



(11) **EP 4 452 768 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

04.06.2025 Bulletin 2025/23

(21) Application number: **22835491.6**

(22) Date of filing: **20.12.2022**

(51) International Patent Classification (IPC):

B65C 1/02 (2006.01) B65C 9/36 (2006.01)

(52) Cooperative Patent Classification (CPC):

B65C 1/021; B65C 9/36

(86) International application number:

PCT/IB2022/062531

(87) International publication number:

WO 2023/119148 (29.06.2023 Gazette 2023/26)

(54) **TRIAxIAL LABELLING MACHINE**

DREIACHSIGE ETIKETTIERMASCHINE

MACHINE D'ÉTIQUETAGE TRIAXIAL

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **22.12.2021 IT 202100032234**

(43) Date of publication of application:

30.10.2024 Bulletin 2024/44

(73) Proprietor: **Gruppo Fabbri Vignola S.p.A.**

41058 Vignola (IT)

(72) Inventor: **SCHIAVINA, Andrea**

42015 Correggio RE (IT)

(74) Representative: **Concone, Emanuele et al**

Società Italiana Brevetti S.p.A.

Via Carducci 8

20123 Milano (IT)

(56) References cited:

CN-A- 108 177 832 DE-U1- 8 907 855

US-A1- 2020 299 020

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to machines for applying labels to packaging, and in particular to a triaxial labelling machine capable of applying labels in different positions and possibly with different orientations on packaging of varying shapes, especially in the food packaging machine sector. In the following, specific reference will be made to the application of the present invention to the aforementioned sector, but it is clear that the labelling machine described in the present application can be used in any other sector where it is necessary to be able to freely vary the positioning of a label on the upper surface of a package.

[0002] As is well known, fresh food products such as meat, fish, cheese, fruit, etc. are usually placed in trays or containers which are then sealed with a plastic film, which may be a stretch film or a heat-sealable film suitable for modified atmosphere or vacuum packaging (so-called skin packaging) or another type of film. In any case, the resulting packaging has an irregular shape and height that varies according to the shape and quantity of the food, so the label is applied from above by means of an applicator with a pad equipped with movement along the vertical Z-axis, and possibly rotating around said axis in order to vary the orientation of the label.

[0003] The application position of the label on the packaging is determined by a system that moves the applicator along both the transverse X-axis and the longitudinal Y-axis. In known systems, the applicator is typically arranged on a transverse carriage for movement along the X-axis and said carriage in turn moves along the Y-axis. More specifically, the carriage comprises a first motor for moving the applicator along a transverse guide, typically by means of a first toothed belt or the like, and the carriage is in turn moved along two longitudinal side guides by means of two other toothed belts or the like driven by a second motor fixed on the frame of the labelling machine. DE8907855U1 discloses an example of such a system using rack and pinion drives for the X, Y and Z motions.

[0004] This traditional configuration has the drawback of requiring to move back and forth along the Y-axis a rather heavy carriage, since it includes not only the transverse guide and the applicator with its actuator for the movement along the vertical Z-axis, but also the first motor and the first toothed belt for moving the applicator along the X-axis. Consequently, the high inertia of the carriage increases the time for movement and direction reversal along the Y-axis, thus limiting the productivity of the machine, and requires a fixed motor of adequate power with the associated cost and space requirements.

[0005] In addition, the presence of two/three motors on the carriage, if the motor for rotating the pad is also present, implies the use of multiple cables that must be connected to the carriage, contributing to the complexity and inertia of the system. The use of three belts also constitutes an element of complexity with negative repercussions on the cost and reliability of the system, as well as the labour required for assembly and maintenance of the system.

[0006] DE 8907855U describes a similar device and a triaxial labelling machine in accordance with the preamble of claim 1, with the same drawbacks, for the application of image elements reproduced on an adhesive film for the assembly of signs and panels. In this case, the applicator carriage is mounted on a rigid crossbar extending along the X-axis, and the movement of the crossbar along the Y-axis takes place along two parallel tracks by means of a fixed motor on the frame, while the carriage contains three motors for the movement of the applicator along the X-, Z-axes and its rotation about the Z-axis.

[0007] The purpose of the present invention is therefore to provide a labelling machine which overcomes the aforementioned drawbacks. This purpose is achieved by means of a labelling machine in which the movement of both the applicator along the X-axis and of the carriage along the Y-axis are obtained by means of a single toothed belt extending both along the longitudinal guides of the carriage and along the transversal guide of the applicator that is fixed to the belt, which is moved by two motors fixed on the frame and acts on the carriage only by means of four deflection rollers carried by the carriage.

