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- **Burch i Gonzales, Ferran**
17181 Aiguaviva (Girona) (ES)
- **Miravete i Guerrero, David**
17181 Aiguaviva (Girona) (ES)
- **Cordon i Pajuelo, Miquel Angel**
17181 Aiguaviva (Girona) (ES)

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(71) Applicant: **Kontrelmec, SL**
17181 Aiguaviva (Girona) (ES)

(74) Representative: **Gislon, Gabriele et al**
Torner, Juncosa i Associats, S.L.
c/ Bruc, 21
08010 Barcelona (ES)

(72) Inventors:
• **Chetrit i Russi, Richard**
17181 Aiguaviva (Girona) (ES)

(54) **Blade positioning device for a continuous sheet material slitting machine**

(57) The machine includes:

- a series of support carriages (1) in each of which is mounted a blade (2) for cutting a sheet material,
- two transversal support and guide elements (3, 13) coupled to corresponding guide elements (4a, 4b) included in each support carriage (1), to support and guide said carriage, and
- braking means for braking and releasing each support carriage (1).

Said braking means including:

- an auxiliary bar (9) attached to a support (8) of the machine,
- a braking device (10) joined to the support carriage (1), which contains a thrusting element that provides a force for firmly seizing the auxiliary bar (9), and
- energy supply means, for counteracting the force provided by the thrusting element and releasing the seizing action on the bar (9).

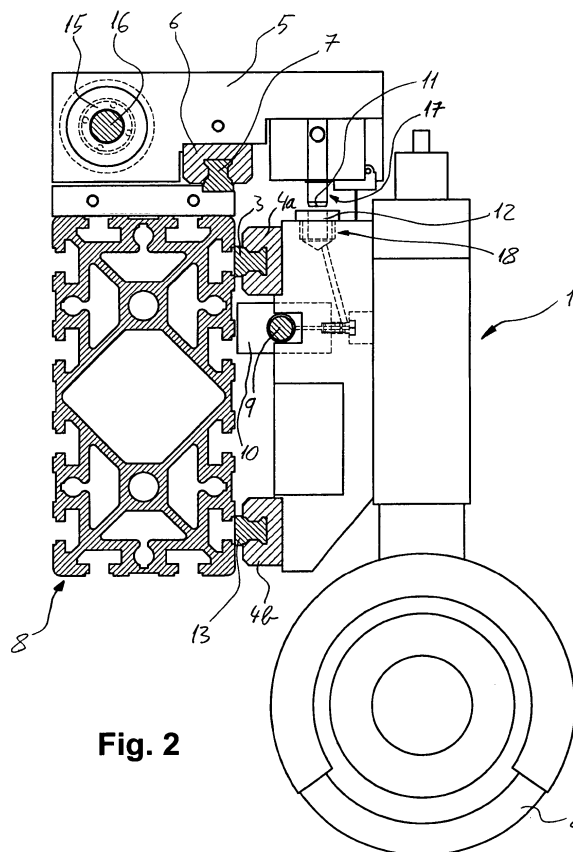


Fig. 2

Description

Technical field

[0001] This invention relates to a blade positioning system in a continuous sheet material cutting machine, and more particularly to a system that uses braking means for support carriages of said blades.

Prior art

[0002] Different control systems for continuous sheet material cutting machines are known, some of which include different braking systems, either mechanical or pneumatic, the latter being based generally on the application of positive fluid pressure to a braking part arranged for this purpose on the mobile parts of the machine.

[0003] Patent US-A-5083489 proposes a control system for a continuous sheet material cutting machine. The system comprises braking means for a blade support carriage, which can be activated by pneumatic pressure according to different control strategies. The braking action is achieved by pressing a shoe in said carriage against a transversal bar on which, in turn, the carriage is guided and supported. The patent specification explains how said shoe is pushed downwards against the bar, mechanically by rotating a bolt or by providing positive pneumatic pressure. The patent does not indicate the fact that other bars are used which act as a guide to provide greater stability to the carriage, or that are used to separate the carriage guiding function from its braking function.

[0004] Another representative document from the prior art is Patent US-A-6631664, which details a cutting tool made up of at least two blades, one fixed and one mobile, each one assembled on a transversal axis, with the mobile blade moving vis-à-vis its respective axis via mechanical compression means in one axial direction and by applying a pressurised fluid in another axial direction opposite the former. The document does not make any reference to any braking system.

