Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 2924128 C 2019/12/31

(11)(21) 2 924 128

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

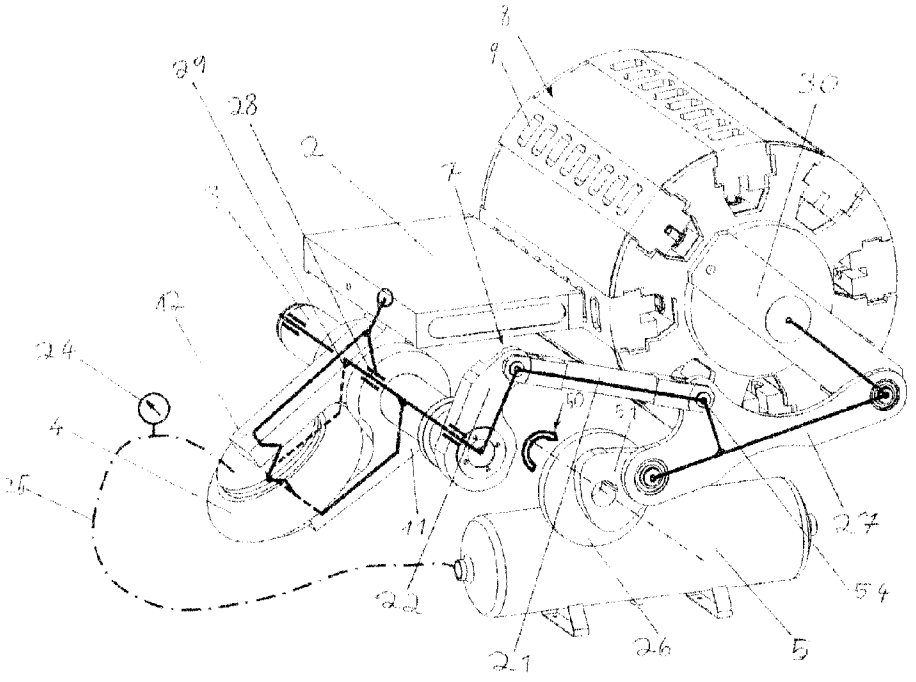
(86) Date de dépôt PCT/PCT Filing Date: 2013/09/09
(87) Date publication PCT/PCT Publication Date: 2014/03/20
(45) Date de délivrance/Issue Date: 2019/12/31
(85) Entrée phase nationale/National Entry: 2016/03/11
(86) N° demande PCT/PCT Application No.: AT 2013/050179
(87) N° publication PCT/PCT Publication No.: 2014/040106
(30) Priorité/Priority: 2012/09/13 (AT A 50388/2012)

(51) Cl.Int./Int.Cl. *A21C 5/04* (2006.01)
(72) Inventeurs/Inventors:
SAUSENG, ROBERT, AT;
POLLABAUER, JOHANN, AT

(73) Propriétaire/Owner:
KONIG MASCHINEN GESELLSCHAFT M.B.H., AT

(74) Agent: MARKS & CLERK

(54) Titre : ENSEMBLE DE PESEE DE PRECISION POUR DEPORTER DES PORTIONS DE PATE
(54) Title: PRECISION WEIGHING SYSTEM FOR MOVING PORTIONS OF DOUGH



(57) Abrégé/Abstract:
This invention relates to a precision weighing system for transporting or moving portions of dough with a dividing slider (2) in a device for portioning and processing dough, wherein the system has a rotatably mounted, in particular pivotally mounted, first pivoting lever (11), and a rotatably mounted, in particular pivotally mounted, second pivoting lever (12), wherein the second pivoting lever (12) carries an actuating projection (18) for the reciprocating motion of the dividing slider (2), and the first pivoting lever (11) can be pivoted about the pivot bearing thereof by a drive, wherein an air bellows (4) is disposed between the first pivoting lever (11) and the second pivoting lever (12), the volume and/or shape of said air bellows being variable by compressed air admission, and which specifies the distance between the opposing lever arms of the two pivoting levers (11, 12).

ABSTRACT

This invention relates to a precision weighing system for transporting or moving portions of dough with a dividing slider (2) in a device for portioning and processing dough, wherein the system has a rotatably mounted, in particular pivotally mounted, first pivoting lever (11), and a rotatably mounted, in particular pivotally mounted, second pivoting lever (12), wherein the second pivoting lever (12) carries an actuating projection (18) for the reciprocating motion of the dividing slider (2), and the first pivoting lever (11) can be pivoted about the pivot bearing thereof by a drive, wherein an air bellows (4) is disposed between the first pivoting lever (11) and the second pivoting lever (12), the volume and/or shape of said air bellows being variable by compressed air admission, and which specifies the distance between the opposing lever arms of the two pivoting levers (11, 12).

PRECISION WEIGHING SYSTEM FOR MOVING PORTIONS OF DOUGH

This invention relates to a precision weighing system for transporting or moving portions of dough with a dividing slider in a device for portioning and processing dough.

From prior art, dividing sliders are known which are moved linearly by means of toggle mechanisms with springs. The dividing slider directly driven by a drive via a toggle mechanism moves portions of dough towards a precision weighing drum. Herein, the springs of the toggle mechanism cause a constant injection force of the portions of dough into the precision weighing drum. If the dough, the portions of dough, or the amount of dough changes, the springs will change the injection force of the dividing slider based on the spring characteristic and the spring excursion. Thus, for different types of dough and portions of dough, it is not possible to ensure a constant injection force of the dough by the dividing slider into the precision weighing drum. Variation of the injection force results in a deviation of the amount of dough in the precision weighing drum from the specification, thereby altering the final weight of the baked goods.