[0008] The fundamental advantage of the labelling machine in question is therefore that it reduces the mass of the carriage, which no longer includes the motor to move the applicator along the X-axis, nor the associated belt. As a result, the reduced inertia of the trolley reduces the time required to move and reverse direction along the Y-axis, thereby increasing the productivity of the machine, and requires lower power motors with a relative reduction in cost and space required. In addition, having only two fixed motors on the frame reduces the number of cables that must be connected to the carriage and therefore the complexity and inertia of the machine.

[0009] Another important advantage of the aforesaid labelling machine is its structural simplicity and low cost due to the use of a single belt instead of three belts, thereby reducing its complexity with positive repercussions on the cost and reliability of the system, as well as on the labour required for assembly and maintenance of the system.

[0010] Further advantages and features of the labelling machine according to the present invention will be apparent to those skilled in the art from the following detailed description of an embodiment thereof with reference to the accompanying drawings, wherein:

Fig.1 is a perspective view from above showing schematically the main elements of the movement system of a labelling machine according to the invention;

Fig.2 is a plan view from below of the system of Fig.1;

Fig.3 is a plan view from above of the system of Fig.1;

Fig.4 is a front view of the system of Fig. 1; and

Fig.5 is a right-side view of the system of Fig. 1.

[0011] Referring to the aforementioned figures, it can be seen that a labelling machine according to the present invention traditionally comprises two longitudinal lateral guides 1, 1' for movement along the Y-axis of a transversal carriage 2, which carries an applicator 3 movable along a double transversal guide 4 for movement along the X-axis. The applicator 3 is also equipped with an actuator for movement along the Z-axis of a pad 6 carrying the label to be applied to the packaging, and with a fan 5 for creating depression inside pad 6 and supporting the labels. A first motor 7 fixed on the frame of the labelling machine, in a front position, drives via a speed reducer 8 a toothed belt 9. The belt 9 is also wound on a rear toothed pulley 10 aligned longitudinally to the speed reducer 8, to achieve the movement of carriage 2 along guide 1 (for simplicity, the teeth on the inner side of belt 9 are not shown in the drawings).

[0012] As mentioned above, the innovative aspect of the present invention consists in the fact that the toothed belt 9 not only extends along the left longitudinal guide 1 between the speed reducer 8 and the corresponding rear toothed pulley 10, but also along carriage 2 and the right longitudinal guide 1'. More specifically, the labelling machine comprises a second motor 7' fixed on the frame of the packaging machine, also in a front position, which also acts via a speed reducer 8' on the toothed belt 9, which is also wound on a corresponding rear toothed pulley 10' aligned longitudinally with the speed reducer 8', so that the toothed belt 9 also extends along the right longitudinal guide 1'.

[0013] Each of the end portions of the carriage 2 running on the longitudinal guide rails 1, 1' is provided below with a pair of longitudinally spaced and preferably aligned deflection rollers 11, 11', around which the toothed belt 9 is wound to bend 90° in a transverse direction along the guide rail 4 so that it also extends along carriage 2. In this way, the toothed belt 9 extends in a loop with a substantially H-shaped plan form (Figs. 2-3), according to a path formed by eight sections which can be identified in sequence as follows:

1. between the left speed reducer 8 and the left front deflection roller 11;
2. between the left front deflection roller 11 and the right front deflection roller 11';
3. between the right front deflection roller 11' and the right speed reducer 8';
4. between the right speed reducer 8' and the right rear toothed pulley 10';
5. between the right rear toothed pulley 10' and the right rear deflection roller 11';
6. between the right rear deflection roller 11' and the left rear deflection roller 11;
7. between the left rear deflection roller 11 and the left rear toothed pulley 10;
8. between the left rear toothed pulley 10 and the left speed reducer 8.

[0014] In the embodiment illustrated, applicator 3 is fixed on the second section with the rod carrying pad 6 arranged behind the double guide 4, but the rod could possibly also be arranged in the middle or in front of the latter and/or applicator 3 could be fixed on the sixth section.

[0015] Preferably, the toothed belt 9 is not a continuous loop but is cut at applicator 3, which acts as an adjustable connector between the two ends of the toothed belt 9 to make the loop. This configuration has the advantage that the length of the loop does not necessarily have to correspond to a multiple of the tooth pitch of the toothed belt 9, since the distance between its ends can be freely adjusted in the attachment area of applicator 3.

[0016] The labelling machine also includes a control unit (not shown) which controls the operation of the two motors 7, 7' in order to achieve with the single toothed belt 9 all the movements of carriage 2 and applicator 3 as per the following scheme, according to the notations shown in Fig.3. In practice, by simultaneously rotating the motors clockwise (CW) or counter-clockwise (CCW), again with reference to the top view in Fig.3, or by keeping one of the two motors static (S), it is possible to obtain both individual movements along the two transversal and longitudinal directions and simultaneous combined movements along both said directions.

