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(54) **AN AUTOMATIC FEEDER**

AUTOMATISCHE ZUFÜHRVORRICHTUNG

DISPOSITIF D'ALIMENTATION AUTOMATIQUE

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Description

[0001] The present invention relates to an automatic feeder for a strip of material.

[0002] The invention can be used in a machine for producing abrasive discs, but not exclusively.

[0003] Abrasive discs mean those tools, widely used in industry, that comprise a disc support, that can be associated with a rotary tool, to which a plurality of sheets of abrasive material are applied, typically sheets of abrasive paper.

[0004] Machines are currently available on the market for the automated production of abrasive discs. Such machines substantially cut out the sheets of abrasive paper and apply the sheets to the disc support, previously fed to the machine.

[0005] The sheets of abrasive paper are cut out by a continuous strip of abrasive paper that is loaded on board the machine in the form of a reel. The end of the reel is manually associated with a cutting assembly which, once started, autonomously unwinds the strip gradually and cuts it into the desired sheets.

[0006] In the machines currently available, the replacement of the empty reel is performed manually. In substance, once the reel is empty an operator inserts a new reel into the machine and feeds the end of the reel to the cutting unit.

[0007] This causes the machine to stop for a relatively extended period of time, as well as requiring the supervision of an operator who, although not necessarily having to constantly oversee the operation of the machine, needs to be available to intervene for replacing the empty reel.

[0008] An example of prior art machine which only in part faces the above technical problem is disclosed in document US2009/184192. This machine is considered to represent the closest prior art.

[0009] The object of the present invention is to offer an automatic feeder that enables the performance of machines for producing abrasive discs currently available to be improved.

[0010] An advantage of the automatic feeder according to the present invention is that it does not require the intervention of an operator to perform the replacement of an empty reel.

[0011] Another advantage of the feeder according to the present invention is that it allows the stopping times of machines for replacing empty reels to be substantially reduced.

[0012] Further characteristics and advantages of the present invention will become more apparent in the following detailed description of an embodiment of the present invention, illustrated by way of non-limiting example in the attached figures, in which:

- figure 1 shows a schematic view of the automatic feeder in a first operating configuration;
- figure 2 shows the automatic feeder in a second operating configuration.

[0013] The automatic feeder according to the present invention is particularly useful for feeding a strip of material to an operator device (D). The strip of material is substantially in the form of a continuous and thin strip, which has a prevalent longitudinal extension with respect to the transversal extension or width.

[0014] The automatic feeder according to the present invention comprises an orientation assembly (10), structured to retain a free end (T) of a strip (R) on a predetermined gripping plane (11), in a waiting position. The strip (R), for example, is wound in a roll and the orientation assembly (10) retains the free end (T) in a desired position, useful for a grip of the end (T) itself by a gripping device that will be described in more detail below.

[0015] The gripping plane (11) can be oriented horizontally or in another way. Preferably, the gripping plane (11) is horizontal.

[0016] The orientation assembly (10) comprises at least one presser element (12), structured to press and retain the free end (T) of the strip (L) on the gripping plane (11). Such presser element (12), for example, is in the form of a pneumatic or hydraulic piston, activatable between an operating configuration, in which it presses and locks the free end (T) onto the gripping plane (11), and an active configuration, in which it does not interfere with the free end (T). In the embodiment represented, the stem of the presser element (12) is movable vertically between the operating position and the inactive position.

[0017] The orientation assembly (10) further comprises an abutment (13), structured to come into contact with a front edge of the free end (T) and to define the waiting position of the free end (T) on the gripping plane (11). In substance, the abutment (13) constitutes a reference for the correct positioning of the free end (T) on the gripping plane (11).

[0018] In the solution shown in the figure, the abutment (13) is movable between an operating position, in which it can come into contact with the front edge of the free end (T), and an inactive position, in which it does not interfere with the free end (T) and the strip (R) can slide longitudinally. Preferably, the abutment (13) comprises an edge (14) being rotatable about an axis of rotation (X1) between the operating position and the inactive position. In particular, the edge (14) is solidly constrained to a support (15) being rotatable about the axis of rotation (X1). The support (15), in the operating position, is substantially aligned and coplanar with the gripping plane (11).

