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(54)

Konverter

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

CONVERTER

Prior Art

The invention relates to a converter, in particular for the conversion of one or more fibres, in particular of continuous fibres, into staple fibres.

GB 754 610 A has already disclosed a converter for the conversion of one or more fibres into staple fibres, which converter has a rotationally driveable cutting bearing unit which forms a spindle, a cutting unit which is rotationally driveably supported by means of the cutting bearing unit, and a fibre exit unit for the discharge of one or more fibres along a direction running at least substantially parallel with respect to a rotational axis of the cutting bearing unit. The cutting unit is provided for interacting with a shear plate in order to shear off the fibres fed to the cutting unit and the shear plate by means of the fibre exit unit.

Advantages of the Invention

The invention is based on a converter, in particular for the conversion of one or more fibres into staple fibres, having at least one cutting unit which is rotationally driveably supported by means of the cutting bearing unit, having at least one counter cutting unit cooperating with the cutting unit and stationary during operation, and having at least two fibre exit units assigned to the cutting bearing unit, from which, in operation, continuous fibres intended to be cut are discharged at least substantially parallel with respect to a rotational axis of the cutting bearing unit.

It is proposed that the converter comprises a thermal setting unit which is intended for setting at least one cutting gap. A "thermal setting unit" is in this context to be understood, in particular, as meaning a setting unit which is deliberately intended for setting a temperature and/or, by means of the setting of a temperature, for setting a dimension and/or position of a component, such as, in particular, a cutting unit. In this case, by means of the thermal setting unit, a temperature change which occurs, such as is caused by friction particularly during operation, can be at least partially counteracted and/or can be compensated, and/or a specific temperature can also be set in a directed manner for setting purposes.

By virtue of a corresponding configuration according to the invention, especially accurate setting can be achieved and, in particular, can also be maintained during operation.

As a further development of the invention a configuration is proposed having at least two fibre exit units and a central setting unit, which is intended, at least in one mode, for simultaneously setting cutting gaps assigned to the at least two fibre exit units. A "fibre exit unit" is to be understood in this context as meaning, in particular, a unit which is intended for guiding a fibre and/or which is intended for dispensing a fibre into a cutting region, such as, in particular, a nozzle unit. A "central setting unit" is to be understood, in particular, as meaning a unit, preferably a mechanical unit, which is intended for setting a plurality of cutting gaps in a convenient way centrally, preferably in at least one mode, at least partially simultaneously and/or preferably by means of at least one central setting means which is intended for acting, specifically preferably simultaneously, upon a plurality of means for setting. A "cutting gap" is to be understood, in particular, as meaning a spatial

arrangement of a cutter with respect to a component, such as, in particular, a mating cutter, which matches with the cutter during a cut. Furthermore, "intended" is to be understood, in particular, as meaning especially equipped, designed and/or programmed.

Convenient and rapid setting can be made possible by means of a corresponding configuration according to the invention.

The central setting means may be formed by various means that seem expedient to a person skilled in the art, for example by a gearwheel, a toothed belt etc. However, if the setting means is formed by a toothed rack, particularly precise setting can be realized in a structurally simple and inexpensive manner, in particular by virtue of the toothed rack being coupled to multiple gearwheels for setting purposes.

Furthermore, it is proposed that the converter have at least one individual setting unit which is intended for setting at least one cutting gap independently of at least one further cutting gap, with the result that especially flexible and accurate setting can be ensured.

If the individual setting unit and the central setting unit are formed at least partially in one piece, additional components, assembly outlay and costs can be saved.

A unit, in particular a moved bearing unit, which is moved during operation and/or especially advantageously a unit, in particular bearing unit, which is stationary during operation can be designed so as to be capable of being set by means of the central setting unit and/or by means of an individual setting unit, with the result that a structurally simple tie-up can be implemented. In this case, the converter preferably has at least two bearing units which are stationary during operation and which can be set by means of the central setting unit.

The thermal setting unit may have various means for cooling and/or heating, which seem expedient to a person skilled in the art, such as, in particular, electrical heating elements, cooling elements, such as heat pipes, etc. Especially advantageously, however, the thermal setting unit comprises at least one flow medium, by means of which larger regions can be heated and/or, in particular, cooled to a desired temperature in a simple way. In this context, various flow media which seem expedient to a person skilled in the art may be envisaged, such as air, an air mixture, oil or preferably water or a water mixture.

