of the receptacle opening 9 of the weighing-out drum 8. The distance and aperture angle φ between the two pivot levers 11, 12 as preset by the air bellows 4 is limited via the movement coupling of the actuating extension 18 in the extension path of the weighing-out slide 2.

In this embodiment, the air bellows 4 are in the form of a pressure vessel as a compressed air source 5 connected with a compressor, which supplies the air bellows 4 with compressed air and acts as a buffer volume. A pressure control unit 24 is advantageously integrated in the compressed air source 5 or pressure line 25 to provide the filling volume and the filling pressure of the air bellows 4, preferably adjustable to 1 to 3 bar, so that the

filling pressure and filling volume of the air bellows 4 can be adjusted for different amounts of dough and different doughs.

Fig. 2 shows a front view of a weighing-out arrangement, wherein the first pivot lever 11 and the second pivot lever 12 are in a deflected state. The weighing-out slide 2 is shown in the extended state. The deflection is caused by the toggle lever 7 being driven by the drive 50. The pressure and the filling volume of the now slightly compressed air bellows 4 determine the opening angle φ between the two pivot levers 11, 12 and hence the adjustment force of the weighing-out slide 2. The dough portion 13 shown was displaced by the weighing-out slide 2 in the direction of the receptacle opening 9 of the weighing-out drum 8, wherein the pressure set in the air bellows 4 dictates the pressing force of the dough portion 13 in the receptacle opening 9 of the weighing-out drum 8.

Fig. 1 and Fig. 2 show the essential further elements of a device for portioning and processing dough. A pre-portioning device 19 includes a star-shaped cutter 20 to pre-portion the dough 53. The pre-portioned dough thereby falls into the output channel 6 and is output as dough portion 13 from the weighing-out slide 2. The weighing-out drum 8 includes a plurality of receptacle openings 9 and adjusting elements for receiving, processing and forwarding the dough portions 13.

In the starting position according to Fig. 1, the air bellows 4 are not compressed and the first pivot lever 11 is moved by the drive 50 via the toggle lever 7 to the starting position. The stop 14 prevents further opening beyond a maximum opening angle φ, while ensuring entrainment of the second pivot lever 12 into the starting position and prevents over-inflation of the pressurised air bellows 4. Upon the drive 50 extending the toggle lever 7, the first pivot lever is deflected and transfers the pivoting movement as a compressive force via the air bellows 4 to the second pivot lever 12. The pressurised air bellows 4 are compressed (Fig. 2), wherein the pressure vessel 5 serves as a buffer volume, and prevents an excessive pressure rise in the air bellows 4. The air bellows 4 deflects the second pivot lever 12 about the pivot axis 3, and the movement coupling of the second pivot lever 12 with the weighing-out slide 2 causes the deflection of an extension of the weighing-out slide 2 to the weighing-out drum 8.

As an alternative to the pressure vessel 5, the air bellows 4 may be connected to a compressor connected to a compressed air line 25 and the pressure control unit 24 arranged between the compressor and air bellows 4.

As an alternative to the pivot axis 3, the first pivot lever 11 may be mounted on a shaft that is connected to the first pivot lever 11 in order to be pivoted or rotated by the toggle lever 7. In this case, the second pivot lever 12 is pivotally mounted on this shaft.

It is also possible to support the two pivot levers 11, 12 on adjacent parallel axes or shafts, and to arrange an air bellows 4 between them.

Fig. 3 and Fig. 4 each show a perspective view of another embodiment of a weighing-out arrangement according to the invention for displacing dough portions in a device for portioning and processing dough.

Fig. 3 shows a drive 50 indicated by an encircling arrow in Fig. 4, which is attached to a cantilever 30 of the weighing-out drum 8 on the one hand, and to an eccentric extension having a pivot bearing 54 for a short lever 22, via a drive lever or flange 26 with a drive lever pivotally attached to an eccentric rotary link 27. The lever 22 connects the drive lever 27 with an eccentric extension or long lever 21 of a pivot axis in the form of a shaft 3, and is pivotally mounted on the drive lever 27 and the long lever 21. The levers 21 and 22 form the toggle lever 7.

