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(54) **Cardboard working machine**

Bearbeitungsmaschine für Pappe

Machine pour le travail du carton

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(73) Proprietor: **L.C.R. MACCHINE AUTOMATICHE S.R.L.**  
**40050 Castello d'Argile, BO (IT)**

(72) Inventor: **Lorenzoni, Remo**  
**40050 Castello d' Argile (BO) (IT)**

(74) Representative: **Negrini, Elena**  
**Agazzani & Associati S.r.l.**  
**Via dell'Angelo Custode 11/6**  
**40141 Bologna (IT)**

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**DE-A1- 19 620 391 US-A- 6 019 023**  
**US-A1- 2004 082 453 US-B1- 6 245 004**

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## Description

**[0001]** The present invention refers to apparatuses and machines fit for working of cardboard, or similar materials.

**[0002]** In particular the invention refers to a machine for cardboard working for producing blanks, i.e. for packs, having several characteristics and types, starting from cardboard in sheets, reams or tape.

**[0003]** Automatic machines are known for cardboard working which move sheets or tapes in order to execute a predetermined operation sequence on the same, i.e. for the production in series of a large amount of blanks of the same type.

**[0004]** Such machines can be predisposed and regulated in order to realize blanks of any type, but they demand operations of generally laborious and complex regulation and configuration, needing specialist staff and involve long stop periods for the machine and therefore the production interruption.

**[0005]** In order to execute each single working on the cardboard in transversal direction with respect to the motion of the same cardboard, as example of cutting or punching, such machines must arrest the movement of the cardboard lengthening the working times proportionally to the blank complexity. Moreover often, as an example, in the case of the production of articles and elements having different and particular shapes in limited number, the employment of traditional punching or cutting machines is not convenient because the different times of tooling, that is the predisposition of the tools necessary for working the sheets of cardboard blanks, for the different blanks, would be remarkably higher than the effective production time. In such cases it is preferable to use specialized operators, working by hand the cardboard sheets in order to obtain the desired blanks.

**[0006]** A disadvantage of such known machines consists in the fact that, stopping the cardboard in order to carry out each single transversal working, these machines are slow particularly in the realization of complex blanks.

**[0007]** Other disadvantage of the known, above mentioned, machines is the insufficient operating flexibility, due to the laborious and complex operations of regulation and configuration necessary in order to set such machines for the realization of blanks of different type.

**[0008]** Document US-A-6 019 023 discloses a machine for cardboard working provided with advancing means of the cardboard in a lengthwise direction and with a plurality of transversal translation means each fit to move in an almost transversal direction with respect to the cardboard motion, at least a mobile means having at least a tool means for the cardboard working; said machine comprises at least a longitudinal positioning means fit for adjustably moving and in longitudinal direction the at least one tool means: at least a tool means is connected to the corresponding mobile means at fixed transversal and longitudinal positions with respect to

such mobile means; each longitudinal positioning means comprises at least a translation arm for a tool means; each longitudinal positioning means comprises at least a motor means for at least a translation arm and a tool means; each translation arm (10) has a rack means (12) an end of which is fixed to a tool means (4, 5) and is engaged with a corresponding pinion (13) of the corresponding motor means (11).

**[0009]** An object of the present invention is to propose a machine for the cardboard working having elevated productive speed also in order to realize complex blanks. Another object is to propose a machine able to operate with cardboard in single sheets or sheets in continuous module or in continuous tape, limiting at minimum the material waste. Other object is to propose a machine for the realization of cardboard blanks of versatile and flexible them and fit for realize a wide range of blanks having different shapes and dimensions.

**[0010]** Said objects are obtained according to contents of the claims.

**[0011]** The characteristics of the present invention are evidenced in the following with particular reference to the attached drawings, in which:

- figure 1 illustrates a frontal, schematic and partial view of a transversal translation means associated with a transversal track of the machine for cardboard working object of the present invention;
- figure 2 illustrates an elevation view of the elements of the machine of figure 1;
- figure 3 illustrates a lateral view of the elements of figure 1 in which a couple of tool means are disposed at the maximum mutual distance and in which some parts have been removed in order to better evidence some others;
- figure 4 illustrates a lateral view of the elements of figure 1 in which a couple of tool means are at the minimal mutual distance and in which some parts have been removed in order to better evidence others;
- figure 5 illustrates a frontal schematic and partial view of a transversal translation means associated to a transversal track of first embodiment of the machine of figure 1;
- figure 6 illustrates an elevation view of the elements of the machine of figure 5;
- figure 7 illustrates a lateral view of the elements of figure 5 in which a couple of tool means are at the maximum mutual distance and in which some parts have been removed in order to better evidence some others;
- figure 8 illustrates a lateral view of the elements of figure 5 in which the couple of tool means is at the minimal mutual distance and in which some parts have been removed in order to better evidence others;
- figure 9 illustrates a frontal schematic and partial view of a transversal translation means associated

to a transversal track of a second embodiment of the machine of figure 1;

- figure 10 illustrates an elevation view of the elements of the machine of figure 9;
- figure 11 illustrates a lateral view of the elements of figure 9 in which two tool means are at the maximum mutual distance and in which some parts have been removed in order to better evidence others;
- figure 12 illustrates a lateral view of the elements of figure 9 in which the tool means are at the minimal mutual distance and in which some parts have been removed in order to better evidence others.

**[0012]** The figures from 1 to 5 illustrate a mobile means, indicated with reference 3, of the machine for cardboard working of the kind provided with advancing means of the same cardboard, for example undulated in sheets, ream or coil, in a lengthwise direction indicated with the arrow L.

**[0013]** Each mobile means 3 consist in a carriage moved along a transversal track means 17 by moving means, known and not illustrated, of transversal translation means 2.

**[0014]** The advancing means comprise, as an example, two rolls, at least one of which is motorized, horizontal and perpendicular to the lengthwise direction L, fit to find the opposite faces of the cardboard.

**[0015]** The machine comprises also a mobile means 3 each moved in transversal direction T, with respect to the cardboard motion, by transversal translation means 2.