[0019] Advantageously, the orientation assembly (10) comprises a detection means (16) provided to detect the correct location of the free end (T) in the gripping position on the gripping plane (11). Such detection means may for example be in the form of photocells or proximity sensors. Preferably, the detection means (16) is positioned in proximity to the edge (14).

[0020] The gripping plane (11), the presser element

(12), the abutment (13) and the detection means (16) are associated with a support arm (17), which can be associated with the machine frame.

[0021] The operation of the orientation assembly (10) can take place in the following ways. Initially the presser element (12) is in the inactive position and the abutment (13) is in the active position. The free end (T) can then be positioned on the gripping plane (11), bringing the end border into contact with the abutment (13), in particular in contact with the edge (14). Having reached that position, the presser element (12) is activated and is brought into the operating position, locking the free end (T) on the gripping plane. Subsequently, the abutment (13) is brought into the inactive position. The movements of the presser element (12) of the abutment (13) can be coordinated and driven by a control module, which receives the signal of the detection means (16) as an input. For example, the control module moves the presser element (12) into the operating position only after receiving the signal of the detection means (16) that indicates the correct positioning of the free end (T). The control module then drives the movement of the abutment (13) into the inactive position only after detecting the reaching of the operating position by the presser element (12).

[0022] In a particularly advantageous embodiment, the automatic feeder comprises a support shaft (30) for supporting one or more rolls of strip (R). The number of rolls inserted side by side on the support shaft (30) substantially form the stock of strip (R) available for the automatic feeder.

[0023] The automatic feeder further comprises one or more orientation assemblies (10), each of which is structured to retain a free end (T) of one of the strips (R) on a predetermined gripping plane (11), in a waiting position. Preferably, there is only one orientation assembly (10) and it is equipped with a plurality of presser elements (12), each of which being structured to press and retain the free end (T) of a respective strip (R) on the gripping plane (11). Preferably, the gripping planes (11) are coplanar to one another so that, in substance, there is a common gripping plane (11) for all the presser elements (12). In the waiting position, the free ends (T) of the various strips (R) are therefore arranged parallel to one another on the gripping plane (11).

[0024] The automatic feeder is further provided with a gripping device (20), structured to grasp the free end (T) of a strip (R) and to translate the end (T) from the waiting position to a feeding position, in which the end (T) can be grasped by another operating device (D). For example, in the case of a machine for producing abrasive discs the operating device (D) comprises a cutting assembly (D), structured to grasp the free end (T) of a strip (R), for drawing in advancement the strip (R) and for cutting out from the strip (R) a plurality of sheets, which can subsequently be applied to a support disc by an assembly device. Both the cutting assembly (D) and the assembly device are known to a person skilled in the art and therefore will not be described in further detail.

[0025] In the embodiment shown, the gripping device (20) comprises a gripper (21), structured to grasp the free end (T) of a strip (R). The gripper comprises a fixed part (21a) and a movable part (21b) which can assume a gripping position, in which it is flanked to the fixed part and can lock the free end (T), and a release position, in which it is distanced from the fixed part and cannot lock the free end (T). For example, a rotary actuator (M1) can be associated with the movable part (21b) to activate it in rotation between the gripping and release positions.

[0026] The gripper (21) is associated with a support arm (22). Such support arm rotates about an axis of rotation (X) between a first position, in which the gripper (21) can grasp the free end (T) in the gripping position, and a second position, in which the free end (T), retained by the gripper (21), is brought into the proximity of the operating device (D) and can be picked up by it. An actuator device (M2), for example an electric or pneumatic motor, is provided to produce the rotation of the support arm (22). In the embodiment shown, the actuator device (M2) is associated with the support arm (16) of the orientation assembly (10).