Summary of the invention

[0005] It is interesting to offer an improvement on the afore-mentioned prior art, which represents a development in the type of machines contemplated herein, overcoming the restrictions of the machines known to date, particularly with regard to the braking incorporated positioning system of these machines, and the stability of the blade support carriages included therein.

[0006] This invention proposes a positioning system for blades, generally circular, for a continuous sheet material cutting machine, of the type including:

- at least one support carriage where one of said blades is mounted, said support carriage including

driving means for moving its respective blade up and down, said latter position bearing on a sheet material in order to cut it,

- at least one first transversal support and guide element coupled to at least one corresponding first guide element in said support carriage, which is at least one, to support and guide said carriage, and
- braking means for braking and releasing the brake on said support carriage.

[0007] The invention is characterised in that the said braking means include:

- an auxiliary bar attached to a support of said machine,
- a braking device joined to the support carriage, which contains at least one thrusting element that provides a force for firmly seizing said auxiliary bar, thus blocking the support carriage on the bar in the given position, and
- energy supply means, generally, pressurised air, to counteract said force provided by said thrusting element and release the seizing action on said bar by supplying energy to said braking device.

[0008] It is evidently advantageous that the braking device, and therefore the blade-support carriage, be kept in its braked condition at rest, in other words when there is no pressurised air, and that when air is supplied the carriage is released with respect to the bar, in other words, the braking device is opposed. This implies being certain that once the carriage (or carriages) is positioned it does not work loose and move involuntarily in a non-desired manner, which would seriously affect safety, since it could be dangerous for the machine proper, and the material parts to be cut, which require a very accurate, precise cut, and for a possible worker, such as a maintenance technician, operating the machine in a particular position, if the carriage or carriages, and therefore the blades, were to move.

Brief description of the drawings

[0009] These characteristics and others of the invention will become more evident from the following detailed description of some non-limiting embodiment examples, with reference to the attached drawings, in which:

Figure 1 is a perspective view of a support carriage with its respective blade that belong to a cutting machine, where it can be seen that the braking device is part of this invention,

Figure 2 is a sectional elevation view of the carriage in Figure 1 coupled to a support body of said cutting machine, together with a handler for said carriage, also coupled to said support body, and

Figure 3 is a perspective view of part of the cutting

machine where the positioning system that is the object of this invention is applied, in relation to reels of sheet material to be cut (not shown), wherein several support carriages can be seen with their respective blades in relation to the reels.

Detailed description of the invention

[0010] As shown in the figures, this invention relates to a blade positioning system for a continuous sheet material cutting machine, said machine being of the type that includes:

- a series of support carriages 1 (Figure 3 illustrates three of said carriages), in each of which there is mounted one of said blades 2, preferably circular, with each of said support carriages 1 including driving means for moving its corresponding blade 2 up and down, said latter position (lowered) bearing on a sheet material in order to cut it,
- a first transversal support and guide element 3 (Figures 2 and 3) on which a corresponding first guide element 4a is coupled that is included in each of said support carriages 1, to support and guide the carriage, and
- braking means for braking and releasing the brake on each support carriage 1.

[0011] As can be seen in the attached figures, the braking means comprise:

- an auxiliary bar 9 (Figures 2 and 3) attached to a support 8 of said machine,
- a braking device 10 (Figures 1 and 2) joined to each support carriage 1, which contains at least one thrusting element that provides a force for firmly seizing said auxiliary bar 9, thus blocking the support carriage 1 on the bar 9 in a given position, and
- energy supply means, which is preferably pressurised air, to counteract said force provided by said thrusting element and release the seizing action on said bar 9 by supplying energy to said braking device 10, therefore enabling the carriage 1 to move freely.

[0012] In order to obtain greater stability and resistance to possible turning torques that could divert the support carriage 1 from its position, the system includes (as clearly illustrated in Figures 1 and 2) a second guide element 4b included in said support carriage 1 coupled to a corresponding second transversal support and guide element 13 that is attached, in parallel, to said support 8 of said machine, to support and guide the support carriage 1.

[0013] In other embodiments, other combinations may exist that contemplate more guide elements in the support carriage 1 and more support and guide elements in the support 8, not necessarily coupled together.

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[0014] The braking device 10 is of the type generally available in the market that incorporates one or several of said thrusting elements, which may consist in one or several springs, or another elastic element (or elements) that can yield and recover its shape.