Consequently, the object of the invention is to ensure constant injection force of the dividing slider into the precision weighing drum, regardless of the amount weighed and the nature of the dough. Another object is to create a precision weighing system of simple design and trouble-free operation.

According to another aspect of the present invention, there is provided a precision weighing system for transporting or moving portions of dough, comprising a dividing slider in a device for portioning and processing dough, wherein the system has a rotatably mounted, in particular pivotally mounted, first pivoting lever, and a rotatably mounted, in particular pivotally

mounted, second pivoting lever, wherein the second pivoting lever carries an actuating projection for the reciprocating motion of the dividing slider, and the first pivoting lever is pivotable about the pivot axis thereof by a drive, characterized in that between the first pivoting lever and the second pivoting lever, an air bellows is disposed the volume and/or shape of which is variable by compressed air admission, and which specifies the distance between the opposing lever arms of the two pivoting levers.

According to another aspect of the present invention, there is provided a weighing-out system for conveying or moving dough portions with a weighing-out slide in a device for portioning and processing dough, wherein the system comprises a rotatably mounted first pivot lever and a rotatably mounted second pivot lever, wherein the second pivot lever carries an actuating extension for back and forth movement of the weighing-out slide, and wherein the first pivot lever is pivoted by a drive about a pivot bearing of the first pivot lever, wherein air bellows are arranged between the first pivot lever and the second pivot lever, wherein volume and/or shape of the air bellows is variable by application of compressed air, in order to set a distance between opposing lever arms of the two pivot levers.

According to the invention, provision is made for an air bellows to be disposed between the first pivoting lever and the second pivoting lever, the volume and/or shape of said air bellows being variable by compressed air

admission, and which specifies the distance between the opposing lever arms of the two pivoting levers.

Empty runs can be avoided, and thereby, faster cycle times can be achieved if the first pivoting lever and the second pivoting lever can be applied against the air bellows or at least one pivoting lever is connected to the air bellows.

In order to ensure constant filling of the air bellows and identical weighing conditions of the portions of dough, it is advantageous for the air bellows to be connected to a compressed air source, preferably a pressure vessel or compressor.

For the pressure inside the air bellows to be maintained approximately constant and pressure surges inside the air bellows to be minimized by a buffer volume, provision is made for the air bellows to be connected to a compressed air source, preferably a pressure vessel designed as a buffer volume.

In order to have a better capacity for adapting the dividing slider to changes in the amount of dough and the composition of the dough, provision is made for the air bellows and/or the compressed air source to have a pressure regulating unit for setting the pressure inside the air bellows and consequently the volume and/or shape of the air bellows.

A compact and precisely operating embodiment of the invention provides for the first pivoting lever and the second pivoting lever to be pivotally mounted on pivot axes which are parallel to each other, or for the first pivoting lever and the second pivoting lever to be pivotally mounted with respect to each other on the same pivot axis.

One embodiment of the invention of a particularly simple design provides for a drive and a toggle to be provided for rotating the first pivoting lever, wherein the drive drives a short lever forming the toggle together with a long lever,

wherein the end of the long lever is connected to the first pivoting lever.

Efficient load transmission from the first pivoting lever via the air bellows to the second pivoting lever is achieved if the air bellows is disposed at least partially in the path or plane of motion of the two pivoting levers.

In order to cause symmetrical load transmission from the first pivoting lever via the air bellows to the second pivoting lever and prevent tilting of the pivoting levers, provision is made for the first pivoting lever to have two bearing parts by which it is mounted on the pivot axis and between which the second pivoting lever is mounted on the pivot axis.

The invention achieves advantageous relative strength at the second pivoting lever if the length of the lever arm of the second pivoting lever in contact with the air bellows is greater than the length of the actuating projection, preferably from two to four times the length of the actuating projection.

A particularly suitable setting of the travel of the dividing slider is achieved if the filling pressure and filling volume of the air bellows define the opening angle between the first pivoting lever and the second pivoting lever.

In order to enable efficient setting of the dividing slider, provision is made for the opening angle between the pivoting levers to be adjustable and specified by the pressure inside the air bellows.

An advantageous embodiment of the invention is achieved if upon pivoting of the first pivoting lever via the toggle the air bellows can be admitted with compressed air, and the second pivoting lever can be deflected by the air bellows about the pivot axis so that the dividing slider coupled with

the second pivoting lever can be moved along an output channel when the first pivoting lever is pivoted.

The operation of the inventive dividing slider is particularly efficient if the air bellows determines the opening angle between the pivoting levers and the rotation of the second pivoting lever and specifies the length of the excursion of the dividing slider and possibly the injection pressure of a portion of dough into a radial intake opening of a precision weighing drum.

Easy load transmission from the second pivoting lever to the dividing slider is achieved if the dividing slider has a recess which is engaged by the second pivoting lever, preferably with a roller rotatably mounted at the free end of the actuating projection.

In order to avoid unnecessary stretching of the air bellows and assist in returning the second pivoting lever, it is advantageous for a stop to be provided for limiting the opening angle and preventing overstretching of the air bellows, said stop having a catch and a stop face cooperating therewith, wherein possibly the stop face of the stop is made on the first pivoting lever and the catch is made on the second pivoting lever.