The first pivot lever 11 is rigidly mounted on the shaft 3, and is applied to the air bellows 4 and is advantageously connected thereto. The second pivot lever 12 is applied to the air bellows 4 opposite the first pivot lever 11, wherein it is also advantageously connected with the air bellows 4 and is rotatably mounted on the shaft 3. The second pivot lever 12 is connected to the weighing-out slide 2 via an actuating extension 18 and a roller 16 as in the case of the embodiment described in Fig. 1 and 2. The weighing-out drum 8 shown has a plurality of mutually parallel receptacle openings 9 uniformly arranged along the circumference of the weighing-out drum 8. The air bellows 4 is connected with a pressure vessel 5 via the pressure line 25.

Fig. 4 shows a perspective view of a weighing-out arrangement according to the invention shown in a deflected state in Fig. 3, wherein the weighing-out slide 2 is in a forward extended position. Furthermore, Fig. 4 shows the force coupling and the force flow to the weighing-out arrangement and the weighing-out drum 8 of the drive 50 that is only indicated.

Upon rotation of the flange 26 about its axis of rotation, the cantilever or drive arm 27 of the cantilever 30 and thus the weighing-out drum 8, are rotated about their rotational axis via

the drive lever. The drive lever 27 pivoted in this way draws with it the actuating lever or short lever 22 pivotally connected via the extension 54. As a result, the lever 22 rotates the eccentric extension or long lever 21 and thus rotates the shaft 3 about its axis. The first pivot lever 11 is fixed to the shaft 3 and is pivoted outwards to subject the air bellows 4 that is connected with it to pressure. The inner pressure and the filling volume of the air bellows 4 causes the movement to be transmitted to the second pivot lever 12, which is advantageously connected to it, in order to pivot the second pivot lever 12 about the rotational axis of the shaft 3. The weighing-out slide 2 is thereby extended to the forward position and presses the dough portions 13 into the receptacle openings 9 of the weighing-out drum 8 with a pressing force that is determined by the air bellows 4.

VEJEANORDNING TIL FLYTNING AF DEJPORTIONER

PATENTKRAV

1. Vejeanordning til transport eller forskydning af dejportioner med en vejeskubber (2) i en indretning til portionering og bearbejdning af dej, hvor anordningen har en drejeligt, navnlig svingbart, lejret første svingarm (11) og en drejeligt, navnligt svingbart, lejret anden svingarm (12), hvor den anden svingarm (12) bærer en betjeningsforsats (18) til frem- og tilbagebevægelse af vejeskubberen (2), og den første svingarm (11) af et drev kan svinges om sit svingleje, hvor der mellem den første svingarm (11) og den anden svingarm (12) er anbragt en luftbælg (4), hvis volumen og/eller form kan ændres via trykluftpåvirkning, og som bestemmer afstanden mellem de overfor hinanden liggende løftearme på de to svingarme (11, 12).

2. Vejeanordning ifølge krav 1, **kendetegnet ved, at** den første svingarm (11) og den anden svingarm (12) kan lægges an mod luftbælgen (4), eller at i det mindste én svingarm (11, 12) er forbundet med luftbælgen (4).

3. Vejeanordning ifølge krav 1 eller 2, **kendetegnet ved, at** luftbælgen (4) er forbundet med en trykluftkilde (5), fortrinsvist en trykbeholder eller kompressor, og/eller luftbælgen (4) er forbundet med en trykluftkilde (5), fortrinsvist en som buffervolumen udformet trykbeholder, og/eller luftbælgen (4) og/eller trykluftkilden (5) har en trykreguleringsenhed (24) til indstilling af trykket i luftbælgen (4) og følgelig luftbælgens volumen og/eller form (4).

4. Vejeanordning ifølge et af kravene 1 til 3, **kendetegnet ved, at** den første svingvarm (11) og den anden svingarm (12) er lejret på indbyrdes parallelle svingakser (3), eller at den første svingarm (11) og den anden svingarm (12) er lejret relativt indbyrdes svingbart på den samme svingakse (3).

5. Vejeanordning ifølge et af kravene 1 til 4, **kendetegnet ved, at** der til drejning af den første svingarm (11) er tilvejebragt et drev (50) og en vinkelarm (7), hvor drevet (50) driver en kort arm (22), som med en lang arm (21) danner vinkelarmen (7), hvor enden af den lange arm (21) er forbundet med den første svingarm (11).

6. Vejeanordning ifølge et af kravene 1 til 5, **kendetegnet ved, at** luftbælgen (4) i det mindste delvist er anbragt i bevægelsesbanen eller –niveauet for de to svingarme (11, 12).