[0015] The positioning system that is the object of this invention includes, as can be seen in Figures 2 and 3, a manipulator element 5 for moving said support carriages 1, with a guide element 6 coupled to a corresponding transversal support and guide element 7 (although for other embodiments, other similar combinations may exist, similar to those discussed above for the guide elements of support carriage 1), which is attached to the support 8, on which said first element 3 and, for the preferred embodiment shown, second support and guide element 13 are also attached, said energy supply means being arranged in said manipulator element 5.

[0016] Preferably both the support 8 and the said support and guide elements 3, 7 extend along the machine and are parallel to the continuous sheet material to be cut and perpendicular to the feed direction thereof. The same occurs with the said second transversal support and guide element 13, as it is located parallel to the support 8 of said machine.

[0017] Said energy supply means arranged in said manipulator element 5 preferably include (see Figures 2 and 3), an inlet 19 that is connected to a energy supply source of said machine, for example by means of a flexible lead, and an outlet 11 that can be connected to a corresponding energy inlet 12 in the support carriage 1, through which energy is supplied to driving means arranged inside the support carriage 1, which act on said braking device 10 to release it, when the energy is supplied, or to keep it immobile, when energy is not supplied, with respect to said auxiliary bar 9.

[0018] Said energy supply means arranged in the manipulator element 5 preferably include an air duct (not shown).

[0019] In the embodiment shown in the drawings, said energy outlet 11 consists of a nozzle 17 to be coupled in a sealed fashion to a corresponding mouth 18 that defines said energy inlet 12 in the support carriage 1, so that the manipulator 5, as well as supplying energy, moves the support carriage 1, although the system used for the manipulator 5 to move the support carriage 1 could be another different system, independent of the energy supply (generally pressurised air), which could also be different from that detailed.

[0020] Figure 3 shows how, for a preferred embodiment, said machine includes a series of said support carriages 1 supported and guided by one of said first 3 and/or one of said second 13 transversal support and guide elements, although the combination and number of support carriages 1 with respect to the support and guide elements could be different for other embodiments.

[0021] The positioning system also includes driving

and control means for moving the manipulator element 5 in a controlled manner, and they preferably include a nut 15 and bolt 16 ensemble (see Figures 2 and 3) associated with said manipulator 5, a driving motor for said ensemble 15, 16 and an electronic system (not shown) that controls said motor.

[0022] Figure 3 also shows a series of circular blades 20 arranged on a cylinder 21, each one arranged below a respective blade 2 arranged on each support carriage 1. This is the most common arrangement in a continuous sheet material cutting machine, wherein said circular blades 20 are usually called counter-blades, owing to their function when cutting said sheet material, cooperating with the blades 2 in order to produce said cutting action.

[0023] A person skilled in the art could introduce changes and modifications to the described embodiments without departing from the scope of the invention as defined in the attached claims.

Claims

1. Blade positioning system in a continuous sheet material cutting machine, said machine being of the type that includes:

- at least one support carriage (1) where one of said blades (2) is mounted, said support carriage (1) including driving means for moving said blade (2) up and down, said latter position bearing on a sheet material in order to cut it,
- at least one first transversal support and guide element (3) coupled to at least one corresponding first guide element (4a) included in said support carriage (1), which is at least one, to support and guide said carriage, and
- braking means for braking and releasing said support carriage (1),

characterised in that said braking means include:

- an auxiliary bar (9) attached to a support (8) of said machine,
- a braking device (10) joined to the support carriage (1), that contains at least one thrusting element that provides a force for firmly seizing said auxiliary bar (9), thus blocking the support carriage (1) on the bar (9) in a given position, and
- energy supply means, for counteracting said force provided by said thrusting element and releasing the seizing action on said bar (9).

2. Positioning system according to claim 1, **characterised in that** it comprises a manipulator element (5) for moving said support carriage (1), with at least

one guide element (6) coupled to at least one corresponding transversal support and guide element (7), which is attached to said support (8), on which there is also attached said first support and guide element (3), said energy supply means being arranged in said manipulator element (5).

3. Positioning system according to claim 2, **characterised in that** the support (8) and the said support and guide elements (3, 7) extend along the machine and are parallel to the continuous sheet material to be cut and perpendicular to the feed direction thereof.

4. Positioning system according to claim 2, **characterised in that** said energy supply means arranged in said manipulator element (5) include an inlet (19) that is connected to an energy supply source of said machine, and an outlet (11) that can be connected to a corresponding energy inlet (12) in the support carriage (1), through which energy is supplied to driving means arranged inside the support carriage (1), which act on said braking device (10) to release it, when energy is supplied, or keep the carriage immobile when energy is not supplied, with respect to said auxiliary bar (9).