According to the invention, provision is made for the dividing slider to be incorporated into a device for portioning and processing dough.

One embodiment of the device provides for the device to have a drive for actuating the first pivoting lever, and/or for a precision weighing drum to follow the output path of the dividing slider or the output channel, and/or for a discharge channel of a pre-portioning device to open into the output channel.

A device working precisely under practical circumstances is created if a drive lever is hinged at a lever rotated by the drive, whereto the short lever of the toggle and a

cantilever arm are pivotally hinged, wherein the cantilever arm drives the precision weighing drum.

Preferred embodiments of the invention will be explained hereafter with reference to Fig. 1 to Fig. 4.

In the figures:

Fig. 1 schematically shows a precision weighing system with a dividing slider in the initial position,

Fig. 2 schematically shows a precision weighing system with a dividing slider in the final position according to Fig. 1,

Fig. 3 schematically shows a precision weighing system in a perspective view, and

Fig. 4 schematically shows a precision weighing system in a perspective view according to Fig. 3.

Fig. 1 and Fig. 2 respectively show a schematic front view of an inventive precision weighing system for moving portions of dough 13 in a device for portioning and processing dough. Herein, the dough 53 is pre-portioned in a pre-portioning device 19 and discharged as a portion of dough 13 in an output channel 6 of a dividing slider 2 radially into an intake opening 9 of a precision weighing drum 8.

The precision weighing system comprises a first pivoting lever 11 and a second pivoting lever 12 rotatably mounted about a pivot axis 3. The two pivoting levers 11 and 12 are pivoted about the pivot axis 3 by a toggle 7 connected to a drive 50. The toggle 7 having a short lever 22 and a long lever 21 is extended by the drive 50 rotating the short lever 22. The long lever 21 is applied at the first pivoting lever 11, and upon extension of the toggle 7, causes the first pivoting lever 11 to pivot about the pivot axis 3.

Between the two pivoting levers 11, 12, an air bellows 4 is inserted as a pressure pad. Herein, the two pivoting levers 11, 12 are applied against opposing surfaces of the air bellows 4 and possibly connected to the air bellows 4. The

application point of the first pivoting lever 11, the air bellows 4, and the second pivoting lever 12 are advantageously located in a plane extending vertically to the pivot axis 3. As represented, the first pivoting lever 11 may have bearing parts 28 and 29 located on either side of the second pivoting lever 12 or be of dual design. The second pivoting lever 12 is located between the bearing parts 28 and 29. This allows for symmetrical application of force, and no guiding against tilting is required.

In Fig. 4, the course of the second bearing part 29 of the first pivoting lever 11 is indicated in dashed lines. A stop 14 made as a catch on the second pivoting lever 12 and as a stop face on the first pivoting lever 11 limits the maximum opening angle φ of the first pivoting lever 11 and the second pivoting lever 12 with respect to each other and at the same time prevents overinflating and overstretching of the air bellows 4.

The air bellows 4 is connected to a pressure vessel 5 via a compressed air duct 25. The pressure vessel 5 acts as a buffer volume so that the pressure will not rise too much when the air bellows 4 is compressed. The objective is to apply an approximately constant force to the dividing slider 2. The distance of the first pivoting lever 11 from the second pivoting lever 12, and thus the opening angle φ, are determined by the filling pressure and filling volume of the air bellows 4 with the pressure vessel 5.

On the second pivoting lever 12, an actuating projection 18 is formed extending the second pivoting lever 12 and causing load transmission from the second pivoting lever 12 to the dividing slider 2. The actuating projection 18 can be made as a rod and carry a roller 16 at the free end. When the dividing slider 2 is extended, the roller 16 is applied to the averted surface of a recess 17 of the dividing slider 2, and

when the dividing slider 2 is returned, it is applied to a the surface facing the precision weighing drum 8.

When the second pivoting lever 12 is deflected about the pivot axis 3, the actuating projection 18 with the roller 16 thus causes translation of the dividing slider 2 inside the output channel 6 and causes the pivoting motion of the pivoting lever 11, 12 about the pivot axis 3 to be converted into translation of the dividing slider 2 inside the output channel 6. Thereby, the dividing slider 2 moves the portion of dough 13 towards the intake opening 9 of the precision weighing drum 8. The distance and the opening angle φ of the two pivoting levers 11, 12 specified by the air bellows 4 limit the excursion of the dividing slider 2 via motion coupling of the actuating projection 18.

The air bellows 4 is connected to a compressed air source 5, in this embodiment made as a pressure vessel with a compressor supplying the air bellows 4 with compressed air and acting as a buffer volume. A pressure regulating unit 24, advantageously integrated into the compressed air source 5 or pressure duct 25 adjustably specifies the filling volume and filling pressure of the air bellows 4, preferably as 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 types of dough.

Fig. 2 shows a precision weighing system in a front view with the first pivoting lever 11 and the second pivoting lever 12 in the deflected state. The dividing slider 2 is represented in the extended state. Deflection is caused by the toggle 7 which is driven by drive 50. The pressure and filling volume of the by now compressed air bellows 4 determine the opening angle φ of both pivoting levers 11, 12 and thus the adjusting force of the dividing slider 2. The portion of dough 13 represented was moved by the dividing slider 2 towards the intake opening 9 of the precision weighing drum 8, with the

pressure set in the air bellows 4 specifying the injection force of the portion of dough 13 into the intake opening 9 of the precision weighing drum 8.