7. Vejeanordning ifølge et af kravene 1 til 6, **kendetegnet ved, at** den første svingarm (11) har to lejedele (28, 29), med hvilke den er lejret på svingaksen (3), og mellem hvilke den anden svingarm (12) er lejret på svingaksen (3).

8. Vejeanordning ifølge et af kravene 1 til 7, **kendetegnet ved, at** længden af den anden svingarms (12) løftearm, som er i kontakt med luftbælgen (4), er større end betjeningsforsatsens (18) længde, fortrinsvist det dobbelte til det firedobbelte af betjeningsforsatsens (18) længde.

9. Vejeanordning ifølge et af kravene 1 til 8, **kendetegnet ved, at** luftbælgens (4) påfyldningstryk og påfyldningsvolumen definerer åbningsvinklen (φ) mellem den første svingarm (11) og den anden svingarm (12), og/eller at åbningsvinklen (φ) mellem svingarmene (11, 12) kan indstilles og fastsættes via trykket i luftbælgen (4).

10. Vejeanordning ifølge et af kravene 1 til 9, **kendetegnet ved, at** luftbælgen (4) er trykpåvirkelig ved svingning af den første svingarm (11) via luftbælgens (4) vinkelarm (7), og at den anden svingarm (12) via luftbælgen (4) kan artikuleres omkring svingaksen (3), således at vejeskubberen (2), der er koblet sammen med den anden svingarm (12), ved en svingning af den første svingarm (11) kan forskydes langs en udgangskanal (6).

11. Vejeanordning ifølge et af kravene 1 til 10, **kendetegnet ved, at** luftbælgen (4) bestemmer åbningsvinklen (φ) mellem svingarmene (11, 12) og drejningen af den anden svingarm (12) og fastsætter længden af vejeanordningens (2) udkørselsbane og evt. indpresningstrykket for en dejportion (13) i en radial optagelsesåbning (9) i en vejetromle (8).

12. Vejeanordning ifølge et af kravene 1 til 11, **kendetegnet ved, at** vejeanordningen (2) har en udsparing (17), i hvilken den anden svingarm (12), fortrinsvist med en på den ledige ende af betjeningsforsatsen (18) drejeligt lejret rulle (16), griber ind, og eller der er tilvejebragt et anslag (14), til begrænsning af åbningsvinklen (φ) og forhindring af overstrækning af luftbælgen (4), som har en tap og en dermed samvirkende anslagsflade, hvor evt. anslagets (14) anslagsflade er udformet på den første svingarm (11) og tappen på den anden svingarm (12).

13. Anordning til positionering og bearbejdning af dej, som indeholder en vejeanordning ifølge et af de foregående krav 1 til 12.

14. Anordning ifølge krav 13, **kendetegnet ved, at** anordningen har et drev (50) til aktivering af den første svingarm (11), hvor der evt. på en arm (51), der roteres af drevet

(50), er artikuleret en drivarm (27), hvorpå vinkelarmens (7) korte arm (22) og en udligger (30) er svingbart artikuleret, hvor udliggeren (30) driver vejetromlen (8).

15. Anordning ifølge krav 13 eller 14, **kendetegnet ved, at** en vejetromle (8) er tilsluttet til vejeskubberens (2) udgangsbane eller til udgangskanalen (6), og/eller en udgangskanal fra en forpositioneringsanordning (19) munder ud i udgangskanalen (6).