**[0016]** Each mobile means 3 has five tool means 4, 5, 6 for cardboard working

**[0017]** The tool means 4, 5, 6 comprise, for example, cutting and/or creasing tools of discoidal shape and rotatable around their own axis, free or motorized.

**[0018]** Four of such tool means 4, 5 are connected to mobile means 3 through two longitudinal positioning means 7, 8 each destined to move, regularly and in longitudinal direction, two of such tool means 4, 5.

**[0019]** Each longitudinal positioning mean 7, 8 comprise two translation arms 10, each for a respective tool mean 4, 5 for creasing or cutting.

**[0020]** One of the tool means 6 is connected to respective mobile means 3 in fixed transversal and longitudinal positions with respect to the mobile means 3.

**[0021]** In particular the machine comprises one or more mobile means 3 each equipped with longitudinal positioning means 7 provided with two translation arms 10 for symmetrically moving the corresponding tool means 4 for creasing.

**[0022]** Furthermore each mobile means 3 comprises a further longitudinal positioning mean 7 provided with two translation arms 10 for symmetrically moving the corresponding tool means 5 for cutting.

**[0023]** As already seen, each mobile means 3 is provided with a tool means 6 placed in fixed longitudinal position with respect to the mobile means 3.

**[0024]** Each tool means 4, 5, 6 moves in perpendicular or tilted direction, with respect to the plan defined by the transversal and longitudinal directions, for the effect of the activation means 18 fit for putting said tool means in finding or removing condition of the cardboard.

**[0025]** Each activation means 18 comprises a pneumatic linear actuator provided with translation guides 16 destined to guarantee rectilinear translations, without rotations, to the tool means 4, 5, 6.

**[0026]** The actuators of activation means 18 are interposed between the mobile means 3 and each longitudinal positioning means 7, 8 and are interposed between the mobile means and the tool means fixed in transversal and longitudinal directions with respect to related mobile means 3.

**[0027]** The fixed tool means 6, is motorized and the remaining mobile means 4, 5 are free.

**[0028]** Each longitudinal positioning means 7, 8 comprises at least a motor means 11 provided with a pinion 13 engaged in two opposed rack means 12, of the two translation arms 10 protruding from the opposite sides of mobile means 3. At one end of each rack means 12, a respective tool means 4, 5 is fixed; in such a way the actuating of motor means 11 causes the longitudinal, opposed and symmetrical moving of the respective tool means 4, 5.

**[0029]** Each translation arm 10 comprises a guide 14 for the corresponding rack means 12. Such guides 14 are, as an example, of circulation spheres kind or similar, and are parallels and faced to the back of rack means 12 for their sliding support.

**[0030]** The tool means 6, fixed in fixed transversal and longitudinal positions with respect to its own mobile means 3, is equidistant from the two tool means 4, 5 of each longitudinal positioning means 7 of the same mobile means 3.

**[0031]** A possible operation of the machine provides that the advancing means stops the cardboard under mobile means in a predetermined longitudinal position.

**[0032]** In consequence of the actioning of the activation means 18 and the transversal translation of mobile means, the fixed tool means 6 separate two consecutive cardboard products, for example two packaging blanks, while the tool means 4, 5 downstream and upstream with respect to mobile means carry out the last two workings, for example, creasing and punching the side edges, of the blank carried out at exit and the first two of blank carried out at entry.

**[0033]** In such a way at least five contemporary workings are performed during a single stop of the cardboard.

**[0034]** In the machine of variant of figures from 5 to 8, each mobile means 3 is equipped with longitudinal positioning means 7 with two translation arms 10 for symmetrically moving the respective tool means 4, 5 for creasing or cutting and has a further longitudinal positioning means 8 provided with a single translation arm 10 for independently moving a corresponding tool means 4, 5 for cutting or creasing.

**[0035]** Moreover the mobile means is equipped with two tool means 6, almost aligned, placed in fixed longitudinal position with respect to the mobile means 3 and designed for separating two consecutive products carried out from the cardboard.

**[0036]** In the machine of the embodiment of figures from 9 to 12, each mobile means 3 has longitudinal positioning means 8 provided with a single translation arm 10 protruding from a side of the mobile means for moving a respective tool means 4, 5 for creasing or cutting.

**[0037]** Such mobile means comprises also a further longitudinal positioning means 8 having a single translation arm 10, protruding from the opposite side, for the independent moving of a corresponding tool means 4, 5 for cutting or creasing or similar. Moreover each mobile means are equipped with tool means 6 placed in fixed longitudinal position with respect to the same mobile means 3.

**[0038]** An advantage of the present invention is to supply a machine for the cardboard working having elevated productive speed also in the realization of complex blanks.

**[0039]** Another advantage is to supply a machine able to operate with cardboard in single sheets or sheets in module or in continuous tape, limiting at minimum the material waste.

**[0040]** A further advantage is to supply a machine for making cardboard blanks that are versatile and flexible and able to realize a wide range of blanks having different shapes and dimensions.

**[0041]** Another advantage is to supply a machine without requiring pauses and manual operations in order to predispose the tools in the passage from the production of a blank to another blank.

## Claims

1. Machine for cardboard working provided with advancing means of the cardboard in a lengthwise direction (L) and with a plurality of transversal translation means (2) each fit to move, in an almost transversal direction (T) with respect to the cardboard motion, at least a mobile means (3) having at least a tool means (4, 5, 6) for the cardboard working; said machine comprises at least a longitudinal positioning means (7, 8) fit for adjustably moving and in longitudinal direction at least one tool means (4, 5); at least a tool means (6) is connected to the corresponding mobile means (3) at fixed transversal and longitudinal positions with respect to such mobile means (3); each longitudinal positioning means (7, 8) comprises at least a translation arm (10) for a second tool means (4, 5) and at least a motor means (11) for the at least one translation arm (10) and the second tool means (4, 5); each translation arm (10) has a rack means (12) an end of which is fixed to a tool means (4, 5) and is engaged with a corresponding pinion

(13) of the corresponding motor means (11); said machine being **characterized in that** at least a longitudinal positioning means (7) comprises two translation arms (10), protruding from opposite sides of the mobile means (3), whose rack means (12) are engaged with the corresponding pinion (13) of the corresponding motor means (11) for the symmetrical moving of the corresponding second tool means (4, 5).