In Fig. 1 and Fig. 2, further essential parts of a device for portioning and processing dough are represented. A pre-portioning device 19 includes a star knife 20 for pre-portioning the dough 53. The pre-portioned dough then falls into the output channel 6 and is discharged by the dividing slider 2 as a portion of dough 13. Die precision weighing drum 8 includes a plurality of intake openings 9 and adjusting parts for receiving, processing, and conveying the portions of dough 13.

In the initial position according to Fig. 1, the air bellows 4 is uncompressed, and the first pivoting lever 11 is placed in the initial position by drive 50 via toggle 7. Stop 14 prevents opening beyond a maximum opening angle φ, and at the same time acts so as to carry along the second pivoting lever 12 into the initial position, and prevents overinflating of the pressurized air bellows 4. As the toggle 7 is stretched by the drive 50, the first pivoting lever 11 is deflected and transfers the pivoting motion in the form of pressure force to the second pivoting lever 12 via the air bellows 4. The pressurized air bellows 4 is compressed (Fig. 2), wherein the pressure vessel 5 acts as a buffer volume and prevents excessive pressure rise inside the air bellows 4. The air bellows 4 deflects the second pivoting lever 12 about the pivot axis 3, and due to motion coupling of the second pivoting lever 12 with the dividing slider 2, the deflection causes the dividing slider 2 to be extended towards the precision weighing drum 8.

As an alternative to the pressure vessel 5, the air bellows 4 can be connected to a compressed air duct 25 connected to a compressor, and the pressure regulating unit 24 can be disposed between the compressor and the air bellows 4.

As an alternative to the pivot axis 3, the first pivoting lever 11 may also be fastened to a shaft which is pivoted or rotated by the toggle 7 together with the first pivoting lever 11. Then, the second pivoting lever 12 is pivotally mounted on said shaft.

It is also possible for both pivoting levers 11, 12 to be mounted on adjacent parallel axes or shafts and for an air bellows 4 to be disposed therebetween.

Fig. 3 and Fig. 4 respectively show a perspective view of another embodiment of an inventive precision weighing system for moving portions of dough in a device for portioning and processing dough.

Fig. 3 shows a drive lever 27 fastened pivotally by drive 50, indicated by a circulating arrow in Fig. 4, via a drive level or flange 25 with an eccentric pivot, said drive lever being applied to a cantilever arm 30 of the precision weighing drum 8, on the one hand, and having an attachment off-center with a pivot bearing 54 for a short lever 22. Lever 22 connects the drive lever 27 to an eccentric projection or long lever 21 of a pivot axis made as a shaft 3, and is pivotally mounted on the drive lever 27 and the long lever 21. Levers 21 and 22 form the toggle 7.

The first pivoting lever 11 is rigidly fastened to the shaft 3 and is applied at the air bellows 4 and advantageously connected thereto. Opposite the first pivoting lever 11, the second pivoting lever 12 is applied at the air bellows 4, is advantageously also connected to the air bellows 4, and rotatably mounted on the shaft 3. As in the embodiment described in Figs. 1 and 2, the second pivoting lever 12 is connected to the dividing slider 2 via an actuating projection 18 and a roller 16. The precision weighing drum 8 represented has several intake openings 9 located in parallel to each other, regularly along the circumference of the precision

weighing drum 8. The air bellows 4 is connected to a pressure vessel 5 via the pressure duct 25.

Fig. 4 shows a perspective view of the inventive precision weighing system according to Fig. 3 in the deflected state, wherein the dividing slider 2 is located in the forward extended position. Furthermore, Fig. 4 shows the coupling of forces and the flow of forces of drive 50, merely hinted, to the precision weighing system and precision weighing drum 8.

When the flange 26 is rotated about the rotating axis thereof, the cantilever or drive arm 30, and thus the precision weighing drum 8, is rotated about the rotating axis thereof via the drive lever 27. The drive lever 27 thus pivoted, then carries along the actuating lever or short lever 22 pivotally connected via the off-center attachment 54. Following the eccentric projection or long lever 21, the lever 22 is rotated, thereby rotating shaft 3 about the rotational axis thereof. The first pivoting lever 11 fastened to the shaft 3 is deflected and pressurized by the air bellows 4 connected thereto. Due to the internal pressure and filling volume of the air bellows 4, the movement is transferred to the second pivoting lever 12, advantageously connected thereto, and the second pivoting lever 12 is deflected about the rotational axis of the shaft 3. Thereby, dividing slider 2 is extended into the forward position and pushes the portions of dough 13 into the intake openings 9 of the precision weighing drum 8 with an injection force determined by the air bellows 4.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A weighing-out system for conveying or moving dough portions with a weighing-out slide in a device for portioning and processing dough, wherein the system comprises a rotatably mounted first pivot lever and a rotatably mounted second pivot lever, wherein the second pivot lever carries an actuating extension for back and forth movement of the weighing-out slide, and wherein the first pivot lever is pivoted by a drive about a pivot bearing of the first pivot lever, wherein air bellows are arranged between the first pivot lever and the second pivot lever, wherein volume and/or shape of the air bellows is variable by application of compressed air, in order to set a distance between opposing lever arms of the two pivot levers.

2. The weighing-out system according to claim 1, wherein the first and second pivot levers are pivotably mounted.

3. The weighing-out system according to claim 1 or 2, wherein the first pivot lever and the second pivot lever is applied against the air bellows, or at least one of the pivot levers is connected to the air bellows.

4. The weighing-out system according to any one of claims 1 to 3, wherein the air bellows are connected with a compressed air source.