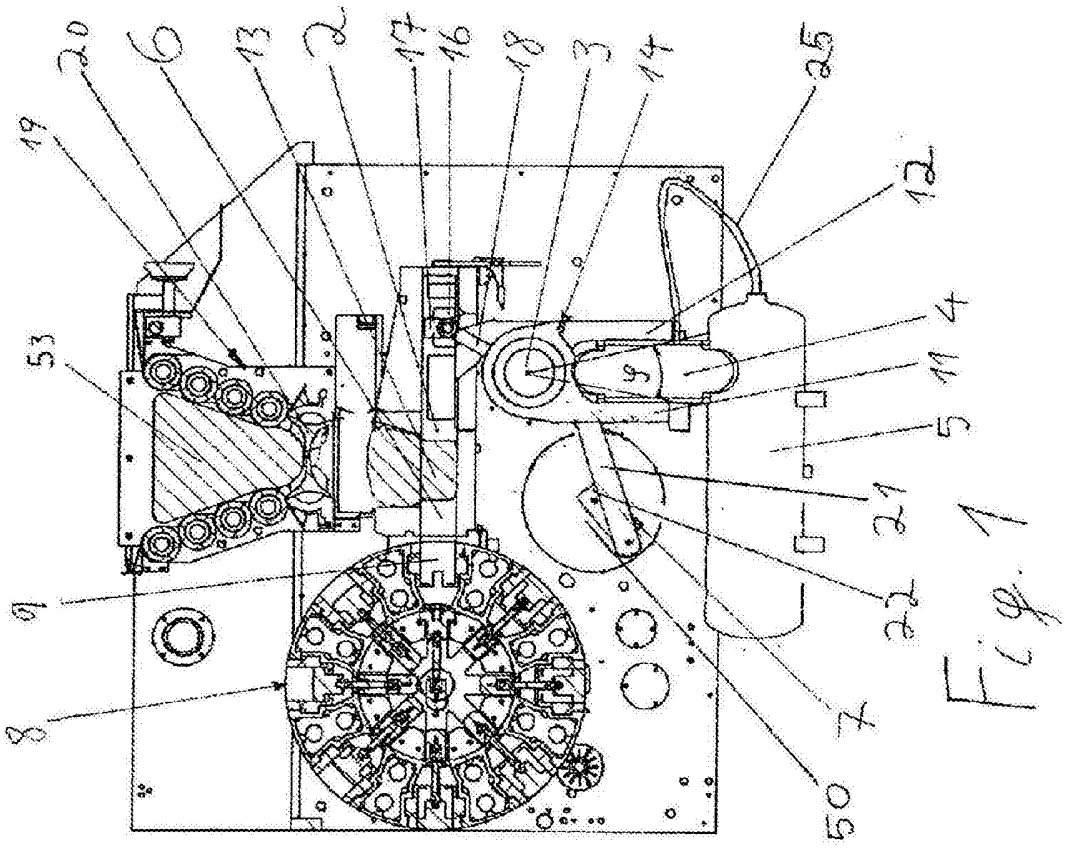

Fig. 1