5. Positioning system according to claim 1 or 4, **characterised in that** said energy is pressurised air.

6. Positioning system according to claim 5 when subordinate to claim 4, **characterised in that** said energy supply means include an air duct.

7. Positioning system according to claim 6, **characterised in that** it comprises a second guide element (4b) included in said support carriage (1), which is at least one, coupled to at least one corresponding second transversal support and guide element (13) that is attached, in parallel, to said support (8) included in said machine, to support and guide the support carriage (1).

8. Positioning system according to claim 7, **characterised in that** said machine includes a series of said support carriages (1) supported and guided by one of said first (3) and/or one of said second (13) transversal support and guide elements.

9. Positioning system according to claim 1, **characterised in that** it includes driving and control means for moving said manipulator element (5) in a controlled manner.

10. Positioning system according to claim 9, **characterised in that** said driving and control means include a nut (15) and bolt (16) ensemble associated with said manipulator (5), a driving motor for said en-

semble (15, 16) and an electronic system that controls said motor.

11. Positioning system according to claim 4, **characterised in that** said energy outlet (11) consists of a nozzle (17) to be coupled in a sealed fashion to a corresponding mouth (18) that defines said energy inlet (12) in the support carriage (1), so that the manipulator (5), as well as supplying energy, moves the support carriage (1). 5 10
12. Positioning system according to claim 4, **characterised in that** said inlet (19) is connected to said energy supply source of said machine by means of a flexible lead. 15

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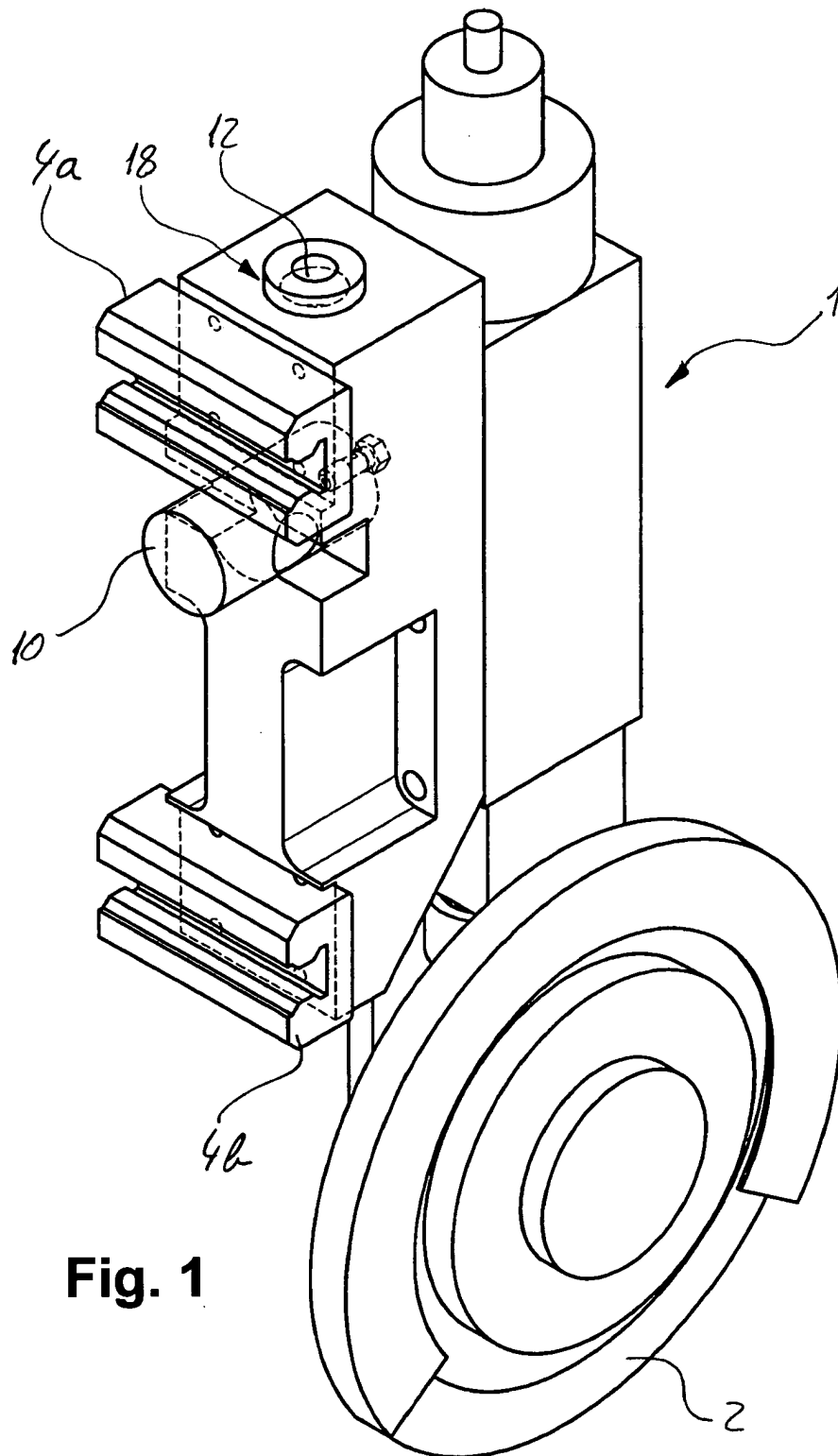