2. Machine according to claim 1 **characterized in that** at least one longitudinal positioning means (7, 8) is connected to the mobile means (3) of the at least one tool means (4, 5).

3. Machine according to claim 1 **characterized in that** comprises at least an activation means (18) of the at least one tool means (4, 5, 6) and destined to move such at least tool means (4, 5, 6) in direction tilted or perpendicular to the plan defined by the transversal and longitudinal directions, for putting it in finding or removal conditions from the cardboard.

4. Machine according to claim 1 **characterized in that** the tool means (4, 5, 6) comprises creasing and/or cutting tools.

5. Machine according to claim 4 **characterized in that** the tool means (4, 5, 6) are discoidal shaped and rotatable around its own axis, free and/or motorized.

6. Machine according to claim 5 **characterized in that** the tool means (6) fixed in transversal and longitudinal directions with respect to its own mobile means (3), is motorized and the remaining mobile tool means (4, 5) are free.

7. Machine according to claim 1 **characterized in that** at least longitudinal positioning means (8) comprises a single translation arm (10), protruding from a side of mobile means (3), for the independent moving of the respective tool means (4, 5).

8. Machine according to claim 1 **characterized in that** each translation arm (10) comprises a guide (14) for each respective rack means (12).

9. Machine according to claim 8 **characterize in that** the guides (14) are of sphere circulation type or similar, are parallel and faced to rack means (12) and destined to slidingly support these latter.

10. Machine according to claim 3 **characterized in that** each activation means (18) comprises at least a linear actuator.

11. Machine according to claim 10 **characterized in that** each linear actuator comprises translation

guides (16).

12. Machine according to claim 10 **characterized in that** at least a linear actuator is pneumatic or electrical.
13. Machine according to claim 3 **characterized in that** at least one of the longitudinal positioning means (7, 8) is connected to mobile means (3) through corresponding activation means (18).
14. Machine according to claim 3 **characterized in that** at least one of tool means (6) connected in fixed transversal and longitudinal positions with respect to corresponding mobile means (3) is connected to such mobile means (3) through a corresponding activation means (18).
15. Machine according to any preceding claims **characterized in that** each mobile means (3) consists in a kind of carriage moved by moving means of the transversal translation means (2) along a transversal track mean (17).

#### Patentansprüche

1. Maschine zur Pappkartonbearbeitung, die mit Vorschubmitteln für den Pappkarton in einer längsgerichteten Richtung (L) sowie mit einer Mehrzahl von Quertranslationsmitteln (2) bereitgestellt ist, die jeweils angepasst sind, sich in einer nahezu transversalen Richtung (T) in Bezug auf die Pappkartonbewegung zu bewegen, mindestens ein mobiles Mittel (3), das mindestens ein Werkzeugmittel (4, 5, 6) für die Pappkartonbearbeitung aufweist, während die Maschine mindestens ein Längspositioniermittel (7, 8), das zum einstellbaren Bewegen angepasst ist, sowie in Längsrichtung mindestens ein Werkzeugmittel (4, 5) umfasst, während mindestens ein Werkzeugmittel (6) mit dem entsprechenden mobilen Mittel (3) bei festen Quer- und Längspositionen in Bezug auf diese mobilen Mittel (3) verbunden ist, wobei jedes Längspositioniermittel (7, 8) mindestens einen Translationsarm (10) für ein zweites Werkzeugmittel (4, 5) und mindestens ein Motormittel (11) für den mindestens einen Translationsarm (10) und das zweite Werkzeugmittel (4, 5) aufweist, während jeder Translationsarm (10) ein Gestellmittel (12) aufweist, von dem ein Ende an einem Werkzeugmittel (4, 5) befestigt ist und mit einem entsprechenden Ritzel (13) des entsprechenden Motormittels (11) in Eingriff steht, die Maschine ist **dadurch gekennzeichnet, dass** mindestens ein Längspositioniermittel (7) zwei Translationsarme (10) umfasst, die sich von entgegengesetzten Seiten des mobilen Mittels (3) erstrecken, deren Gestellmittel (12) mit dem entsprechenden Ritzel (13) des entsprechenden

Motormittels (11) für die symmetrische Bewegung der entsprechenden zweiten Werkzeugmittel (4, 5) in Eingriff stehen.

- 5 2. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** mindestens ein Längspositioniermittel (7, 8) mit dem mobilen Mittel (3) des mindestens einen Werkzeugmittels (4, 5) verbunden ist.
- 10 3. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie mindestens ein Aktivierungsmittel (18) des mindestens einen Werkzeugmittels (4, 5, 6) umfasst und vorgesehen ist, um das mindestens eine Werkzeugmittel (4, 5, 6) in Richtung schräg oder rechtwinklig zu der Ebene zu bewegen, die durch die Quer- oder Längsrichtungen definiert ist, um es in Finde- oder Entfernzustände von dem Pappkarton zu bringen.
- 15 4. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Werkzeugmittel (4, 5, 6) Fall- und/oder Schneidwerkzeuge umfassen.
- 20 5. Maschine gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Werkzeugmittel (4, 5, 6) scheibenförmig sind und frei und/oder motorisiert um ihre eigene Achse drehbar sind.
- 25 6. Maschine gemäß Anspruch 5, **dadurch gekennzeichnet, dass** das Werkzeugmittel (6) in Quer- und Längsrichtungen in Bezug auf seine eigenen mobilen Mittel (3) fest ist, motorisiert ist und die übrigen mobilen Werkzeugmittel (4, 5) frei sind.
- 30 7. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** mindestens das Längspositioniermittel (8) einen einzelnen Translationsarm (10) umfasst, der sich für die unabhängige Bewegung des entsprechenden Werkzeugmittels (4, 5) von einer Seite des mobilen Mittels (3) erstreckt.
- 35 8. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** jeder Translationsarm (10) eine Führung (14) für jedes entsprechende Gestellmittel (12) umfasst.
- 40 9. Maschine gemäß Anspruch 8, **dadurch gekennzeichnet, dass** die Führungen (14) vom Sphärenumlaufertyp oder ähnlichem sind, parallel und den Gestellmitteln (12) zugewandt sind sowie bestimmt sind, um diese letzteren gleitend zu unterstützen.
- 45 10. Maschine gemäß Anspruch 3, **dadurch gekennzeichnet, dass** jedes Aktivierungsmittel (18) mindestens einen linearen Aktuator umfasst.
- 50 11. Maschine gemäß Anspruch 10, **dadurch gekennzeichnet, dass** jeder lineare Aktuator Translations-

führungen (16) umfasst.