[0027] The operation of the gripping device (20), and in particular of the gripper (21) and of the support arm (22), can be adjusted through the control module which acts on the orientation assembly (10). For example, the gripper (21) and the arm (22) can be placed in an initial position in which the gripper (21) is in a release configuration and the support arm (22) in the first position. When the control module detects the operating position of the presser element (12), the gripper (21) can be brought into the gripping configuration. Subsequently, the arm (22) is activated in rotation towards its second position, at which the free end (T) is grasped by the cutting assembly (D), or other operating device. At this point the control module drives the opening of the gripper (21).

[0028] In the embodiment shown, the support shaft (30) and the orientation assemblies (10), or the orientation assembly (10) equipped with various presser elements (12), can translate so as to offer the free end (T) of a strip (R) to the gripping device. In substance, the support shaft (30) and the orientation assembly (10) can translate so as to align any of the free ends (T), in the respective waiting positions, with the first position of the gripper (21).

[0029] The operation of the feeder inserted in a machine for the production of abrasive discs takes place in the following ways.

[0030] In an initial preparation step of the machine, one or more rolls of strip (R) can be inserted on the support shaft (30). The free ends (T) of each roll are associated with the orientation assembly (10), i.e. each free end (T) is locked on the gripping plane (11) by means of a respective presser element (12).

[0031] Subsequently, the gripping element (20) moves to reach the free end (T) of a first roll of strip (R). In particular, the gripper (21) comes into the first position, with the movable part (21b) in the release position. After

reaching the first position, the movable part (21b) is brought into the gripping position, squeezing the free end (T). At this point, the presser element (12) moves from the operating position to the inactive position, releasing the free end (T). The gripper (21), by means of the rotation of the support arm (22), draws the strip (R) in advancement and offers the free end (T) to the cutting assembly (D) which, in a known way, grasps the free end (T) and starts to gradually draw the strip (R) in advancement for subsequent processing.

[0032] Once the first roll of strip (R) has finished, the support shaft (30) and the orientation assembly (10) translate and offer the free end (T) of a new strip (R) to the gripping device (20), which can then perform a new gripping and feeding cycle of the free end (T) in the ways described above. All the operations described above can obviously be coordinated by the control module already mentioned above. For example, the control module can be configured to detect an empty roll and, in that condition, initiate the start of the steps described above for the replacement of the empty roll with another one.

[0033] The automatic feeder according to the present invention achieves important advantages. It enables an empty roll of strip to be replaced in a totally automatic way, reducing the stopping times of the production cycle. If used in a machine for the production of abrasive discs, it allows the time required for changing an empty roll of strip to be drastically reduced, therefore allowing the machine's productivity to be improved, limiting the need for manual intervention by the operator and therefore the operating autonomy of the machine without the need for the constant supervision of an operator.

Claims

1. An automatic feeder for a strip of material, **characterised in that** it comprises:

   an orientation assembly (10), structured to retain a free end (T) of a strip (R) on a predetermined gripping plane (11), in a waiting position; a gripping device (20), structured to grasp the free end (T) of a strip (R) and to translate the end (T) from the waiting position to a feeding position, in which the end (T) can be grasped by another operating device (D);
   characterised in that the orientation assembly (10) comprises at least one presser element (12), structured to press and retain the free end (T) of the strip (L)on the gripping plane (11), and an abutment (13), structured to come into contact with a front edge of the free end (T) and to define the waiting position of the free end (T) on the gripping plane (11).

2. The automatic feeder according to claim 1, wherein the abutment (13) is movable between an operating position, in which it can come into contact with the front edge of the free end (T) to define the waiting position of the free end (T) on the gripping plane (11), and an inactive position, in which it does not interfere with the free end (T) and the strip (R) can slide longitudinally in space.

3. The automatic feeder according to claim 2, wherein the orientation assembly (10) comprises detection means predisposed to detect the correct location of the free end (T) in the gripping position on the gripping plane (11).

4. The automatic feeder according to claim 1, wherein the gripping device (20) comprises a gripper (21), structured to grasp the free end (T).

5. The automatic feeder according to claim 4, wherein the gripper (21) is associated with a support arm (22) rotating about an axis of rotation (X) between a first position, in which the gripper (21) can grasp the free end (T) in the gripping position, and a second position, in which the free end (T) retained by the gripper (21) can be taken by another operating device (D).