5. The weighing-out system according to claim 4, wherein the compressed air source is a pressurised vessel or compressor.

6. The weighing-out system according to claim 4 or 5, wherein the compressed air source is a pressure vessel formed as a buffer volume.

7. The weighing-out system according to any one of claims 4 to 6, wherein the air bellows and/or the compressed air source have a pressure control unit to adjust pressure in the air bellows and, as a result, the volume and/or shape of the air bellows.

8. The weighing-out system according to any one of claims 1 to 7, wherein the first pivot lever and the second pivot lever are mounted pivotably on mutually parallel pivot axes, or wherein the first pivot lever and the second pivot lever are each pivotably mounted relative to the same pivot axis.

9. The weighing-out system according to any one of claims 1 to 8, wherein the drive and a toggle lever are provided for rotation of the first pivot lever, wherein the drive drives a short lever to form the toggle lever with a long lever, wherein an end of the long lever is connected to the first pivot lever.

10. The weighing-out system according to any one of claims 1 to 9, wherein the air bellows is arranged at least partially in a path or plane of the two pivot levers.

11. The weighing-out system according to any one of claims 1 to 12, wherein the first pivot lever has two bearing parts, with which the first pivot lever is mounted on a pivot axis and between which the second pivot lever is mounted on the pivot axis.

12. The weighing-out system according to any one of claims 1 to 11, wherein a length of the lever arm of the second pivot lever in contact with the air bellows is greater than a length of the actuating extension.

13. The weighing-out system according to claim 12, wherein the length of the lever arm of the second pivot lever in contact with the air bellows is two to four times greater than the length of the actuating extension.

14. The weighing-out system according to any one of claims 1 to 13, wherein a filling pressure and a filling volume of the air bellows define an opening angle (ϕ) between the first pivot lever and the second pivot lever.

15. The weighing-out system according to any one of claims 1 to 13, wherein an opening angle between the pivot levers is adjustable and preset via the pressure in the air bellows.

16. The weighing-out system according to claim 9, wherein pivoting of the first pivot lever by the toggle lever causes the air bellows to be acted upon by pressure, while the second pivot lever is deflected about a pivot axis by the air bellows so that the weighing-out slide coupled to the second pivot lever is displaceable along an output channel upon pivoting of the first pivot lever.

17. The weighing-out system according to any one of claims 1 to 16, wherein the air bellows determine an opening angle (ϕ) between the pivot levers and rotation of the second pivot lever, and predetermines a length of a travel path of the weighing-out slide.

18. The weighing-out system according to claim 17, wherein the air bellows predetermines a pressing force on a dough portion in a radial receptacle opening of a weighing-out drum.

19. The weighing-out system according to any one of claims 1 to 18, wherein the weighing-out slide has a recess, in which the second pivot lever engages.

20. The weighing-out system according to claim 19, wherein the second pivot lever engages in the recess with a roller rotatably mounted at a free end of the actuating extension.

21. The weighing-out system according to any one of claims 1 to 13, wherein the weighing-out slide has a stop to limit an opening angle and to prevent over-expansion of the air

bellows, and which has a pin and an interacting stop surface.

22. The weighing-out system according to claim 21, wherein the stop surface of the stop is formed on the first pivot lever and the pin on the second pivot lever.

23. A device for portioning and processing dough comprising a weighing-out system as defined in any one of claims 1 to 22.

24. The device according to claim 23, wherein the device comprises a drive to actuate the first pivot lever.

25. The device according to claim 24, wherein a drive lever is linked to a lever rotated by the drive, and to which the short levers of the toggle lever and a cantilever arm are pivotably linked, and wherein the cantilever arm drives a weighing-out drum.

26. The device according to claim 25, wherein the weighing-out drum is connected to an output path of the weighing-out slide or to an output channel.

27. The device according to claim 26, wherein an output channel opens into a delivery channel of a pre-portioning device.