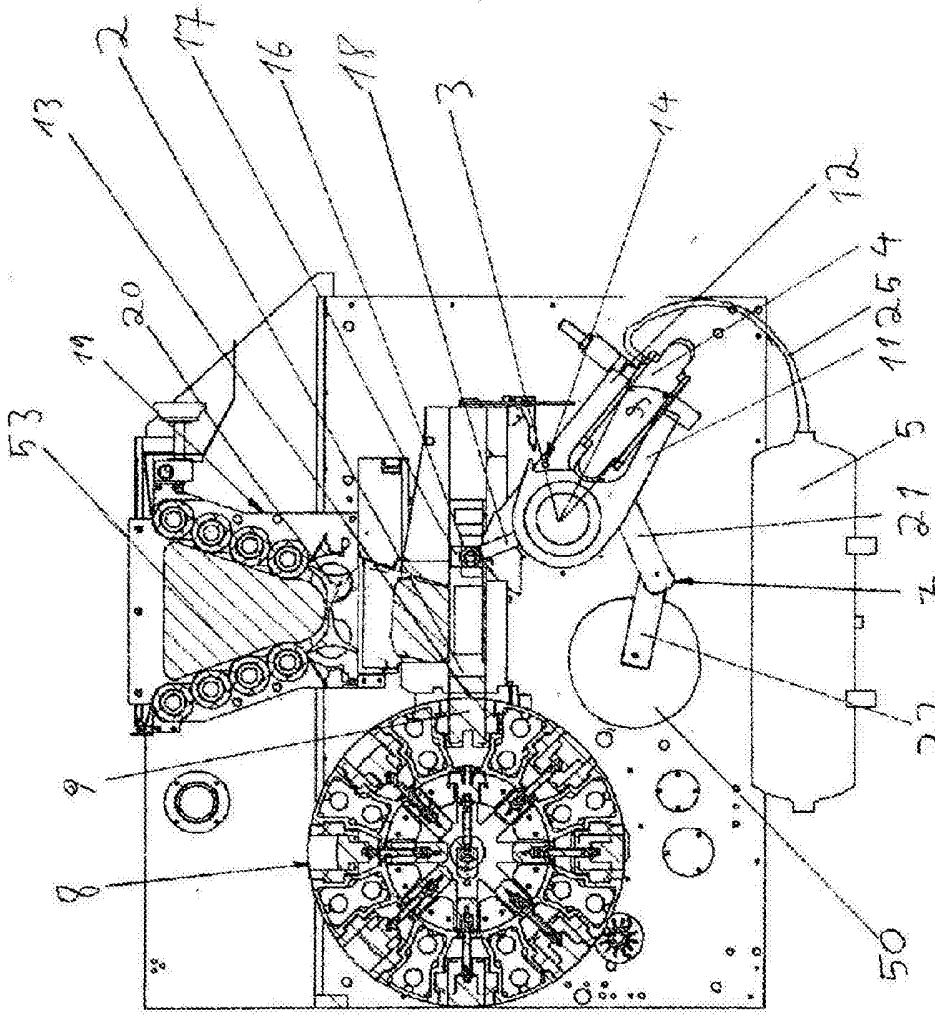

Fig 2

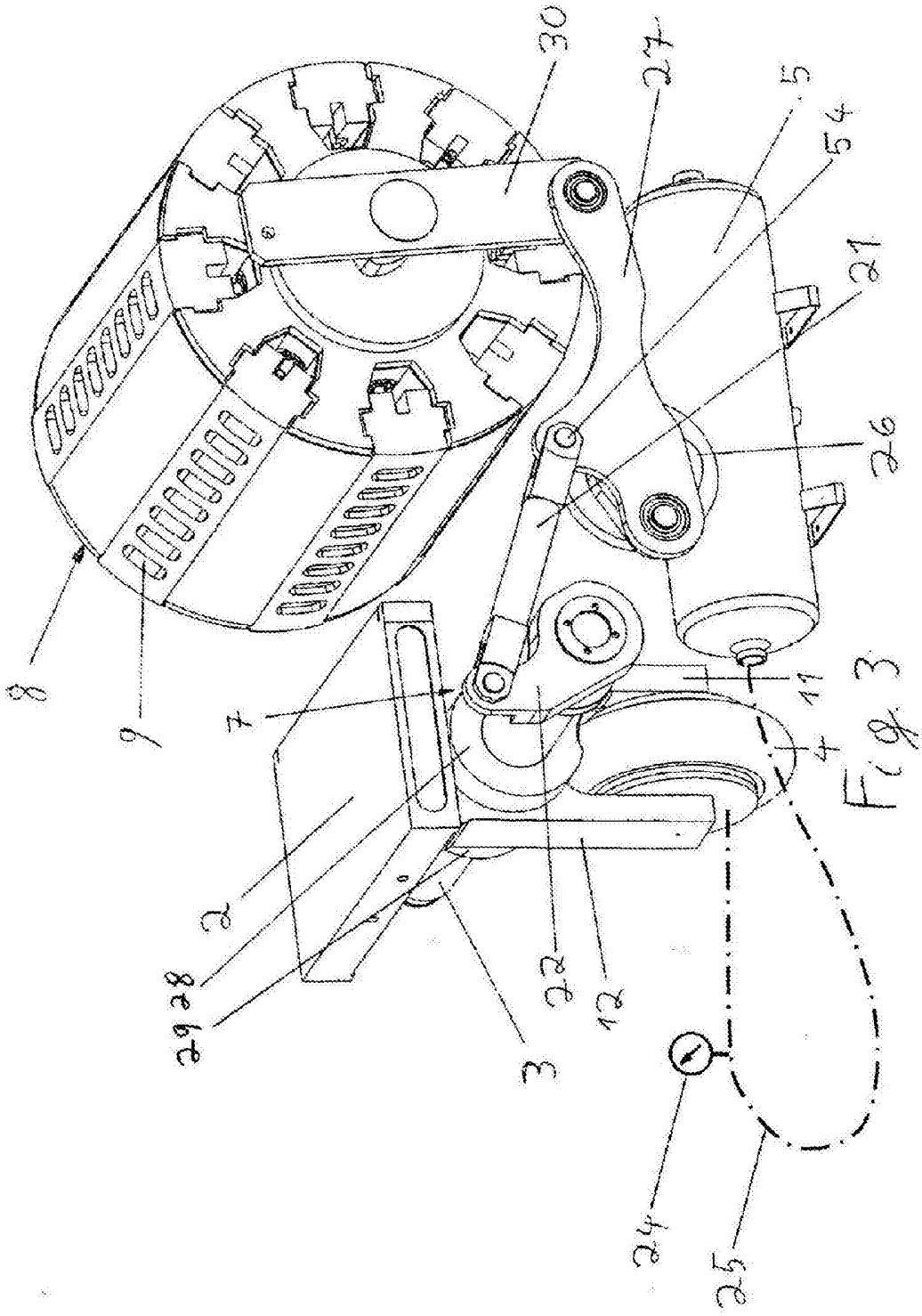