Furthermore, advantageously, regions capable of being influenced thermally can be achieved if the thermal setting unit has at least one ring duct.

The thermal setting unit may be intended for various settings that seem expedient to a person skilled in the art, for example solely for setting a temperature in order to avoid undesirably high temperatures, and/or particularly advantageously for setting at least one cutting gap, whereby said cutting gap can be set particularly exactly and/or held at a specific exact setting.

Furthermore, it is proposed that the converter has a control and/or regulation unit, which is intended for at least partly automated setting, for the conversion of one or more fibres into staple fibres. A "control and/or regulation unit" is to be understood in this context as meaning, in particular, a unit with a computing unit, with a memory and/or with an operating program stored in the memory. The control and/or regulation unit may in this case process different parameters for setting which seem expedient to a person skilled in the art, such as, in particular, a machining time, a sensed temperature, a tool life, etc. Furthermore, the control and/or regulation unit may be intended for setting various parameters, but especially advantageously a temperature and/or, in particular, at least one cutting gap, by means of an individual setting unit, by means of a central setting unit

and/or by means of a thermal setting unit. A corresponding control and/or regulation unit can conveniently ensure advantageously exact setting.

Preferably, the converter has at least one and especially preferably a plurality of cutting bearing units that are drivable in rotation and, in particular, one or preferably a plurality of cutting units that are drivable in rotation, with the result that an advantageous throughput can be achieved, specifically, in particular, when the converter has at least two fibre exit units assigned to the cutting bearing unit that is drivable in rotation. A cutting unit that is drivable in rotation and is mounted by means of the cutting bearing unit can in this case cooperate with one or preferably with a plurality of mating cutting units that are likewise moved during operation and/or especially advantageously with one or a plurality of mating cutting units that are stationary during operation, with the result that undesirable fibre twists can advantageously be avoided during operation.

The thermal setting unit may be coupled to various units, such as, advantageously, to a stationary cutting unit and/or, especially advantageously, to a cutting bearing unit that is drivable in rotation, with the result that an advantageous setting can be achieved.

Furthermore, it is proposed that the converter have at least one drive unit which is intended for driving at least two cutting bearing units that are drivable in rotation, with the result that components, construction space, assembly outlay and costs can be saved. This can be achieved in an especially simple and space-saving way in structural terms if the drive unit has at least one toothed belt.

In a further refinement of the invention, it is proposed that the converter have at least one spring unit which is intended for generating a setting force, with the result that the latter can be metered especially advantageously. The spring unit may have one or preferably a plurality of springs, such as, for example, one or a plurality of helical compression springs, and/or, advantageously, one or a plurality of cup springs which can advantageously be integrated in a space-saving way.

Furthermore, it is proposed that the converter have at least one bearing unit which is intended to be deformed elastically during setting. A "bearing unit" is in this context to be understood as meaning, in particular, a unit which is intended for the mounting of a cutting means and/or of a component matching with a cutting means and which is deformed elastically for setting purposes. By virtue of a corresponding configuration, the possibility of an especially exact setting can be achieved in a simple way, specifically, in particular, when the bearing unit has a hinge intended for elastic deformation, in which case a "hinge" is to be understood as meaning, in particular, a unit, by means of which two legs are mounted so as to be movable in relation to one another.

Drawing

Further advantages may be gathered from the following drawing description. The drawing illustrates an exemplary embodiment of the invention. The drawing, description and claims contain numerous features in combination. A person skilled in the art would expediently also consider the features individually and combine them into expedient further combinations.

In the drawing:

- fig. 1 shows a converter from below,
- fig. 2 shows the converter from figure 1 from above,
- fig. 3 shows a diagrammatically illustrated detail of the converter with a cutting unit that is drivable in

rotation and with stationary cutting units, and

fig. 4 shows an individual illustration of a spindle with the cutting unit that is drivable in rotation.

Description of the Exemplary Embodiment

Figure 1 shows a converter for the conversion of a plurality of continuous fibres into staple fibres. The converter comprises spindles which form four cutting bearing units 46, 46', 46'', 46''' that are drivable in rotation and on the end face of which in each case a cutting unit 48, 48', 48'', 48''' with a cutting means and with a fastening means and also a counterweight unit 50, 50', 50'', 50''' are arranged, which units are coupled via a positive coupling 52, 52', 52'', 52'''. The cutting units 46, 46', 46'', 46''' cooperate, during operation, in each case with two stationary mating cutting units 54, 54', 54'', 54''', 56, 56', 56'', 56'''. As seen in the direction of rotation of the spindles, each mating cutting unit 54, 54', 54'', 54''', 56, 56', 56'', 56''' is preceded by a fibre exit unit 10, 10', 10'', 10''', 12, 12', 12'', 12''' which is stationary during operation and in each case comprises a nozzle. The fibre exit unit may also consist of a plurality of individual fibre feeds.