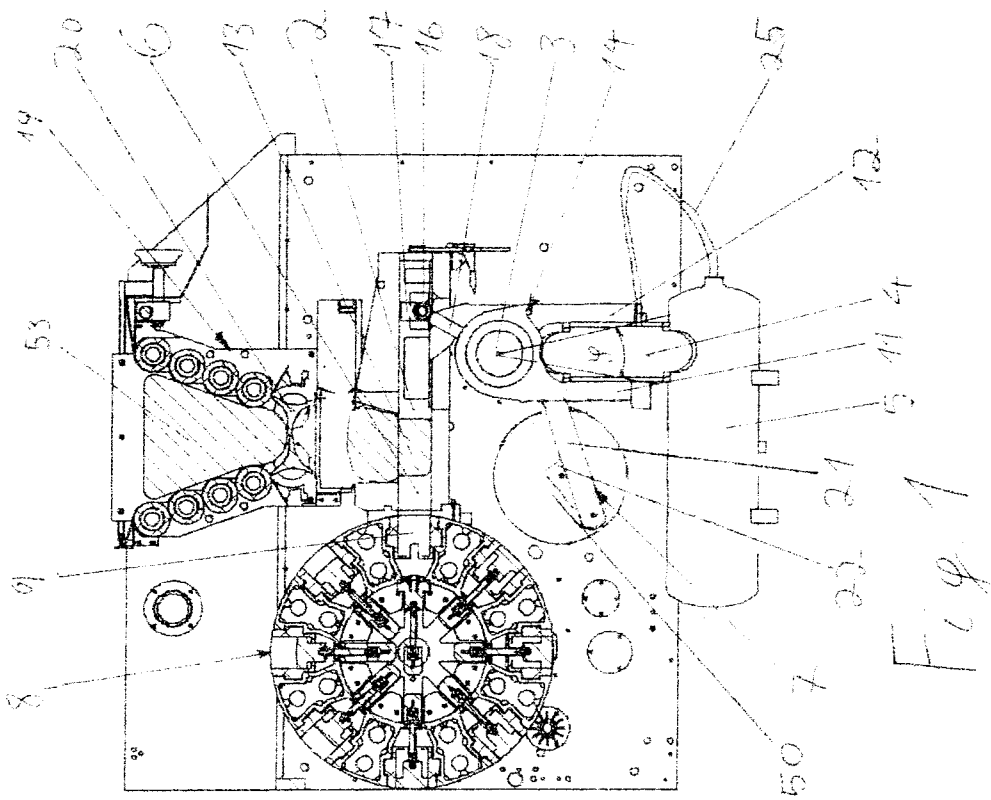


Fig 1

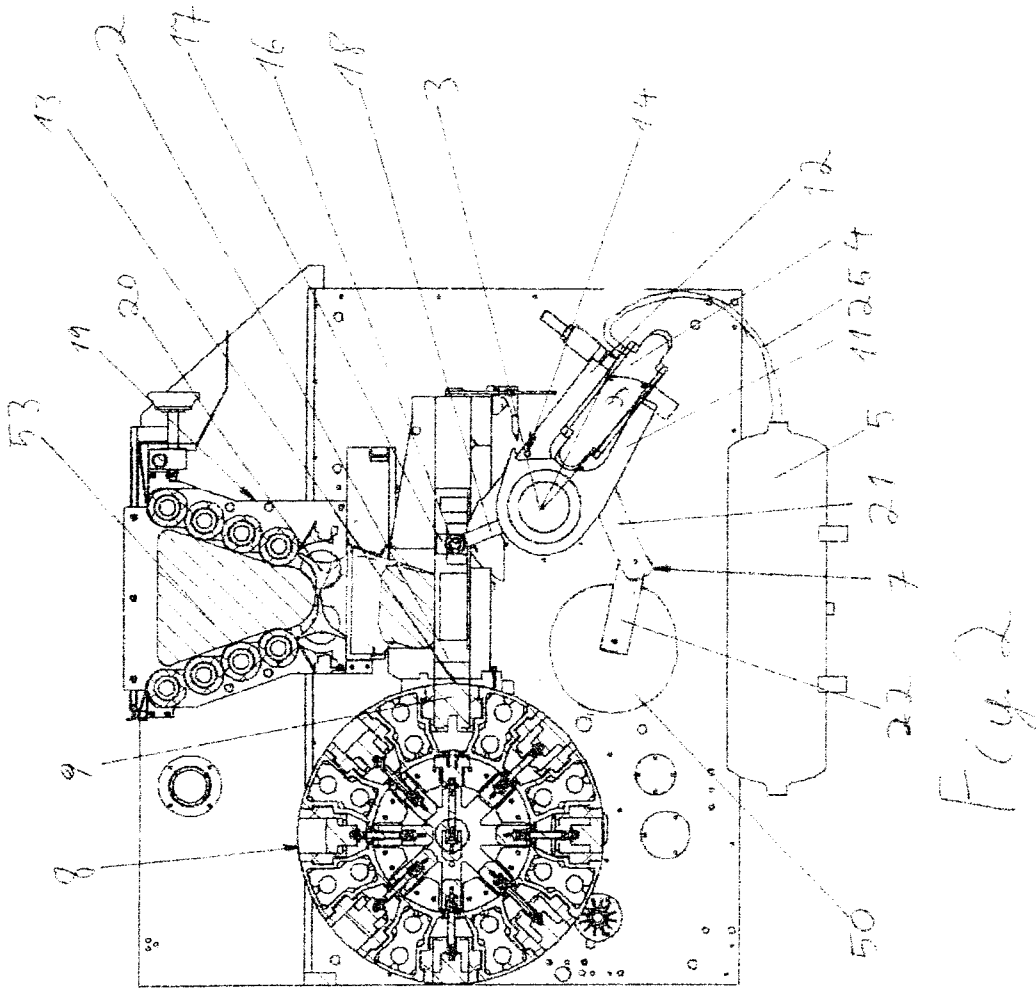


Fig. 2