Fig 3

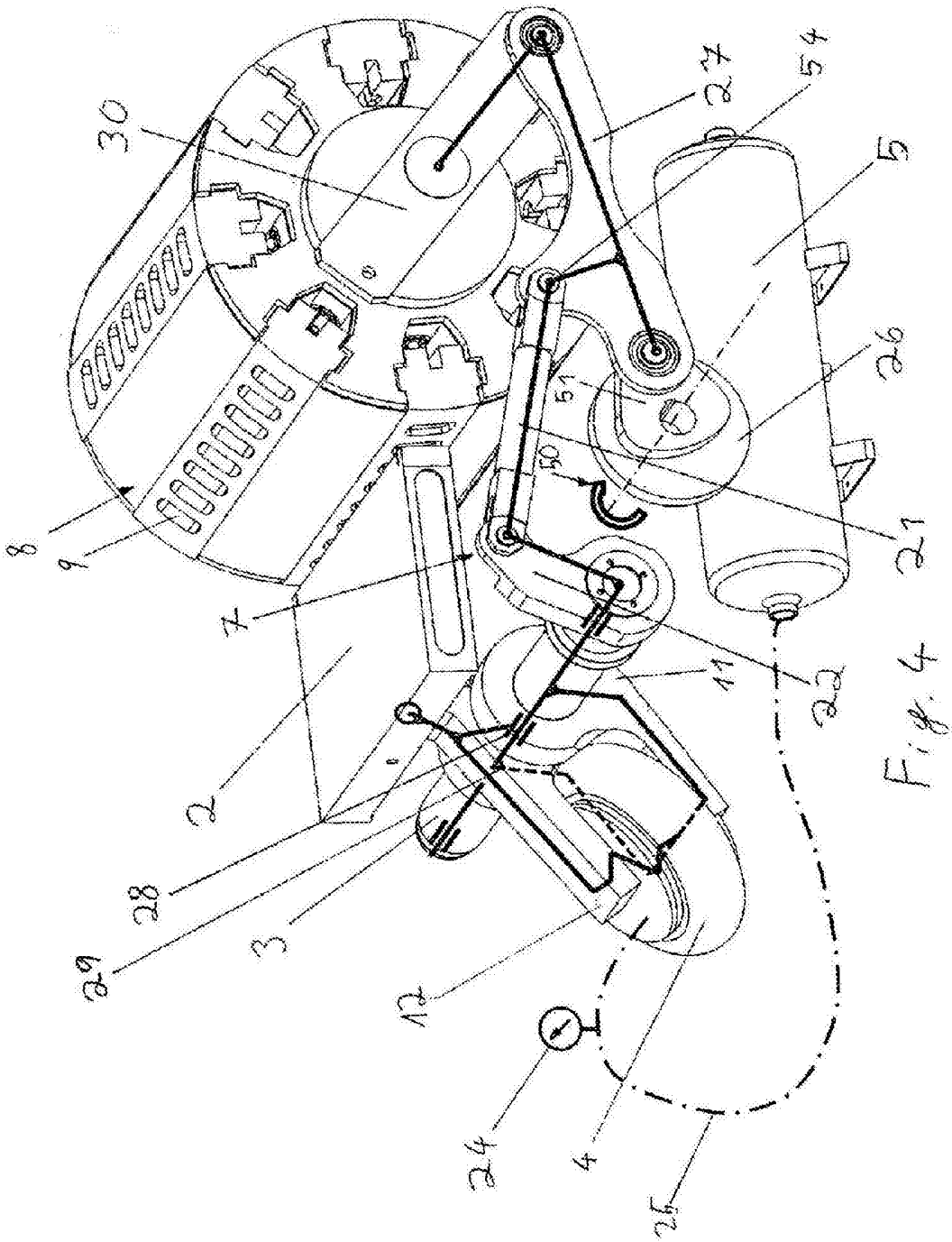

Fig. 4