The converter comprises a drive unit 58, which is intended for driving four cutting bearing units 46, 46', 46'', 46''' that are drivable in rotation. The drive unit 58 has a toothed belt 60 which is coupled to in each case one of the gearwheels 62, 62', 62'', 62''' coupled to the spindles (figure 2). In order to ensure an advantageous engagement of the toothed belt 60 with the gearwheels 62, 62', 62'', 62''', the converter has a deflecting roller 64 which is intended for deflecting the toothed belt 60 in order to enlarge a toothed belt engagement region. The deflecting roller 64 is arranged between the two middle spindles and serves for enlarging a toothed belt engagement region of the toothed belt 60 with the gearwheels 62', 62'' assigned to the two middle spindles. The toothed belt 60 is coupled to an individual motor 66. The motor 66 is formed by an electric motor, but could also be formed by other motors which seem expedient to a person skilled in the art.

The converter comprises a central setting unit 14 which is intended for centrally setting cutting gaps assigned to the fibre exit units 10, 10', 10'', 10''', 12, 12', 12'', 12'''. The central setting unit 14 comprises two setting means 16, 18 which are formed by racks and by means of which in each case four cutting gaps can simultaneously be set centrally. The setting means 18 cooperates with gearwheels 68, 68', 68'', 68''' arranged on a first side of the spindles and assigned in each case to a bearing unit 32, 32', 32'', 32''' of the mating cutting units 54, 54', 54'', 54''', and the setting means 16 cooperates with gearwheels 70, 70', 70'', 70''' arranged on a second side of the spindles and assigned in each case to a bearing unit 34, 34', 34'', 34''' of the mating cutting units 56, 56', 56'', 56''' (figures 1 and 2).

Furthermore, the converter comprises eight individual setting units 20, 20', 20'', 20''', 22, 22', 22'', 22''' which are assigned in each case to a cutting gap and which are intended for setting each cutting gap independently of the other cutting gaps (figure 1). The central setting unit 14 and the individual setting unit 20, 20', 20'', 20''', 22, 22', 22'', 22''' are formed partially in one piece and both serve for setting the bearing units 32, 32', 32'', 32''', 34, 34', 34'', 34''', stationary during operation, of the mating cutting units 54, 54', 54'', 54''', 56, 56', 56'', 56'''.

The converter has four main cutting units which essentially correspond to one another and which comprise in each case, in particular, a cutting bearing unit 46, 46', 46'', 46''', a cutting unit 48, 48', 48'', 48''', arranged on it, and a counterweight unit 50, two mating cutting units 54, 54', 54'', 54''', 56, 56', 56'', 56''' and the bearing units 32, 32', 32'', 32''', 34, 34', 34'', 34''' supporting the two mating cutting units, and also in

each case two fibre exit units 10, 10', 10'', 10''' , 12, 12', 12'', 12''' arranged directly in front of the mating cutting units 54, 54', 54'', 54''' , 56, 56', 56'', 56''' . Only the set-up of the main cutting unit illustrated in figure 3 is partially dealt with below for the sake of clarity, and, with regard to the remaining main cutting units, reference shall be made to the description of the main cutting unit illustrated in figure 3.

The bearing units 32, 34 of the mating cutting units 54, 56 are intended to be deformed elastically during setting (figure 3). The bearing units 32, 34 have in each case a bearing body formed by a U-profile and having two legs which are fastened on a baseplate 72. The legs are in each case connected via a hinge 36, 38 intended for elastic deformation. The legs of the bearing bodies are in each case penetrated by a threaded shaft 78, 80 perpendicularly to the baseplate 72 and perpendicularly to a hinge pivot axis 74, 76, the gearwheels 68, 70 of the central setting unit 14 being arranged on the threaded shafts 78, 80 on a top side and setting means 82, 84 of the individual setting units 20, 22 being arranged on an underside. The gearwheels 68, 70 are coupled fixedly in terms of rotation to the threaded shafts 78, 80 and are mounted rotatably with respect to sleeves 86, 88 via axial bearings. The setting means 82, 84 are mounted rotatably on the threaded shafts 78, 80 via a threaded connection, and they are supported via axial bearings 26, 28.