12. Maschine gemäß Anspruch 10, **dadurch gekennzeichnet, dass** mindestens ein linearer Aktuator pneumatisch oder elektrisch ist.
13. Maschine gemäß Anspruch 3, **dadurch gekennzeichnet, dass** mindestens eines der Längspositioniermittel (7, 8) mit den mobilen Mitteln (3) durch entsprechende Aktivierungsmittel (18) verbunden ist.
14. Maschine gemäß Anspruch 3, **dadurch gekennzeichnet, dass** mindestens eines Werkzeugmittel (6), das in festen Quer- und Längspositionen in Bezug auf entsprechende mobile Mittel (3) verbunden ist, mit dem mobilen Mitteln (3) durch ein entsprechendes Aktivierungsmittel (18) verbunden ist.
15. Maschine gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jedes mobile Mittel (3) aus einer Art von Träger besteht, der mittels Bewegungsmitteln der Quertranslationsmittel (2) entlang eines Querführungsmittels (17) bewegt wird.

#### Revendications

1. Machine pour le travail du carton, munie d'un moyen d'avancée du carton dans une direction longitudinale (L) et d'une pluralité de moyens (2) de translation transversaux convenant respectivement pour déplacer, dans une direction presque transversale (T) par rapport au mouvement du carton, au moins un moyen mobile (3) possédant au moins un outil (4, 5, 6) pour le travail du carton ; ladite machine comprend au moins un moyen de positionnement longitudinal (7, 8) convenant pour déplacer de manière ajustable et dans une direction longitudinale au moins un outil (4, 5) ; au moins un outil (6) est relié au moyen mobile (3) correspondant au niveau de positions transversales et longitudinales fixes par rapport audit moyen mobile (3) ; chacun des moyens de positionnement longitudinal (7, 8) comprend au moins un bras de translation (10) pour un second outil (4, 5) et au moins un moyen moteur (11) pour le au moins un bras de translation (10) et le second outil (4, 5) ; chaque bras de translation (10) possède un dispositif à crémaillère (12) dont une extrémité est fixée à un outil (4, 5) et engrène avec un pignon (13) correspondant du moyen moteur (11) correspondant ; ladite machine étant **caractérisée en ce qu'**au moins un moyen de positionnement longitudinal (7) comprend deux bras de translation (10), faisant saillie à partir de côtés opposés du moyen mobile (3), dont les dispositifs à crémaillère (12) engrènent avec le pignon (13) correspondant du moyen moteur (11)

correspondant pour le déplacement symétrique du second outil (4, 5) correspondant.

2. Machine selon la revendication 1, **caractérisée en ce qu'**au moins un moyen de positionnement longitudinal (7, 8) est relié au moyen mobile (3) du au moins un outil (4, 5).
3. Machine selon la revendication 1, **caractérisée en ce qu'**elle comprend au moins un moyen d'activation (18) du au moins un outil (4, 5, 6) et est destinée à déplacer un tel au moins un outil (4, 5, 6) dans une direction inclinée ou perpendiculaire au plan défini par les directions transversales et longitudinales, pour le placer dans des conditions de rencontre ou de retrait par rapport au carton.
4. Machine selon la revendication 1, **caractérisée en ce que** l'outil (4, 5, 6) comprend des outils de gaufrage et/ou de coupe.
5. Machine selon la revendication 4, **caractérisée en ce que** l'outil (4, 5, 6) est de forme discoïdale et tourne autour de son propre axe, de manière libre et/ou motorisée.
6. Machine selon la revendication 5, **caractérisée en ce que** l'outil (6), fixe dans des directions transversales et longitudinales par rapport à son propre moyen mobile (3), est motorisé et les outils mobiles (4, 5) restants sont libres.
7. Machine selon la revendication 1, **caractérisée en ce qu'**au moins un moyen de positionnement longitudinal (8) comprend un bras de translation unique (10), faisant saillie à partir d'un côté du moyen mobile (3), pour le déplacement indépendant des outils (4, 5) respectifs.
8. Machine selon la revendication 1, **caractérisée en ce que** chaque bras de translation (10) comprend un guide (14) pour chacun des dispositifs à crémaillère (12) respectifs.
9. Machine selon la revendication 8, **caractérisée en ce que** les guides (14) sont du type à circulation sphérique ou similaire, sont parallèles et font face aux dispositifs à crémaillère (12) et sont destinés à supporter de manière coulissante ces derniers.
10. Machine selon la revendication 3, **caractérisée en ce que** chacun des moyens d'activation (18) comprend au moyen un actionneur linéaire.
11. Machine selon la revendication 10, **caractérisée en ce que** chaque actionneur linéaire comprend des guides de translation (16).

12. Machine selon la revendication 10, **caractérisée en ce qu'**au moins un actionneur linéaire est pneumatique ou électrique.
13. Machine selon la revendication 3, **caractérisée en ce qu'**au moins un des moyens de positionnement longitudinal (7, 8) est relié au moyen mobile (3) par l'intermédiaire de moyens d'activation (18) correspondants.
14. Machine selon la revendication 3, **caractérisée en ce qu'**au moins un des outils (6) est relié, au niveau de positions transversales et longitudinales fixes par rapport au moyen mobile (3) correspondant, un tel moyen mobile (3) par l'intermédiaire de moyens d'activation (18) correspondants.
15. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chacun des moyens mobiles (3) consiste en un type de chariot déplacé par des moyens de déplacement des moyens de translation transversale (2) le long d'un rail transversal (7).