Fig. 1

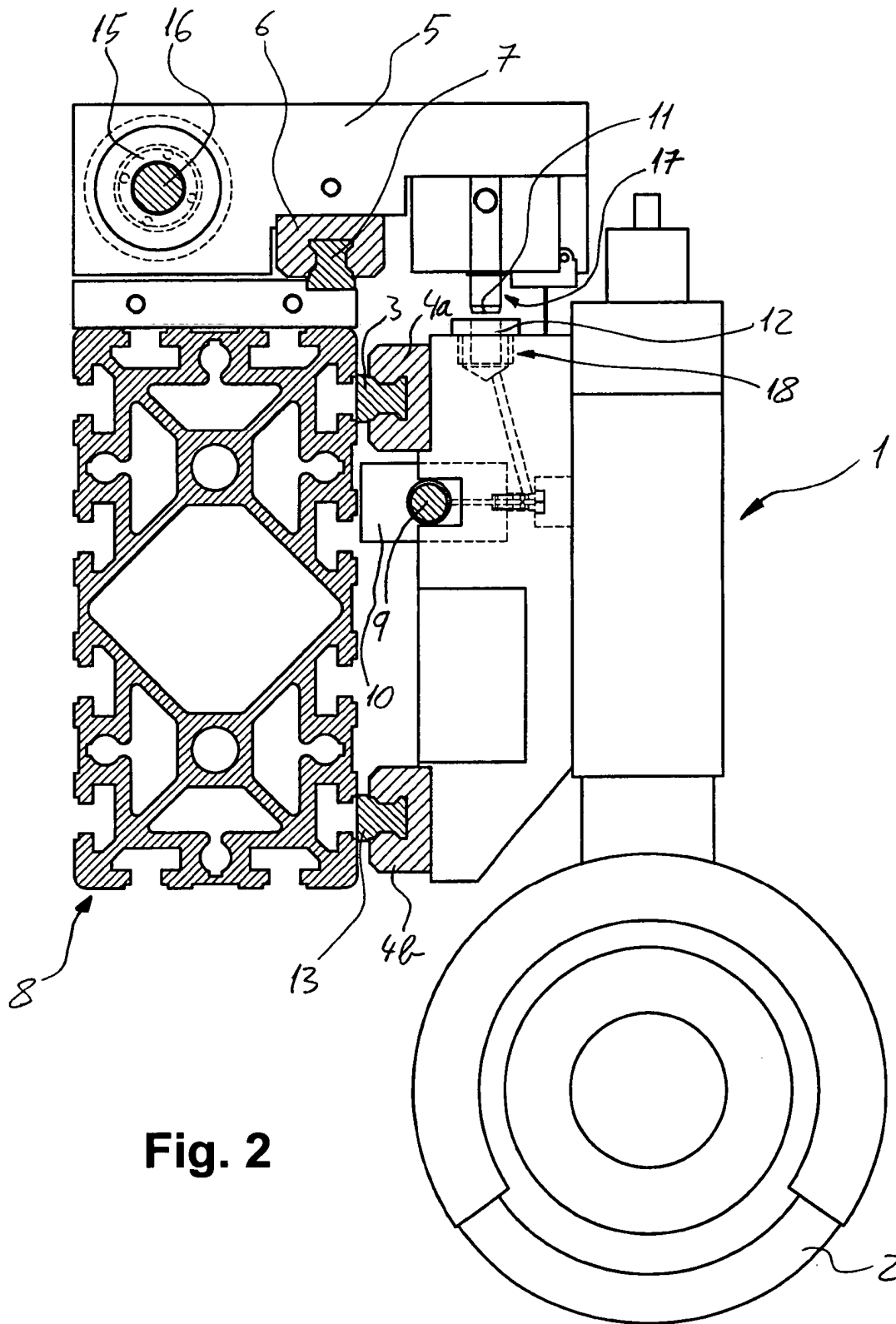