Cup springs of spring units 24, 30, which are intended for generating a setting force, are arranged between the sleeves 86, 88 and the baseplate 72.

For setting by means of the central setting unit 14, the setting means 82, 84 are locked in the direction of rotation by means of locking units 104, 106, so that the gearwheels 68, 70 can be rotated together with the threaded shaft 78, 80 by means of the racks 16, 18, and consequently axial distances between the sleeves 86, 88 and the baseplate 72 or between the sleeves 86, 88 and the setting means 82, 84, and therefore tension forces acting upon the legs of the bearing bodies by the cup springs can be set, without the setting means 82, 84 corotating. As a result of the tension forces which arise, pivot angles, in particular, of the legs, facing away from the baseplate 72, of the bearing bodies about the hinge pivot axes 74, 76 are set, and consequently in each case a position of the mating cutting units 54, 56 with respect to the cutting unit 48 arranged on the cutting bearing unit 46 is set. As a result of corresponding position setting, the cutting gaps assigned to the fibre exit units 10, 12 are set. Alternatively or additionally, individual setting for setting the tension force generated by the cup springs may be carried out by means of the setting means 82, 84, and in this case, preferably, the gearwheels 68, 70, together with the threaded shafts 78, 80, are fixed in their direction of rotation via the racks, and the setting means 82, 84 are rotated.

Furthermore, the converter has a thermal setting unit 40 which is intended likewise for setting cutting gaps and which has ring ducts 42 which are intended for routing a flow medium formed from water and which in each case surround the spindles or the cutting bearing units 46, 46', 46'', 46''' that are drivable in rotation, and which is consequently coupled thermally to these (figure 4).

The converter comprises a control and regulation unit 44, with a processor, a memory and an operating program stored therein, which unit is intended for carrying out automated setting. By means of the control and regulation unit 44, a pump unit 90 and consequently a temperature of the spindles and, via the temperature of the spindles, the cutting gaps can be regulated to a desired value. The pump unit 90 comprises a pump 98 and a settable heat exchanger 100, via which a temperature of the flow medium can be set. The control and regulation unit 44 is coupled to temperature sensors 92 which are arranged on bearing units of the spindles and via which temperatures of the spindles, specifically, in particular, bearing temperatures of the spindles, can be detected.

The flow medium is supplied by the pump 98 to the ring ducts 42 via supply ducts 94 and is discharged via discharge ducts 96.

Furthermore, the control and regulation unit 44 is coupled via a data line to drive units of the setting means 16, 18 of the central setting unit 14, specifically so that automated setting can be carried out via the central setting unit 14. In addition to automated temperature regulation, automated adjustment by means of the central setting unit 14 and/or also by means of individual setting units could also be implemented. For this purpose, sensors are preferably provided, which deliver parameters relating to a desired cutting gap, such as, for example, optical sensors, pressure sensors, etc.

Before commissioning, the cutting gaps are exactly set manually by means of the individual setting unit 20, 20', 20'', 20''', 22, 22', 22'', 22'''. Subsequently, the cutting gaps are enlarged by means of the central setting unit 14 to a dimension such that the converter can be brought to its operating temperature, without the cutting units 48, 48', 48'', 48''' and the mating cutting units 54, 54', 54'', 54''', 56, 56', 56'', 56''' coming into bearing contact. When a desired operating temperature is reached, the cutting gaps are reduced to a desired dimension by means of the control and regulation unit 44 via the central setting unit 14, so that an advantageous cutting function can be achieved.

During operation, the cutting units 48, 48', 48'', 48''' driven in rotation cooperate in each case with the mating cutting units 54, 56, 54', 56', 54'', 56'', 54''', 56''' assigned to them (figure 1). The cutting bearing units 46, 46', 46'', 46''' are assigned in each case two fibre exit units 10, 12, 10', 12', 10'', 12'', 10''', 12''', out of which continuous fibres intended to be cut are discharged during operation. The fibres are preferably discharged at least essentially parallel to the axes of rotation of the cutting bearing units 46, 46', 46'', 46''', that is to say with a deviation of less than 10° and preferably of less than 5° with respect to a parallel to the axes of rotation. The converter has a compressed air unit which is intended for generating a compressed air stream through the fibre exit units 10, 12, 10', 12', 10'', 12'', 10''', 12''' and at the same time conveying and aligning the fibres.