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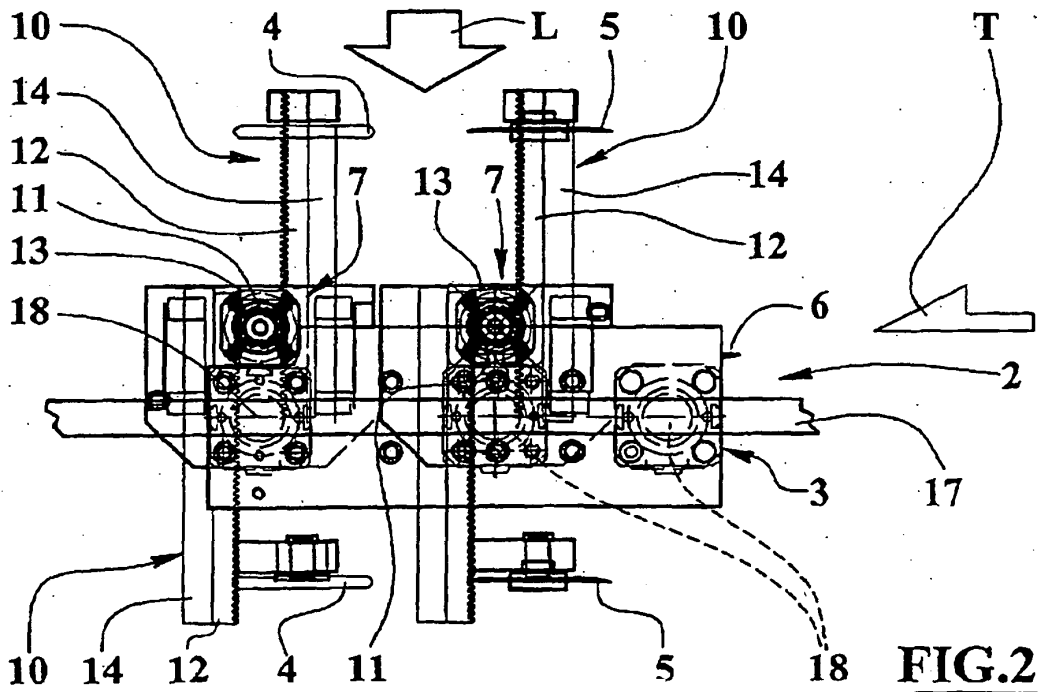
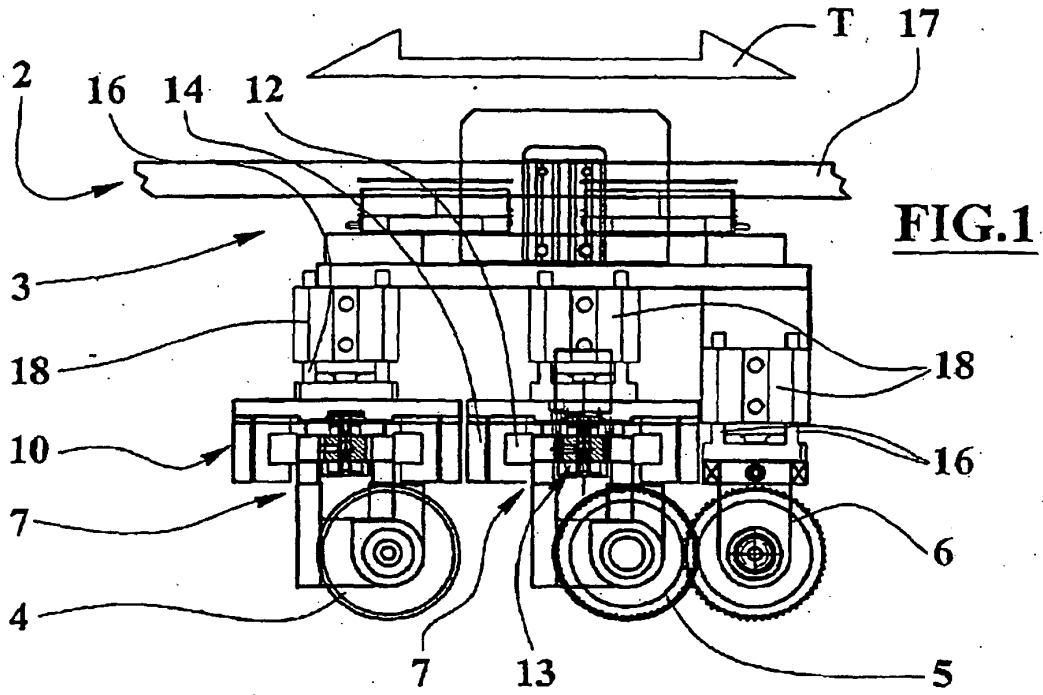
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