6. The automatic feeder according to claim 1, comprising:

   a support shaft (30) for supporting one or more rolls of strip (R);
   one or more orientation assemblies (10), each of which is structured to retain a free end (T) of one of the strips (R) on a predetermined gripping plane (11), in a waiting position;
   wherein the gripping device (20), is movable in order to be able to grasp the free end (T) of one of the strips (R) and to translate the end (T) from the waiting position to the feeding position, in which the end (T) can be grasped by another operating device (D).

7. A machine for producing abrasive discs, comprising: an automatic feeder (1) according to one of the preceding claims; a cutting assembly (D), structured so as to grasp the free end (T) of a strip (R), to drag in advancement the strip (R) and to cut from the strip (R) a plurality of sheets; an assembly device, structured to fix the sheets to a support disc.

Patentansprüche

1. Automatische Zuführvorrichtung für einen Materialstreifen, **dadurch gekennzeichnet, dass** sie Folgendes umfasst:

   eine Ausrichtungsbaugruppe (10), die so strukturiert ist, dass sie ein freies Ende (T) eines Strei-

fens (R) auf einer zuvor bestimmten Greiffläche (11) in einer Warteposition hält;
eine Greifvorrichtung (20), die so strukturiert ist, dass sie das freie Ende (T) eines Streifens (R) fasst und das Ende (T) von der Warteposition in eine Zuführposition, in der das Ende (T) von einer anderen Bedienvorrichtung (D) fassbar ist, überführt;
dadurch gekennzeichnet, dass die Ausrichtungsbaugruppe (10) mindestens ein Presselement (12), das so strukturiert ist, dass es das freie Ende (T) des Streifens (L) auf der Greiffläche (11) presst und hält, und einen Anschlag (13), der so strukturiert ist, dass er mit einer vorderen Kante des freien Endes (T) in Kontakt kommt und die Warteposition des freien Endes (T) auf der Greiffläche (11) definiert, umfasst.

2. Automatische Zuführvorrichtung nach Anspruch 1, wobei der Anschlag (13) zwischen einer Bedienposition, in der er mit der vorderen Kante des freien Endes (T) in Kontakt kommen kann, um die Warteposition des freien Endes (T) auf der Greiffläche (11) zu definieren, und einer inaktiven Position, in der er nicht auf das freie Ende (T) einwirkt und der Streifen (R) in Längsrichtung im Raum gleiten kann, beweglich ist.

3. Automatische Zuführvorrichtung nach Anspruch 2, wobei die Ausrichtungsbaugruppe (10) Erfassungseinrichtungen umfasst, die zum Erfassen der korrekten Lage des freien Endes (T) in der Greifposition auf der Greiffläche (11) ausgelegt sind.

4. Automatische Zuführvorrichtung nach Anspruch 1, wobei die Greifvorrichtung (20) einen Greifer (21) umfasst, der so strukturiert ist, dass er das freie Ende (T) fasst.

5. Automatische Zuführvorrichtung nach Anspruch 4, wobei der Greifer (21) mit einem Trägerarm (22) verbunden ist, der um eine Rotationsachse (X) zwischen einer ersten Position, in der der Greifer (21) das freie Ende (T) in der Greifposition fassen kann, und einer zweiten Position, in der das von dem Greifer (21) gehaltene freie Ende (T) von einer anderen Bedienvorrichtung (D) nehmbar ist, rotiert.

6. Automatische Zuführvorrichtung nach Anspruch 1, umfassend: eine Trägerwelle (30) zum Tragen einer oder mehrerer Rollen von Streifen (R); eine oder mehrere Ausrichtungsbaugruppen (10), die jeweils so strukturiert sind, dass sie ein freies Ende (T) eines der Streifen (R) auf einer zuvor bestimmten Greiffläche (11) in einer Warteposition halten;
wobei die Greifvorrichtung (20) beweglich ist, um dazu fähig zu sein, das freie Ende (T) eines der Streifen (R) zu fassen und das Ende (T) von der Warteposition zu der Zuführposition, in der das Ende (T) von einer anderen Bedienvorrichtung (D) fassbar ist, zu überführen.