The conveying airstream can be regulated by means of a heat exchanger to a temperature which positively influences the cutting result, does not vary the cutting gap and maintains the cutter temperature.

REFERENCE SYMBOLS

10	Fibre exit unit
12	Fibre exit unit
14	Central setting unit
16	Setting means
18	Setting means
20	Individual setting unit
22	Individual setting unit
24	Axial bearing
26	Axial bearing

28	Spring unit
30	Spring unit
32	Bearing unit
34	Bearing unit
36	Hinge
38	Hinge
40	Setting unit
42	Ring duct
44	Regulation unit
46	Cutting bearing unit
48	Cutting unit
50	Counterweight unit
52	Positive coupling
54	Mating cutting unit
56	Mating cutting unit
58	Drive unit
60	Toothed belt
62	Gearwheel
64	Deflecting roller
66	Motor
68	Gearwheel
70	Gearwheel
72	Baseplate
74	Hinge pivot axis
76	Hinge pivot axis
78	Threaded shaft
80	Threaded shaft
82	Setting means
84	Setting means
86	Sleeve
88	Sleeve
90	Pump unit
92	Temperature sensor
94	Supply duct
96	Discharge duct
98	Pump
100	Heat exchanger
102	Data line
104	Locking unit
106	Locking unit

KONVERTER

SZABADALMI IGÉNYPONTOK

1. Konverter, főként egy vagy több szál vágott szálakká való konvertálására, amely konverter tartalmaz legalább egy forgatva meghajtható vágófej-ágyazó egységet (46), legalább egy, a vágófej-ágyazó egység (46) által forgatva meghajtható vágófej egységet (48), legalább egy, a vágófej egységgel (48) együttműködő, működés közben helyben álló vágófej-ellendarab egységet (54), és legalább két, a vágófej-ágyazó egységhez (46) társított olyan szálkibocsátó egységet (10, 12) amelyekből működés közben a vágandó végtelen szálak a vágófej-ágyazó egység (46) forgástengelyével legalább lényegében párhuzamosan kerülnek kibocsátásra, **azzal jellemezve, hogy egy legalább egy vágóhézag beállítására alkalmas termikus beállító egységgel (40) rendelkezik.**
2. Az 1. igénypont szerinti konverter, **azzal jellemezve, hogy legalább egy üzemmódban a legalább két szálkibocsátó egységhez (10, 12) hozzárendelt vágóhézag központi beállítására alkalmas központi beállító egységgel (14) rendelkezik.**
3. Az előző igénypontok bármelyike szerinti konverter, **azzal jellemezve, hogy egy legalább egy vágóhézagnak legalább egy további vágóhézagtól független beállítására alkalmas egyedi beállító egységgel (20, 22) rendelkezik.**
4. Az előző igénypontok bármelyike szerinti konverter, **azzal jellemezve, hogy a termikus beállító egység (40) áramoltatható közeget tartalmaz.**
5. A 4. igénypont szerinti konverter, **azzal jellemezve, hogy a termikus beállító egység (40) legalább egy körcsatornát (42) tartalmaz.**
6. Az előző igénypontok bármelyike szerinti konverter, **azzal jellemezve, hogy a termikus beállító egység (40) a forgatva meghajtható vágófej-ágyazó egységgel (46) össze van kapcsolva.**
7. Az 1. igénypont szerinti konverter, **azzal jellemezve, hogy legalább egy második, forgatva meghajtható vágófej-ágyazó egységet (46') tartalmaz.**
8. A 7. igénypont szerinti konverter, **azzal jellemezve, hogy a legalább két forgatva meghajtható vágófej-ágyazó egység (46) meghajtása céljából legalább egy meghajtó egységet (58) tartalmaz.**
9. A 8. igénypont szerinti konverter, **azzal jellemezve, hogy a meghajtó egység (58) legalább egy fogasszíjat (60) tartalmaz.**