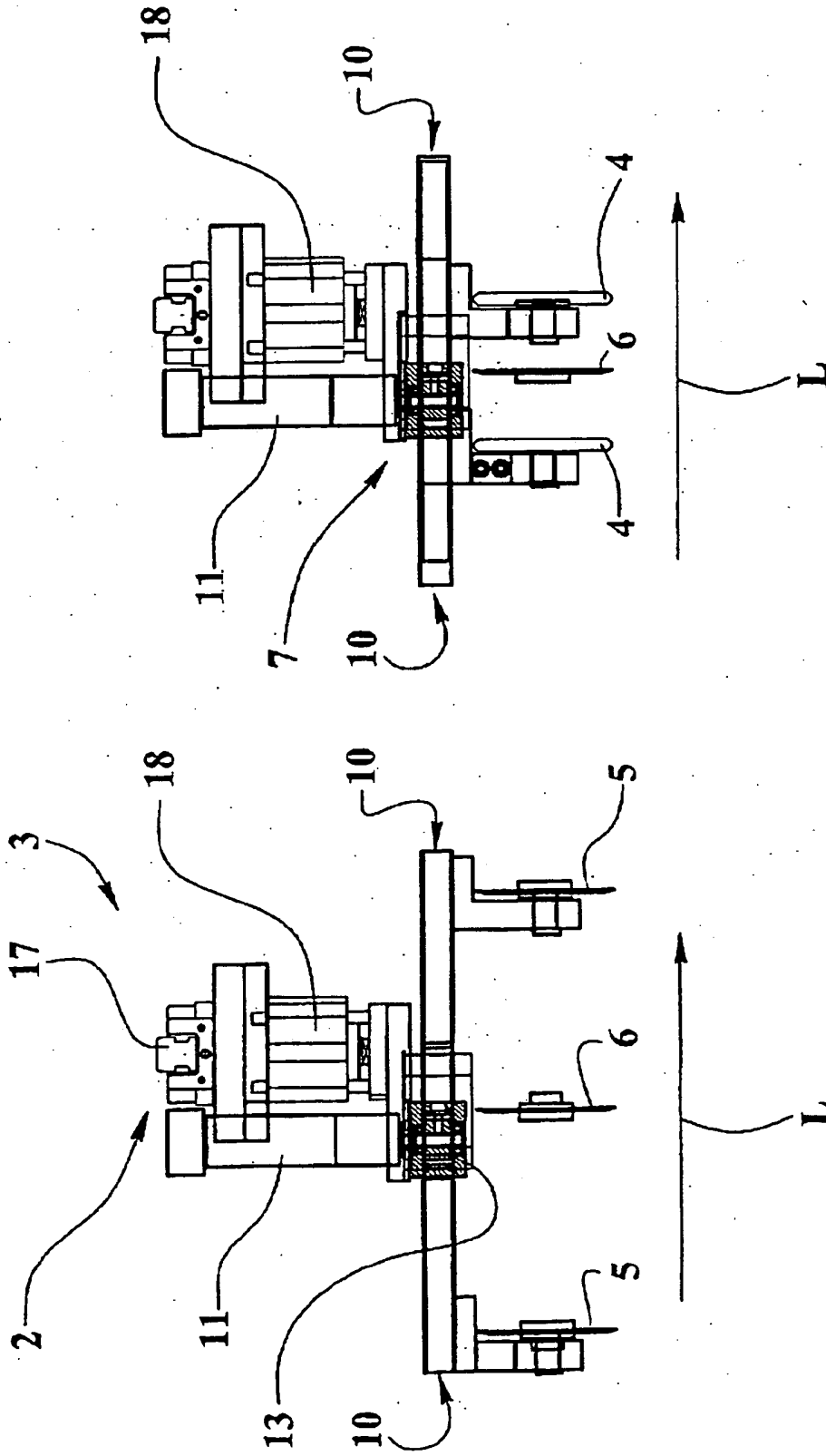
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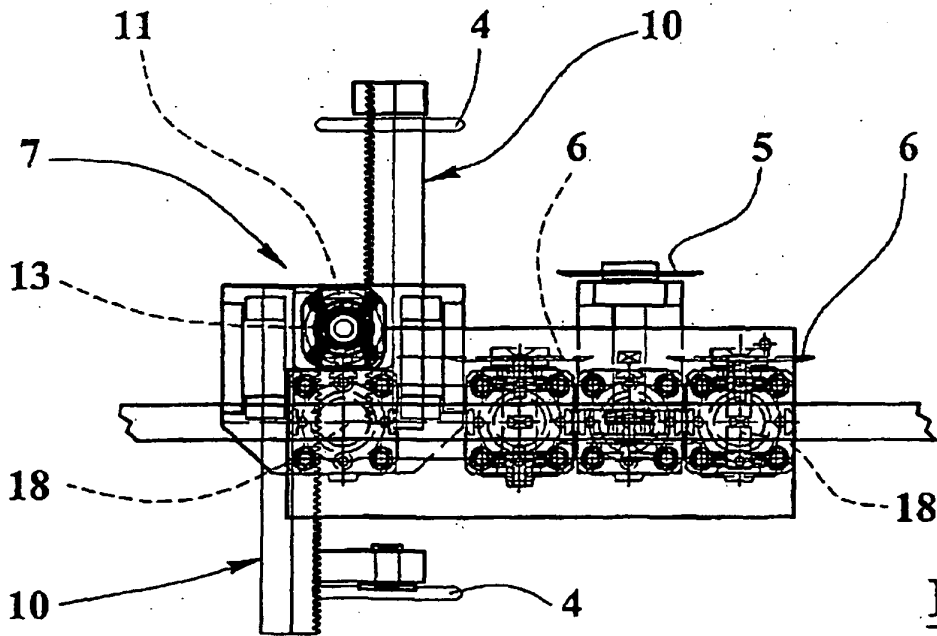
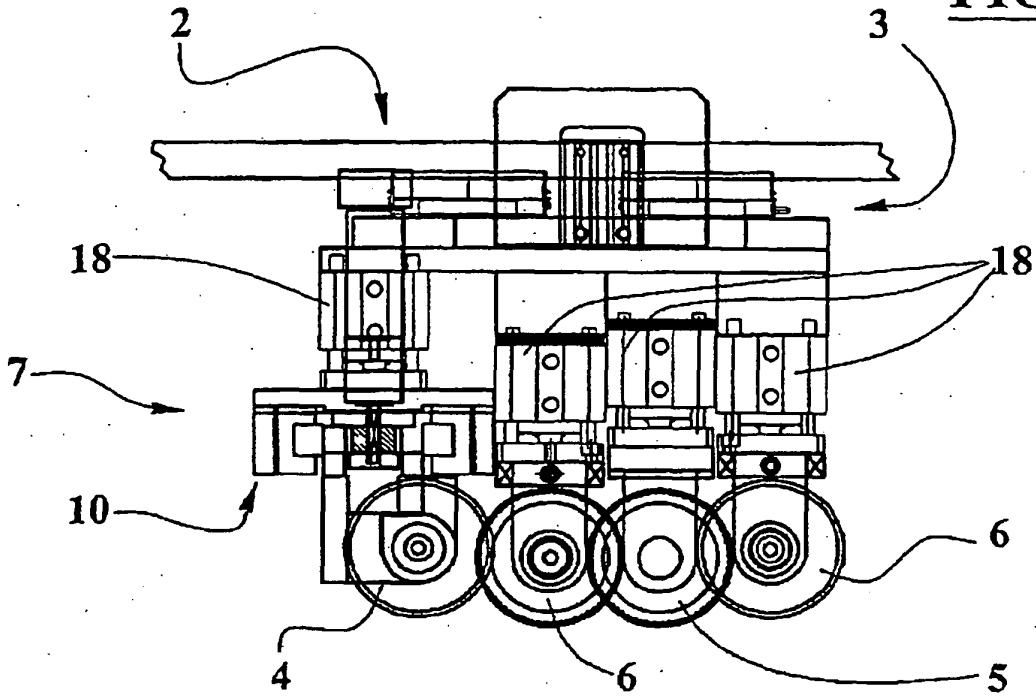