7. Maschine zur Herstellung von Schleifscheiben, umfassend: eine automatische Zuführvorrichtung (1) nach einem der vorangehenden Ansprüche; eine Schneidbaugruppe (D), die so strukturiert ist, dass sie das freie Ende (T) eines Streifens (R) fasst, um den Streifen (R) vorwärts zu ziehen und von dem Streifen (R) eine Vielzahl von Blättern abzuschneiden; eine Montagevorrichtung, die so strukturiert ist, dass sie die Blätter an einer Trägerscheibe befestigt.

Revendications

1. Dispositif d'alimentation automatique pour une bande de matériau, **caractérisé en ce qu'**il comprend :

un ensemble d'orientation (10) structuré pour retenir une extrémité libre (T) d'une bande (R) sur un plan de préhension (11) prédéterminé, dans une position d'attente ;
un dispositif de préhension (20) structuré pour saisir l'extrémité libre (T) d'une bande (R) et pour translater l'extrémité (T) de la position d'attente à une position d'alimentation, dans laquelle l'extrémité (T) peut être saisie par un autre dispositif fonctionnel (D) ;
caractérisé en ce que l'ensemble d'orientation (10) comprend au moins un élément presseur (12) structuré pour presser et retenir l'extrémité libre (T) de la bande (L) sur le plan de préhension (11), et une butée (13) structurée pour entrer en contact avec un bord antérieur de l'extrémité libre (T) et pour définir la position d'attente de l'extrémité libre (T) sur le plan de préhension (11).

2. Dispositif d'alimentation automatique selon la revendication 1, dans lequel la butée (13) est mobile entre une position fonctionnelle, dans laquelle elle peut entrer en contact avec le bord antérieur de l'extrémité libre (T) pour définir la position d'attente de l'extrémité libre (T) sur le plan de préhension (11), et une position inactive, dans laquelle elle n'interfère pas avec l'extrémité libre (T) et la bande (R) peut coulisser longitudinalement dans l'espace.

3. Dispositif d'alimentation automatique selon la revendication 2, dans lequel l'ensemble d'orientation (10) comprend des moyens de détection prédisposés pour détecter l'emplacement correct de l'extrémité libre (T) dans la position de préhension sur le plan de préhension (11).

4. Dispositif d'alimentation automatique selon la reven-

dication 1, dans lequel le dispositif de préhension (20) comprend un préhenseur (21) structuré pour saisir l'extrémité libre (T).

5. Dispositif d'alimentation automatique selon la revendication 4, dans lequel le préhenseur (21) est associé à un bras de support (22) tournant autour d'un axe de rotation (X) entre une première position, dans laquelle le préhenseur (21) peut saisir l'extrémité libre (T) dans la position de préhension, et une seconde position, dans laquelle l'extrémité libre (T), retenue par le préhenseur (21), peut être saisie par un autre dispositif fonctionnel (D).

6. Dispositif d'alimentation automatique selon la revendication 1, comprenant : un arbre de support (30) servant à supporter un ou plusieurs rouleaux de bande (R) ;
un ou plusieurs ensembles d'orientation (10), chacun étant structuré pour retenir une extrémité libre (T) de l'une des bandes (R) sur un plan de préhension (11) prédéterminé, dans une position d'attente ; dans lequel le dispositif de préhension (20) est mobile afin de pouvoir saisir l'extrémité libre (T) de l'une des bandes (R) et translater l'extrémité (T) de la position d'attente à la position d'alimentation, dans laquelle l'extrémité (T) peut être saisie par un autre dispositif fonctionnel (D).

7. Machine servant à la production de disques abrasifs, comprenant : un dispositif d'alimentation automatique (1) selon l'une des revendications précédentes ; un ensemble de coupe (D) structuré de manière à saisir l'extrémité libre (T) d'une bande (R), pour entraîner en progression la bande (R) et pour couper à partir de la bande (R) une pluralité de feuilles ; un dispositif d'assemblage structuré pour fixer les feuilles sur un disque de support.