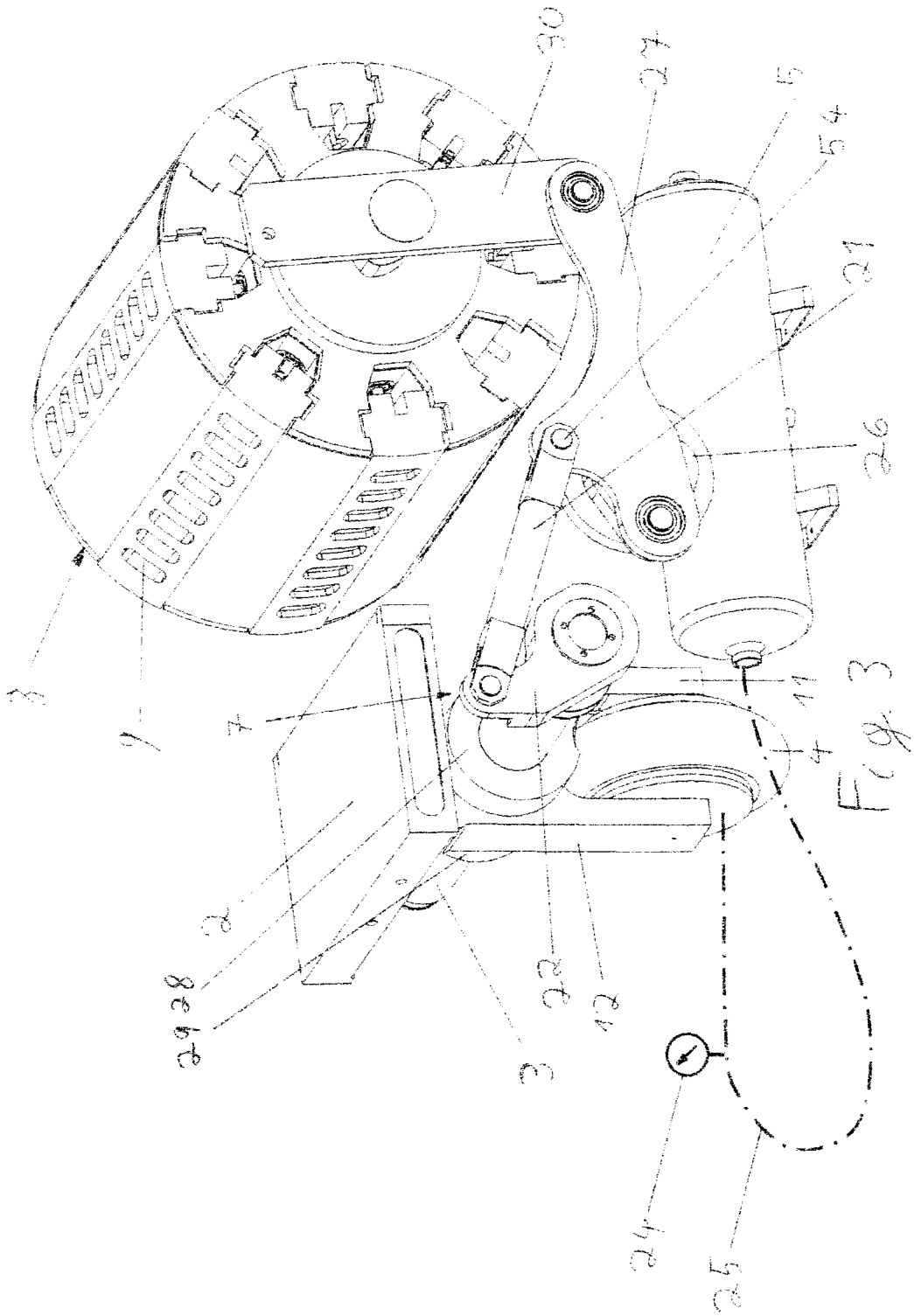


Fig. 3

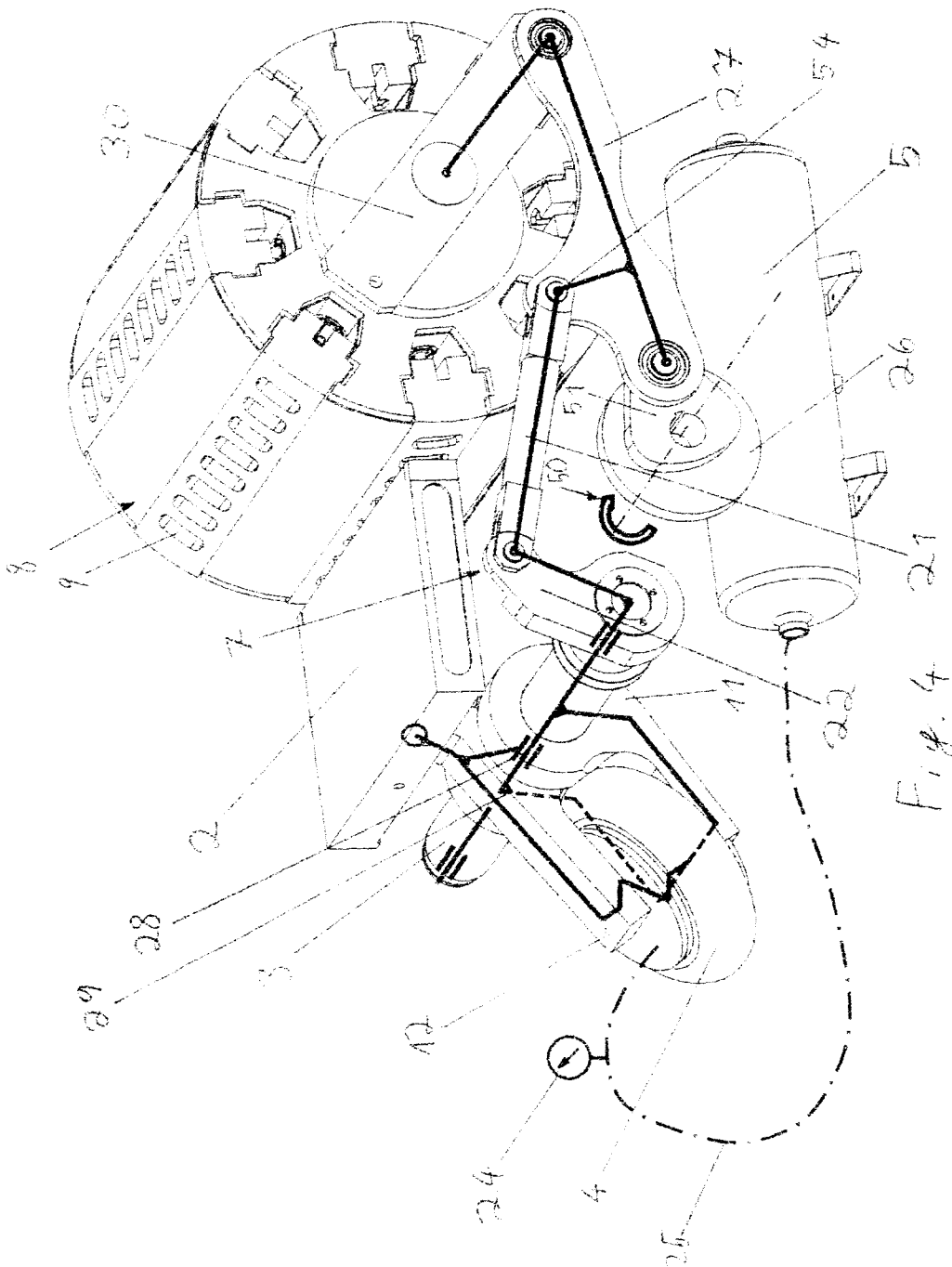