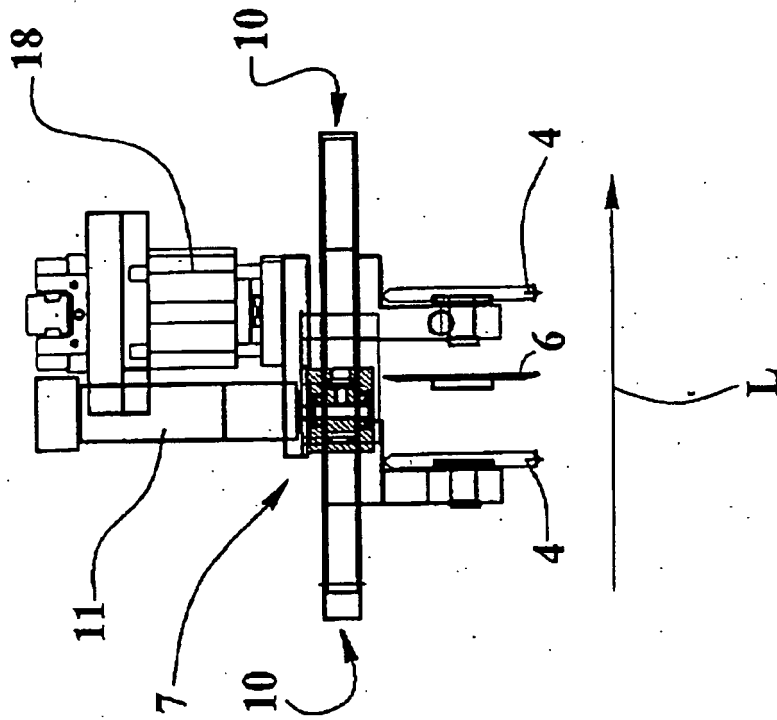
**FIG. 4**

**FIG. 3**

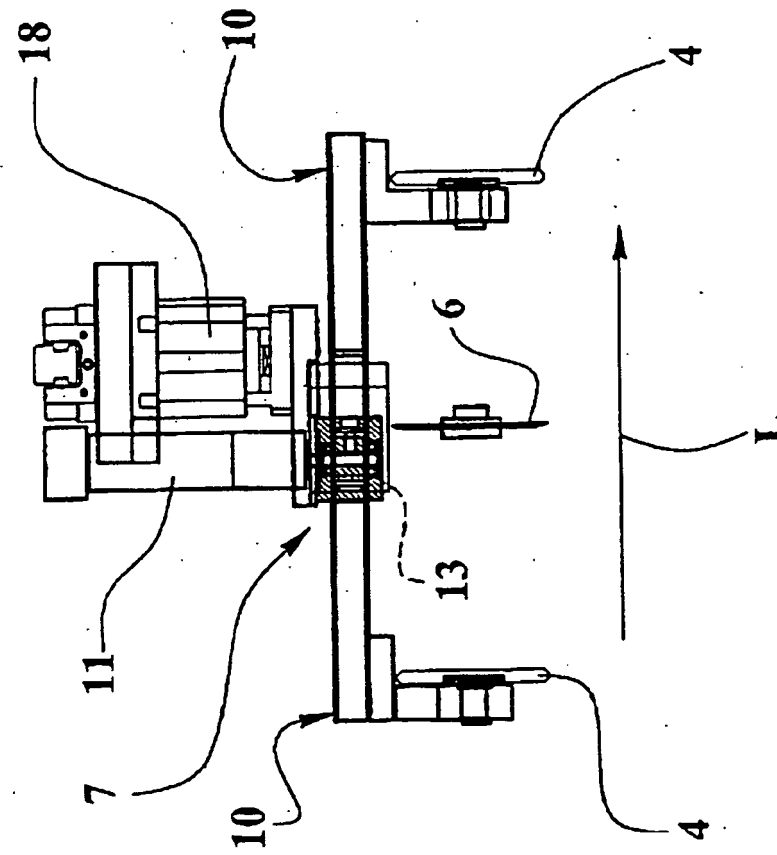
**FIG.5**



**FIG.6**

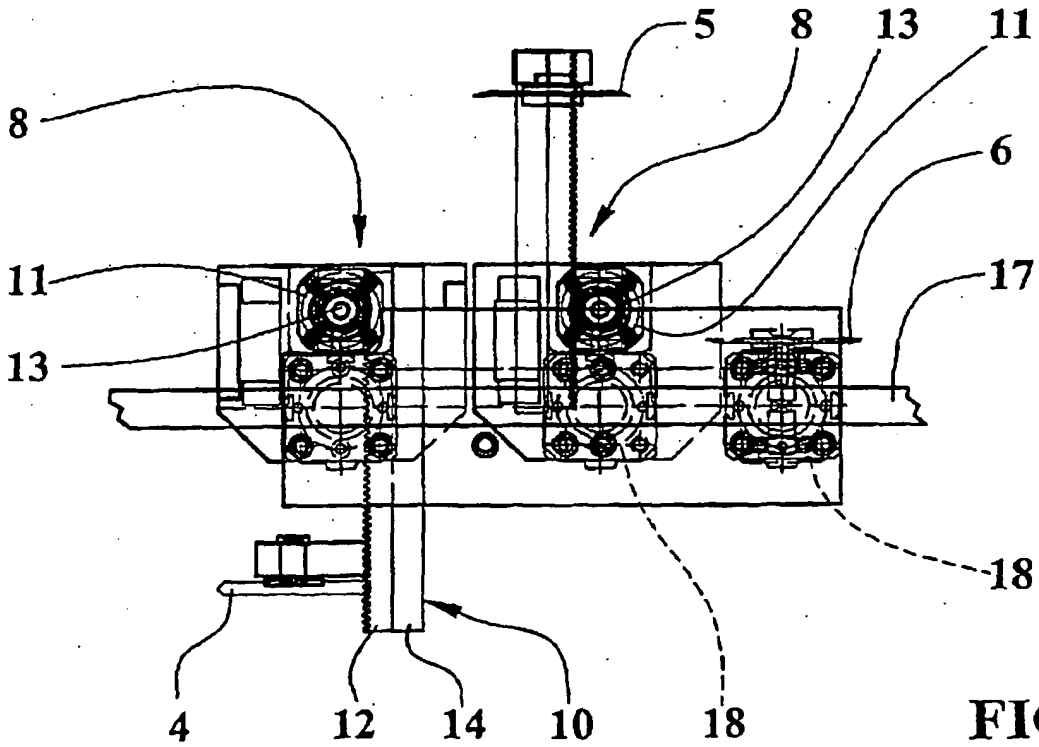