10. Az előző igénypontok bármelyike szerinti konverter, **azzal jellemezve, hogy egy beállító erő létrehozása céljából legalább egy rugóegységet (24, 26, 28, 30) tartalmaz.**
11. A 8. igénypont szerinti konverter, **azzal jellemezve, hogy a rugóegység (24, 26, 28, 30) legalább egy tányérrugót tartalmaz.**
12. Az előző igénypontok bármelyike szerinti konverter, **azzal jellemezve, hogy legalább egy, beállításkor rugalmasan deformálható ágyazóegységet (32, 34) tartalmaz.**
13. A 12. igénypont szerinti konverter, **azzal jellemezve, hogy az ágyazóegység (32, 34) a rugalmas deformálódás céljából egy csuklót (36, 38) tartalmaz.**

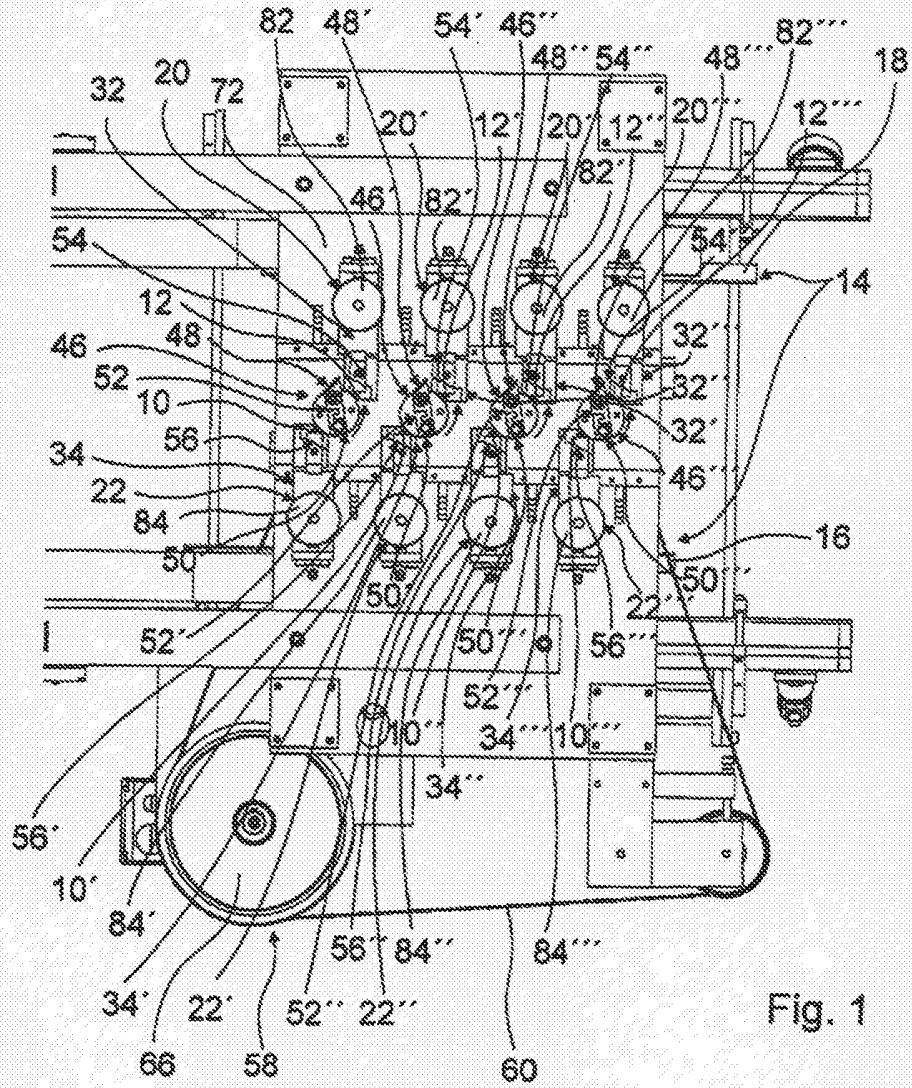


Fig. 1

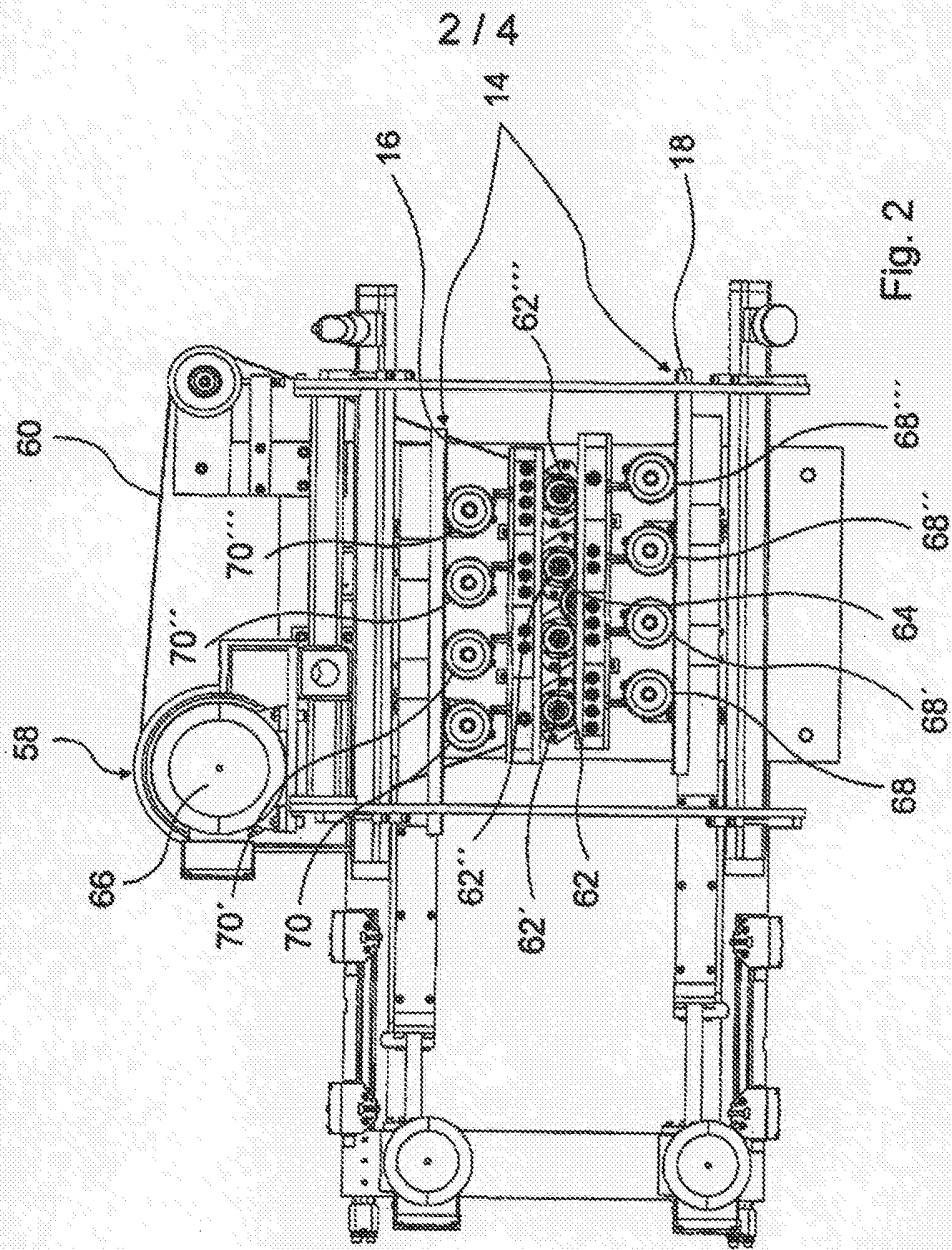


Fig. 2

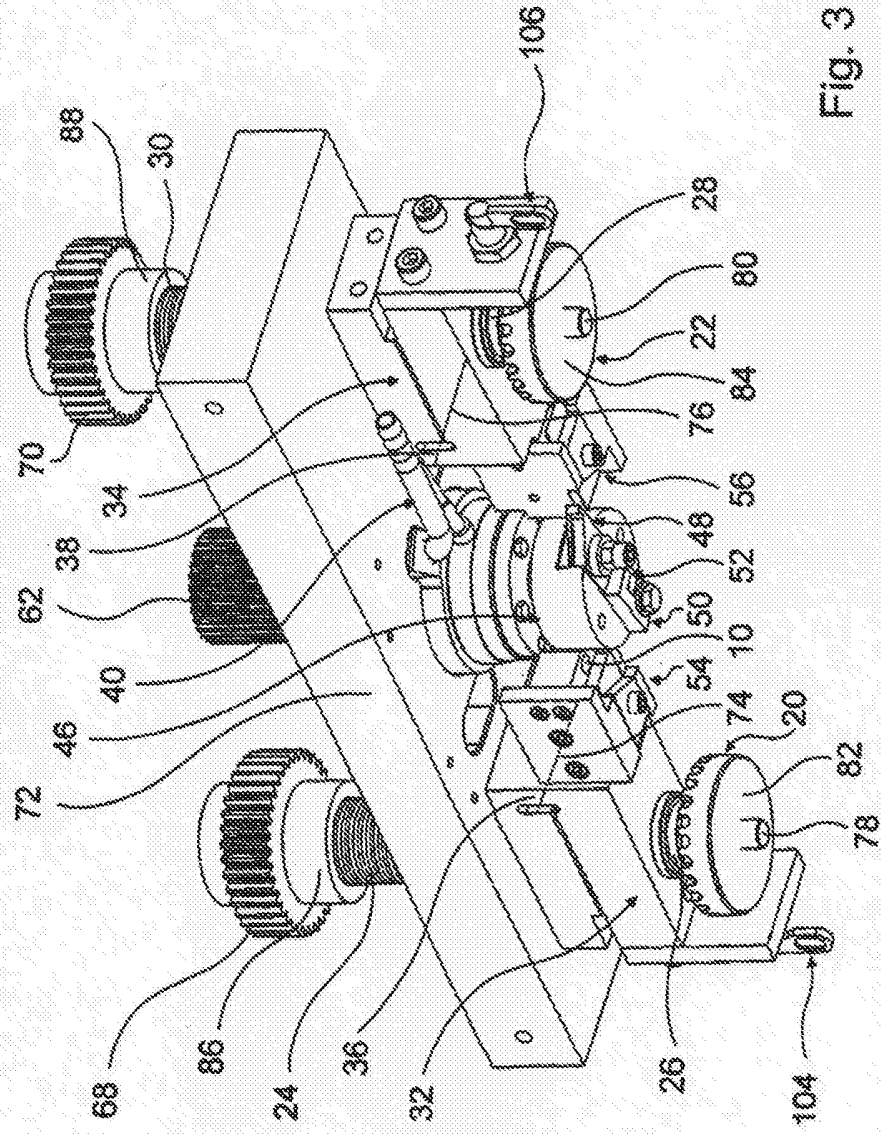


Fig. 3

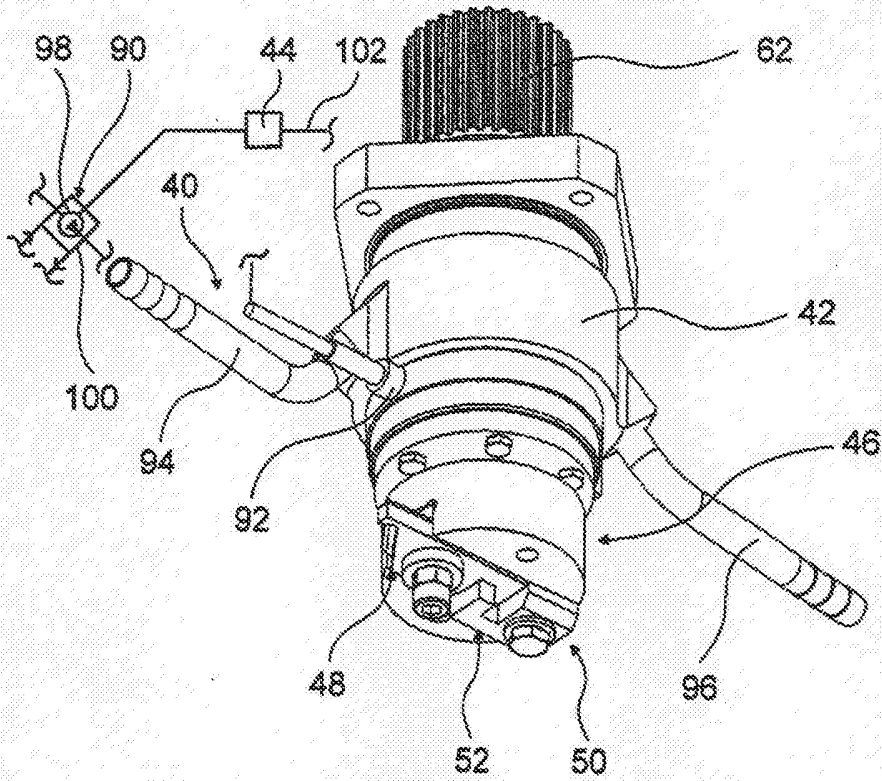


Fig. 4