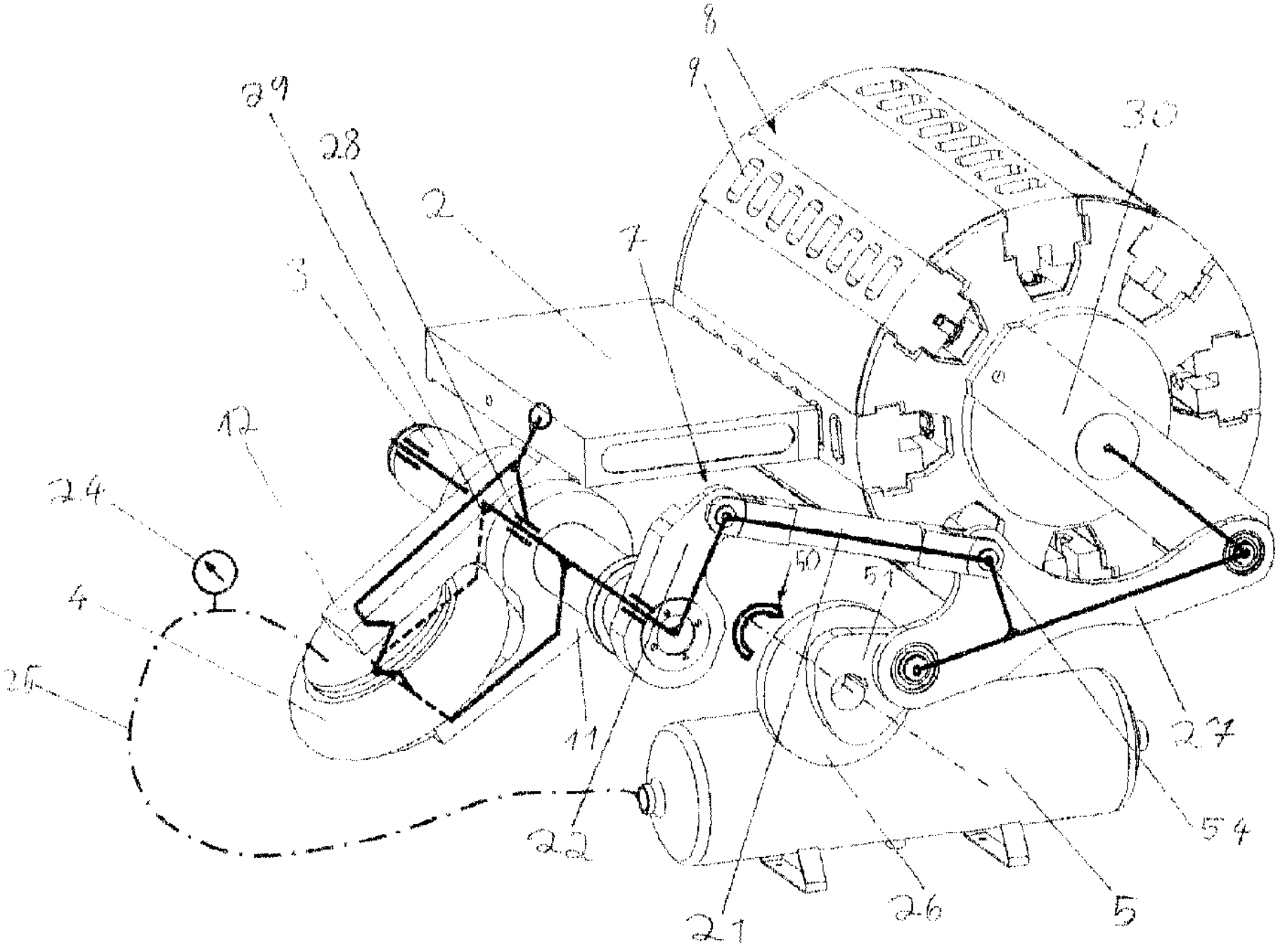


Fig. 4


8
9
29
28
2
7
3
30
12
24
4
25
50
51
11
27
22
54
21
26
5