Fig. 2

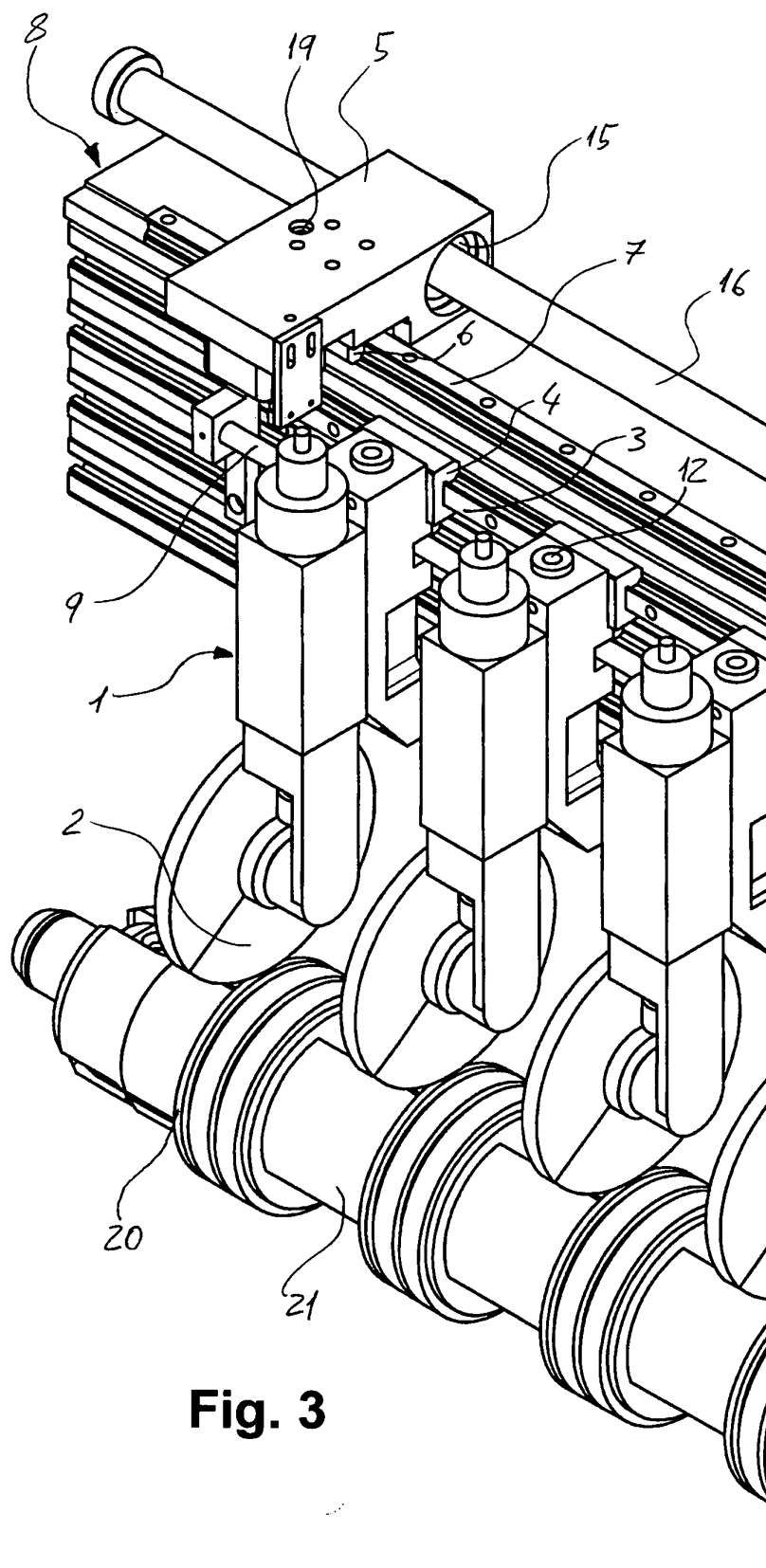


Fig. 3