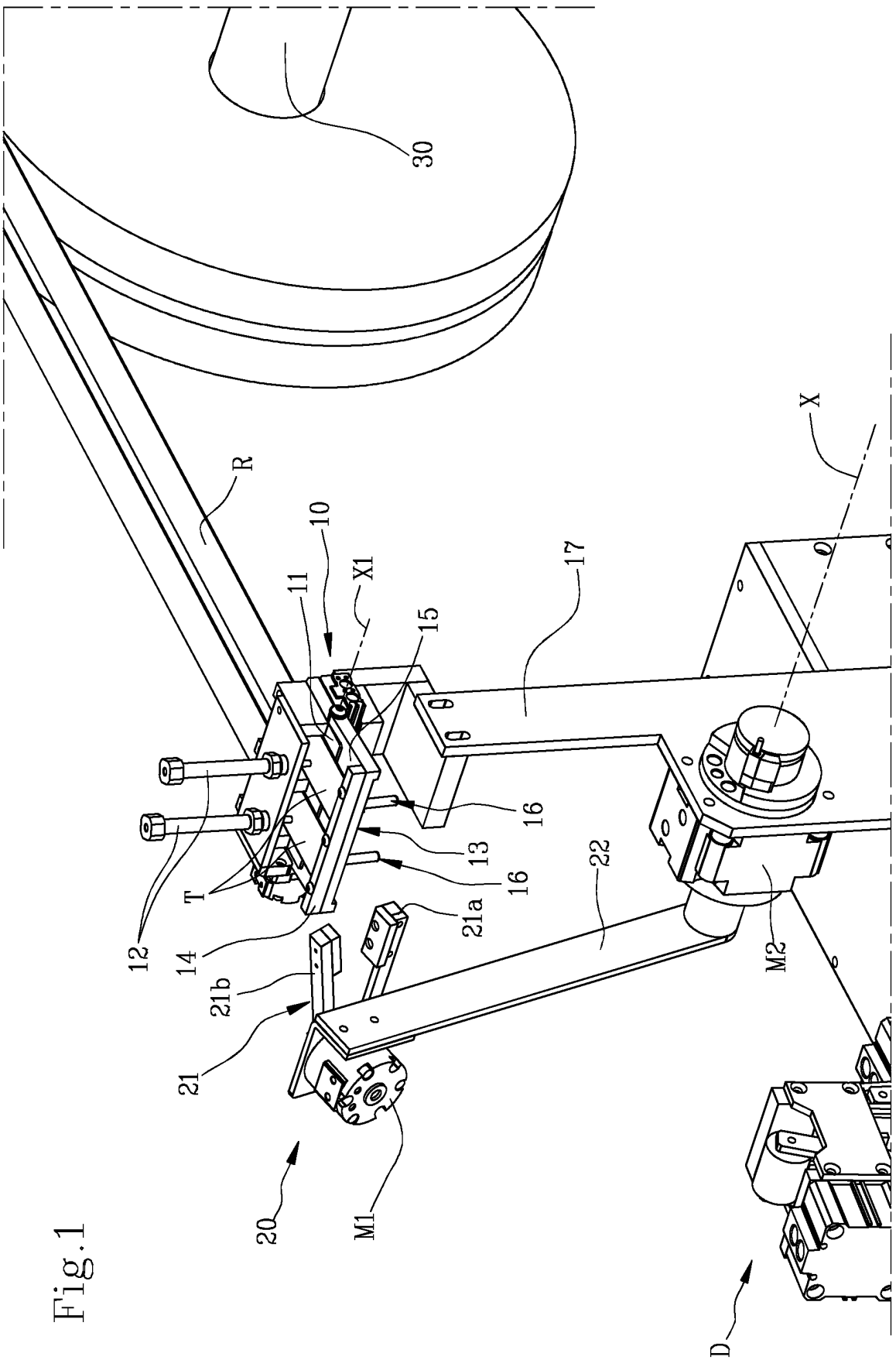

Fig.1

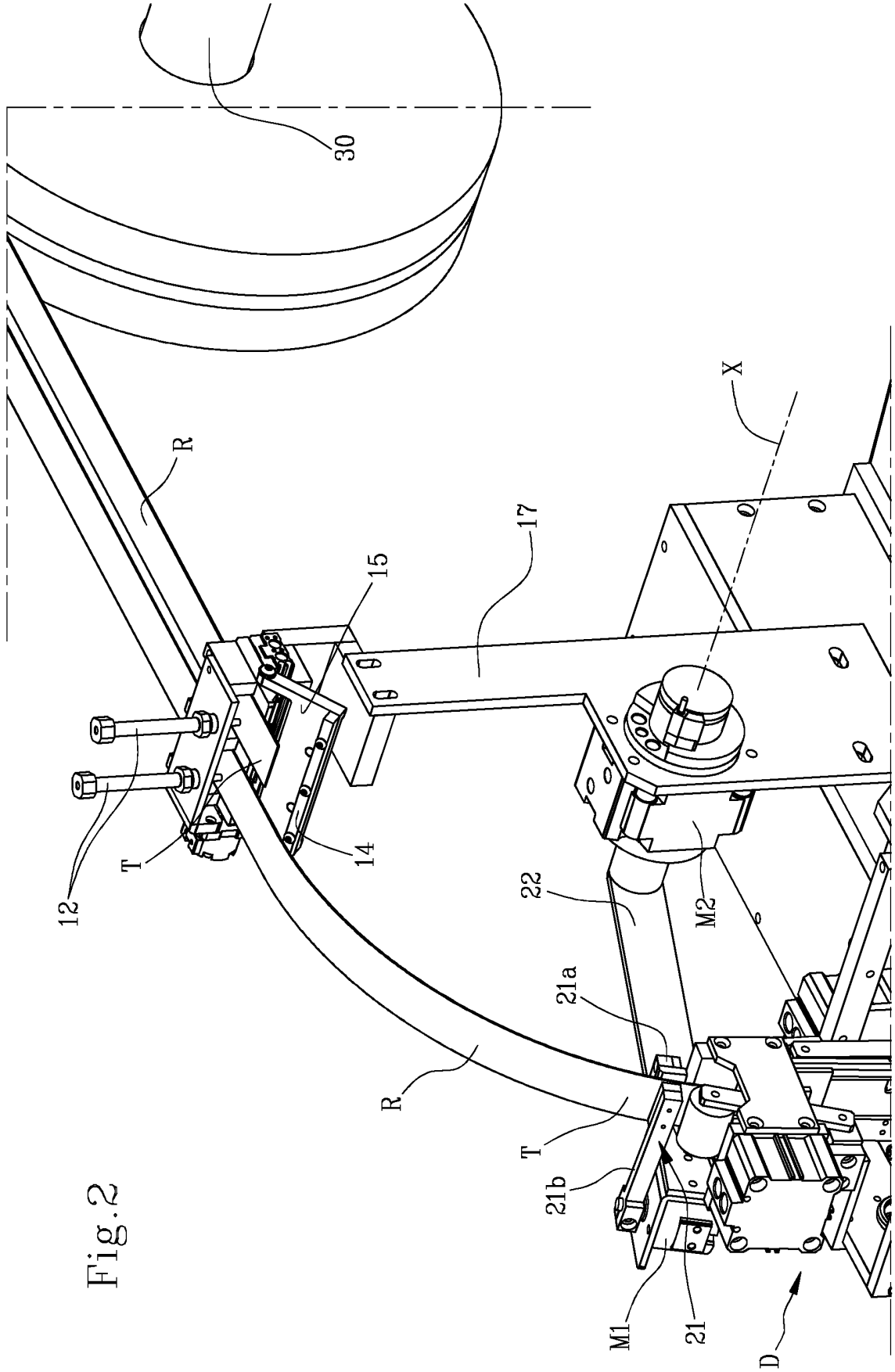

Fig.2

REFERENCES CITED IN THE DESCRIPTION

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