Left motor 7	Right motor 7'	Direction of movement
CW	CW	-X
CCW	CCW	+X
CW	CCW	-Y
CCW	CW	+Y

(continued)

Left motor 7	Right motor 7'	Direction of movement
S	CW	-X/+Y
S	CCW	+X/-Y
CW	S	-X/-Y
CCW	S	+X/+Y

[0017] Note that if the applicator were fixed on the sixth section of the toothed belt 9 then the signs of the displacements X in the table would be reversed, i.e. +X would become - X.

[0018] It is clear that the embodiment of the labelling machine according to the invention described and illustrated above is only an example susceptible to numerous variations. In particular, the specific type of applicator 3 could be different from that shown and described above, without affecting the movement system which constitutes the essence of the invention. Similarly, the front position of motors 7, 7' is preferred to facilitate their maintenance/replacement, but the system could be reversed by swapping the position of motors 7, 7' with that of the toothed pulleys 10, 10'.

[0019] The same applies to the definition of the three directions X, Y, Z since it is clear that the labelling machine can be arranged in any spatial orientation and the description only refers to the relative positions between its elements according to the illustrated example.

Claims

1. Triaxial labelling machine comprising:

- two longitudinal lateral guides (1, 1');
- a transversal carriage (2) movable along said longitudinal lateral guides (1, 1');
- a label applicator (3) movable along a transversal guide (4), carried by said transversal carriage (2), and provided with an actuator for moving a pad (6) along a direction perpendicular to said longitudinal (1, 1') and transversal guides (4);
- a first motor (7) fixed on a frame of the labelling machine and provided with a first speed reducer (8);
- a toothed belt (9) driven by said first speed reducer (8) and wound on a first toothed pulley (10) longitudinally aligned with said first speed reducer (8); and
- a control unit operatively connected to control the operation of said first motor (7) and of said actuator for moving said pad (6);

characterized in that the labelling machine further comprises:

- a second motor (7') fixed on the labelling machine frame and provided with a second speed reducer (8');
- a second toothed pulley (10') longitudinally aligned with said second speed reducer (8');
- a pair of deflection rollers (11, 11') longitudinally spaced and preferably aligned, arranged at each end portion of the transversal carriage (2);

and in that said toothed belt (9) extends in a loop being wound in sequence around the first speed reducer (8), a first front deflection roller (11) adjacent thereto, a second front deflection roller (11'), the second speed reducer (8'), the second toothed pulley (10'), a first rear deflection roller (11') adjacent thereto, a second rear deflection roller (11), and the first toothed pulley (10),

and in that said label applicator (3) is fixed to the toothed belt (9) in one of the two sections between the deflection rollers (11, 11'),

and in that said control unit is operatively connected to said second motor (7') so as to control the simultaneous operation of the two motors (7, 7').

2. Labelling machine according to claim 1, **characterized in that** the toothed belt (9) is not a continuous loop but is cut at the label applicator (3), which acts as an adjustable connector between the two ends of the toothed belt (9) to make the loop.

3. Labelling machine according to claim 1 or 2, **characterized in that** the label applicator (3) comprises a further actuator for rotating the pad (6).

4. Labelling machine according to any of the preceding claims, **characterized in that** both motors (7, 7') are mounted on the frame in a front position.
5. Method for operating a labelling machine according to any of the preceding claims, **characterized in that** for achieving purely transverse displacements the two motors (7, 7') are rotated in the same direction, for purely longitudinal displacements the two motors (7, 7') are rotated in opposite directions and for combined displacements one of the two motors (7, 7') is kept static.

Patentansprüche

1. Dreiachsige Etikettiermaschine, umfassend:

- zwei Längsseitenführungen (1, 1');
- einen Querschlitzen (2), der entlang der Längsseitenführungen (1, 1') bewegbar ist;
- einen Etikettenapplikator (3), der entlang einer Querführung (4) bewegbar ist, von dem Querschlitzen (2) getragen wird und mit einem Aktuator zum Bewegen eines Stempels (6) entlang einer Richtung senkrecht zu den Längs- (1, 1') und Querführungen (4) bereitgestellt ist;
- einen ersten Motor (7), der an einem Rahmen der Etikettiermaschine befestigt und mit einem ersten Drehzahlminderer (8) bereitgestellt ist,
- einen Zahnriemen (9), der durch den ersten Drehzahlminderer (8) angetrieben wird und auf eine erste Zahnriemenscheibe (10) gewickelt ist, die in Längsrichtung mit dem ersten Drehzahlminderer (8) ausgerichtet ist; und
- eine Steuereinheit, die betriebsmäßig angeschlossen ist, um den Betrieb des ersten Motors (7) und des Aktuators zum Bewegen des Stempels (6) zu steuern;

dadurch gekennzeichnet, dass die Etikettiermaschine ferner umfasst:

- einen zweiten Motor (7'), der am Rahmen der Etikettiermaschine befestigt und mit einem zweiten Drehzahlminderer (8') bereitgestellt ist;
- eine zweite Zahnriemenscheibe (10'), die in Längsrichtung an dem zweiten Drehzahlminderer (8') ausgerichtet ist, und
- ein Paar in Längsrichtung beabstandeter und vorzugsweise fluchtender Umlenkrollen (11, 11'), die an jedem Endabschnitt des Querschlitzens (2) angeordnet sind;

und dadurch, dass der Zahnriemen (9) in einer Schleife verläuft und nacheinander um den ersten Drehzahlminderer (8), eine erste vordere Umlenkrolle (11), eine zweite vordere Umlenkrolle (11'), den zweiten Drehzahlminderer (8'), die zweite Zahnriemenscheibe (10'), eine erste hintere, dazu benachbarte Umlenkrolle (11'), eine zweite hintere Umlenkrolle (11) und die erste Zahnriemenscheibe (10) gewickelt ist,
und dadurch, dass der Etikettenapplikator (3) in einem der beiden Abschnitte zwischen den Umlenkrollen (11, 11') am Zahnriemen (9) befestigt ist,
und dadurch, dass die Steuereinheit betriebsmäßig mit dem zweiten Motor (7') verbunden ist, um den gleichzeitigen Betrieb der beiden Motoren (7, 7') zu steuern.

2. Etikettiermaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zahnriemen (9) keine durchgehende Schlaufe ist, sondern am Etikettenapplikator (3) durchtrennt wird, der als verstellbares Verbindungsstück zwischen den beiden Enden des Zahnriemens (9) dient und so die Schlaufe bildet.
3. Etikettiermaschine nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Etikettenapplikator (3) einen weiteren Aktuator zum Drehen des Stempels (6) aufweist.
4. Etikettiermaschine nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** beide Motoren (7, 7') in einer vorderen Position am Rahmen montiert sind.
5. Verfahren zum Betreiben einer Etikettiermaschine nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** zum Erzielen reiner Querverschiebungen die beiden Motoren (7, 7') in die gleiche Richtung gedreht werden, für reine Längsverschiebungen die beiden Motoren (7, 7') in entgegengesetzte Richtungen gedreht und werden für kombinierte Verschiebungen einer der beiden Motoren (7, 7') stationär gehalten wird.

Revendications

1. Étiqueteuse triaxiale, comprenant :

- deux guides latéraux longitudinaux (1, 1') ;
- un chariot transversal (2) pouvant être déplacé le long desdits guides latéraux longitudinaux (1, 1') ;
- un applicateur d'étiquettes (3) pouvant être déplacé le long d'un guide transversal (4), porté par ledit chariot transversal (2), et pourvu d'un actionneur permettant le déplacement d'un patin (6) le long d'une direction perpendiculaire auxdits guides longitudinaux (1, 1') et transversaux (4) ;
- un premier moteur (7) fixé sur un cadre de l'étiqueteuse et pourvu d'un premier réducteur de vitesse (8) ;
- une courroie crantée (9) entraînée par ledit premier réducteur de vitesse (8) et enroulée sur une première poulie crantée (10) alignée longitudinalement avec ledit premier réducteur de vitesse (8) ; et
- une unité de commande connectée de manière fonctionnelle pour commander le fonctionnement dudit premier moteur (7) et dudit actionneur pour déplacer ledit patin (6) ;

caractérisée en ce que l'étiqueteuse comprend en outre :

- un second moteur (7') fixé sur le cadre de l'étiqueteuse et pourvu d'un second réducteur de vitesse (8') ;
- une seconde poulie crantée (10') alignée longitudinalement avec ledit second réducteur de vitesse (8') ;
- et
- une paire de rouleaux de déviation (11, 11') espacés longitudinalement et de préférence alignés, disposés au niveau de chaque partie d'extrémité du chariot transversal (2) ;

et en ce que ladite courroie crantée (9) s'étend en une boucle en s'enroulant en séquence autour du premier réducteur de vitesse (8), d'un premier rouleau de déviation (11) avant adjacent à celui-ci, d'un second rouleau de déviation (11') avant, du second réducteur de vitesse (8'), de la seconde poulie crantée (10'), d'un premier rouleau de déviation (11') arrière adjacent à celui-ci, d'un second rouleau de déviation (11) arrière, et de la première poulie crantée (10),

et en ce que ledit applicateur d'étiquettes (3) est fixé à la courroie crantée (9) dans l'une des deux sections entre les rouleaux de déviation (11, 11'),

et en ce que ladite unité de commande est connectée de manière fonctionnelle audit second moteur (7') de manière à commander le fonctionnement simultané des deux moteurs (7, 7').

2. Étiqueteuse selon la revendication 1, caractérisée en ce que la courroie crantée (9) n'est pas une boucle continue mais est coupée au niveau de l'applicateur d'étiquettes (3) agissant comme un connecteur réglable entre les deux extrémités de la courroie crantée (9) pour former la boucle.

3. Étiqueteuse selon la revendication 1 ou 2, caractérisée en ce que l'applicateur d'étiquettes (3) comprend un actionneur supplémentaire permettant la rotation du patin (6).

4. Étiqueteuse selon l'une quelconque des revendications précédentes, caractérisée en ce que les deux moteurs (7, 7') sont montés dans une position frontale sur le cadre.

5. Procédé permettant de faire fonctionner une étiqueteuse selon l'une quelconque des revendications précédentes, caractérisé en ce que, pour obtenir des déplacements purement transversaux, les deux moteurs (7, 7') sont tournés dans la même direction, pour des déplacements purement longitudinaux, les deux moteurs (7, 7') sont tournés dans des directions inverses et, pour des déplacements combinés, l'un des deux moteurs (7, 7') est maintenu statique.

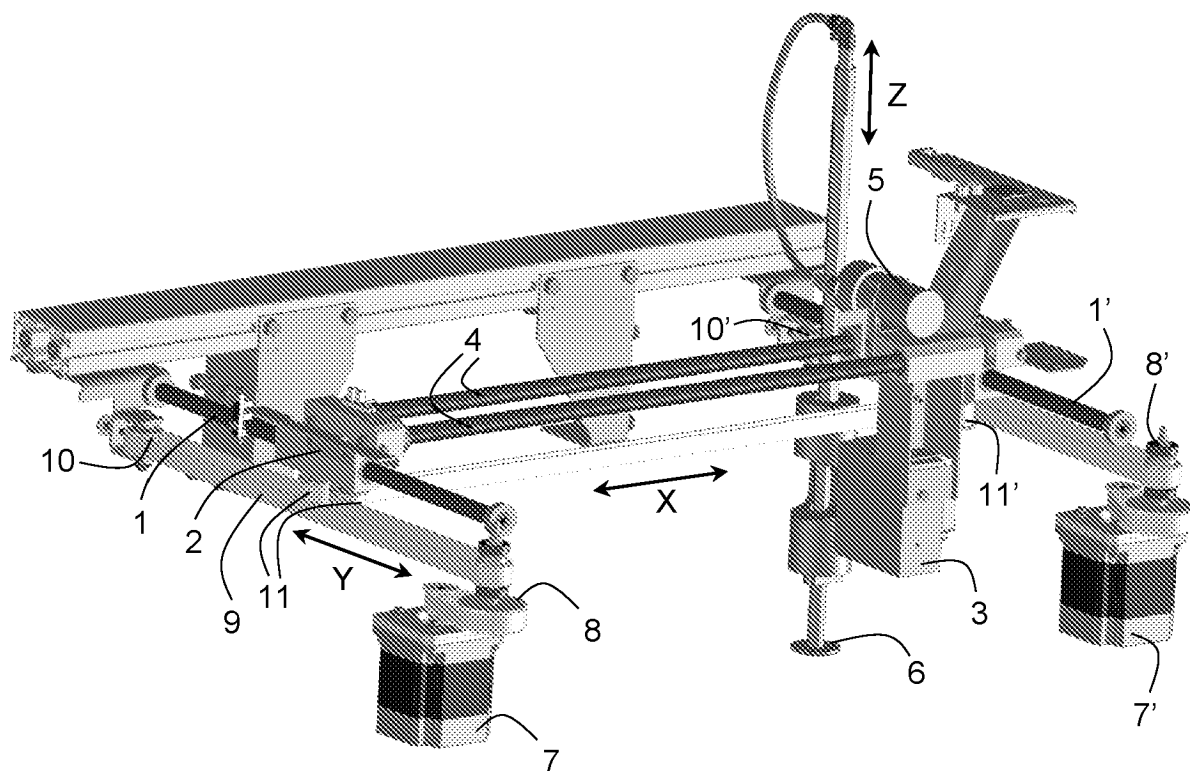


FIG.1

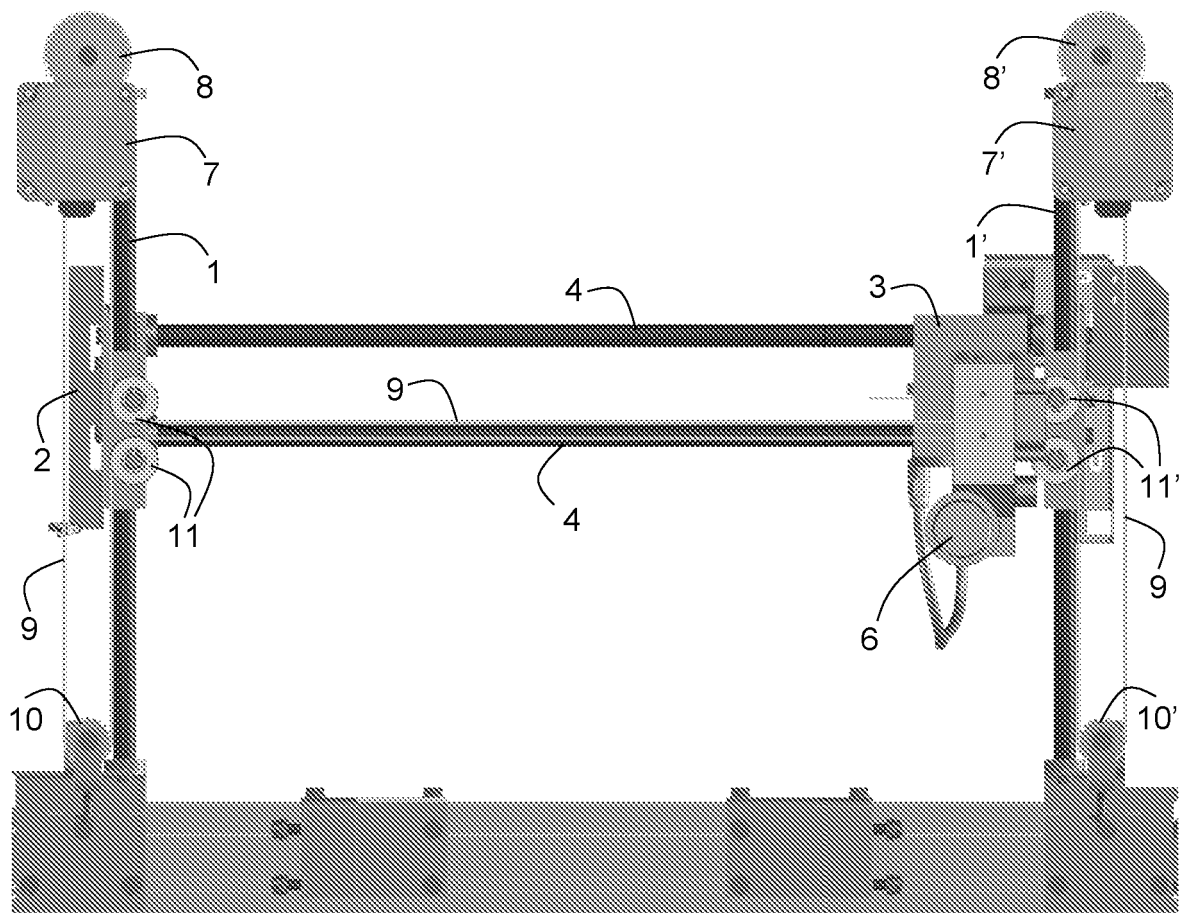


FIG.2

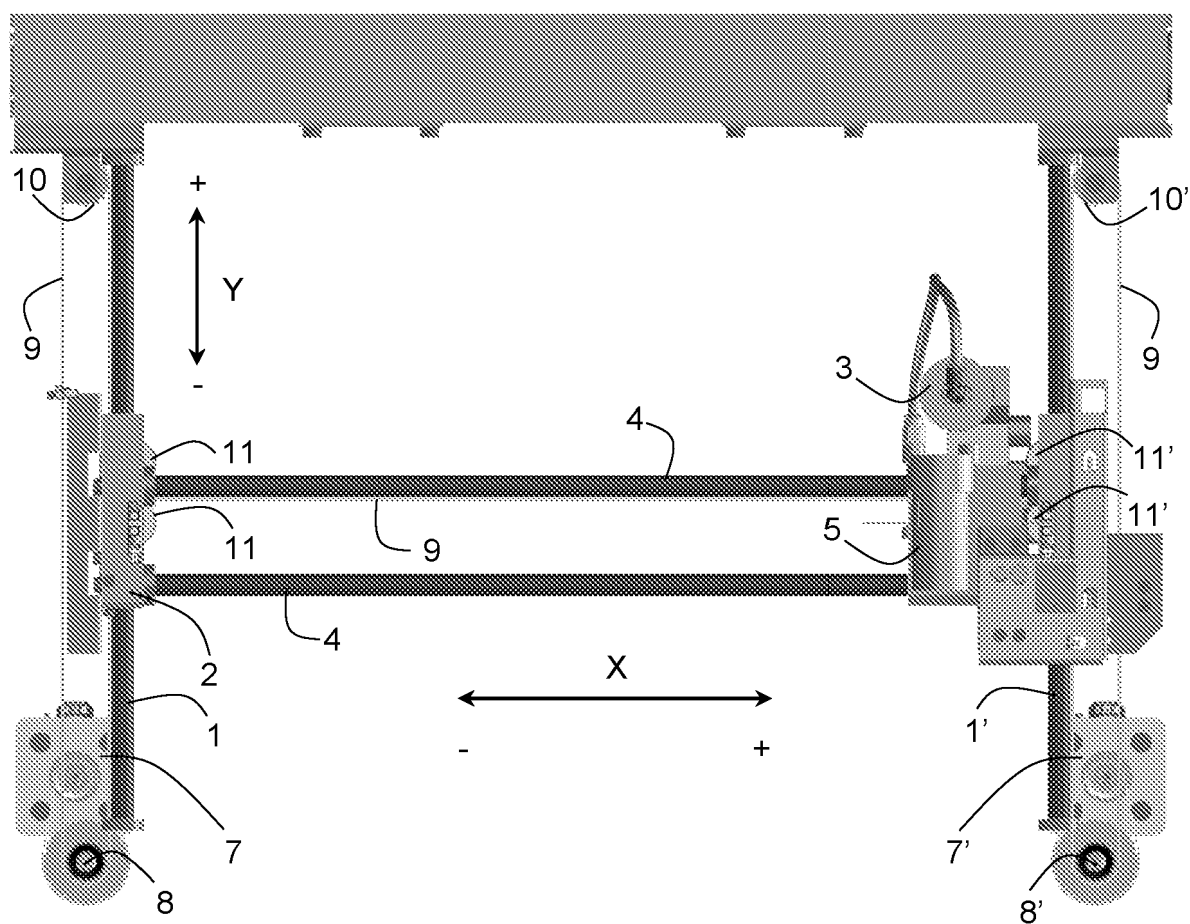


FIG.3

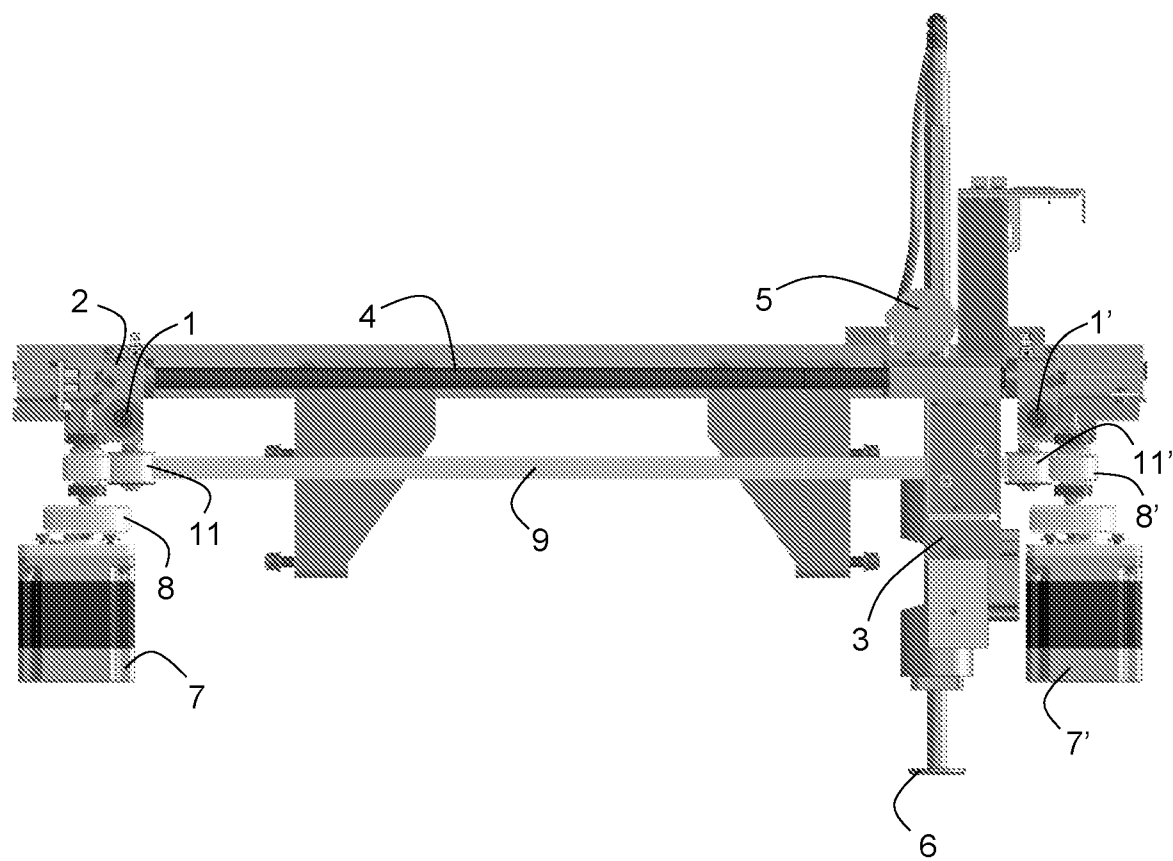


FIG.4

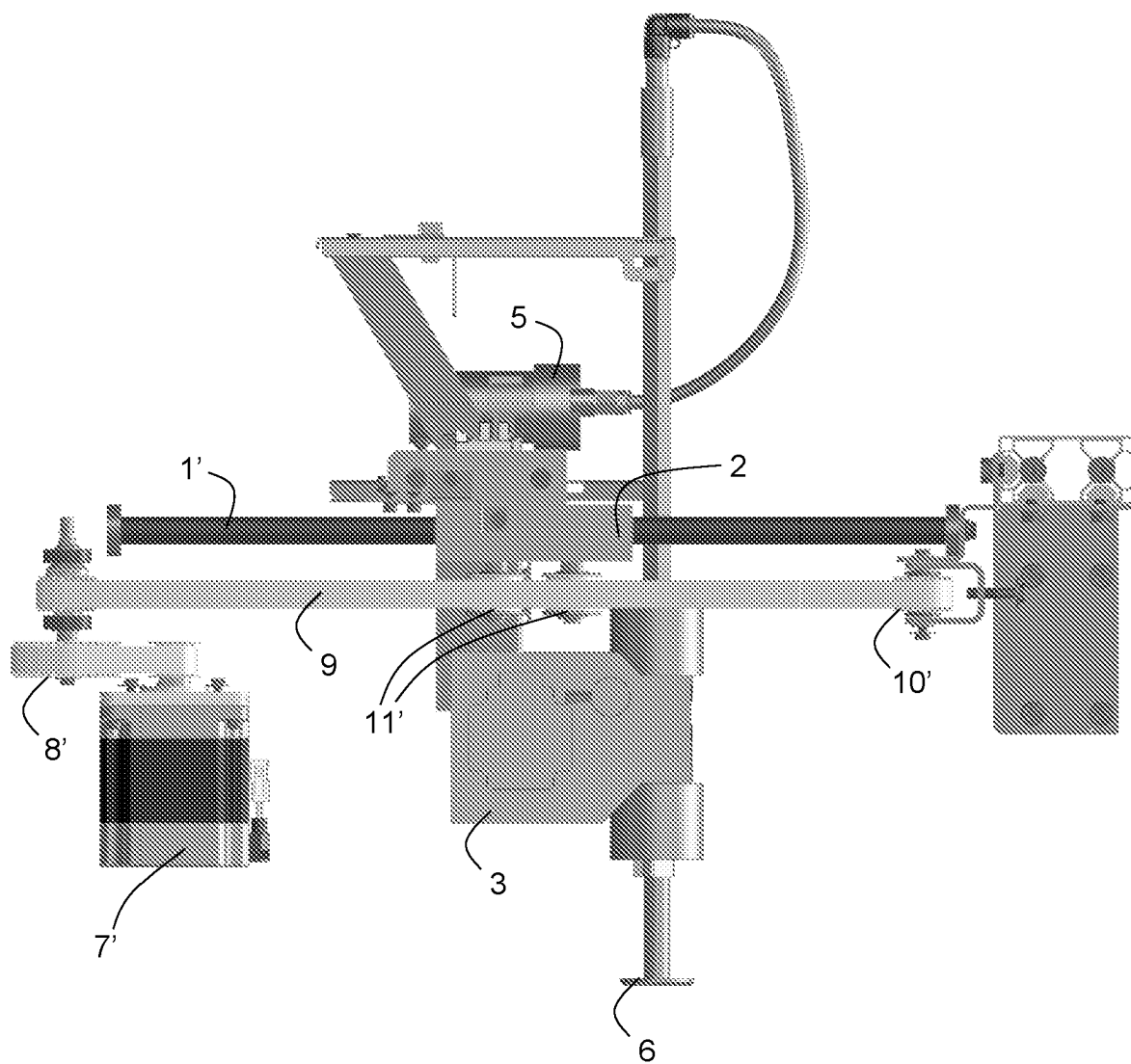


FIG.5

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 8907855 U1 [0003]
- DE 8907855 U [0006]