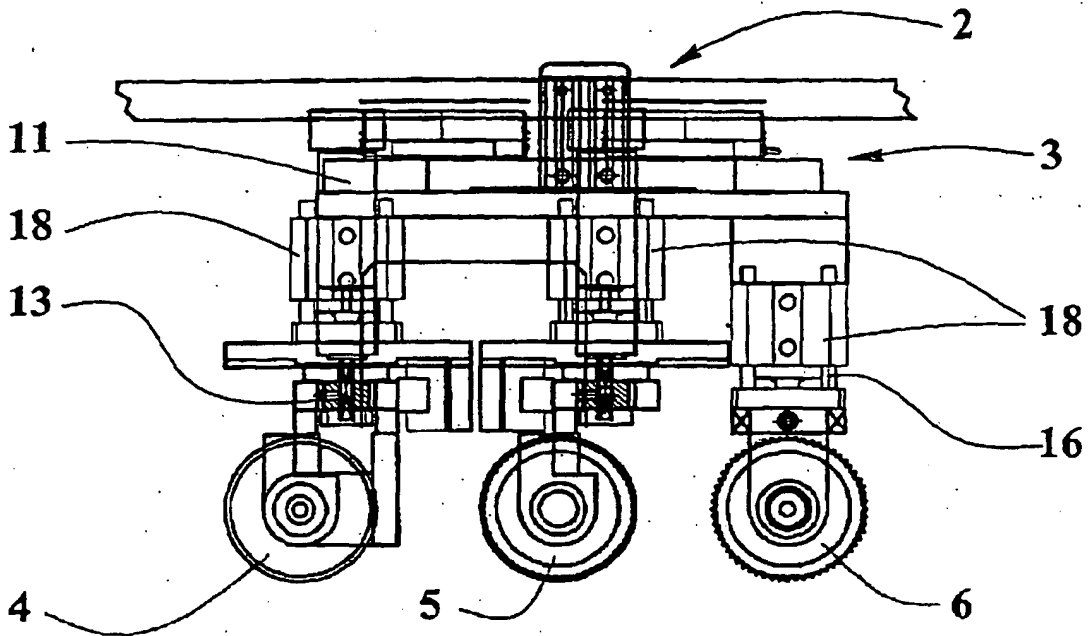


**FIG.7**



**FIG.8**

**FIG.9**



**FIG.10**

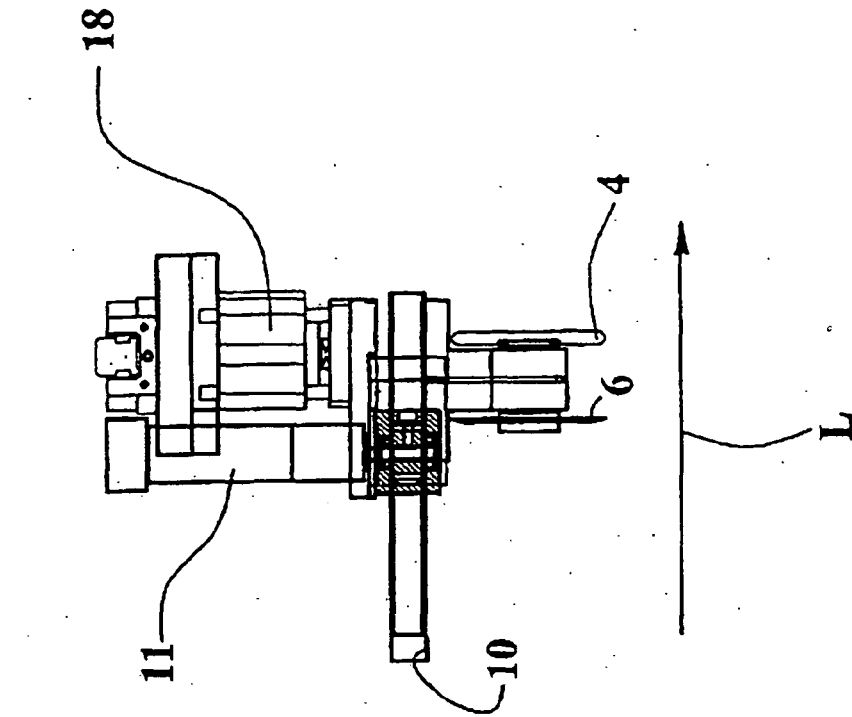


FIG.11

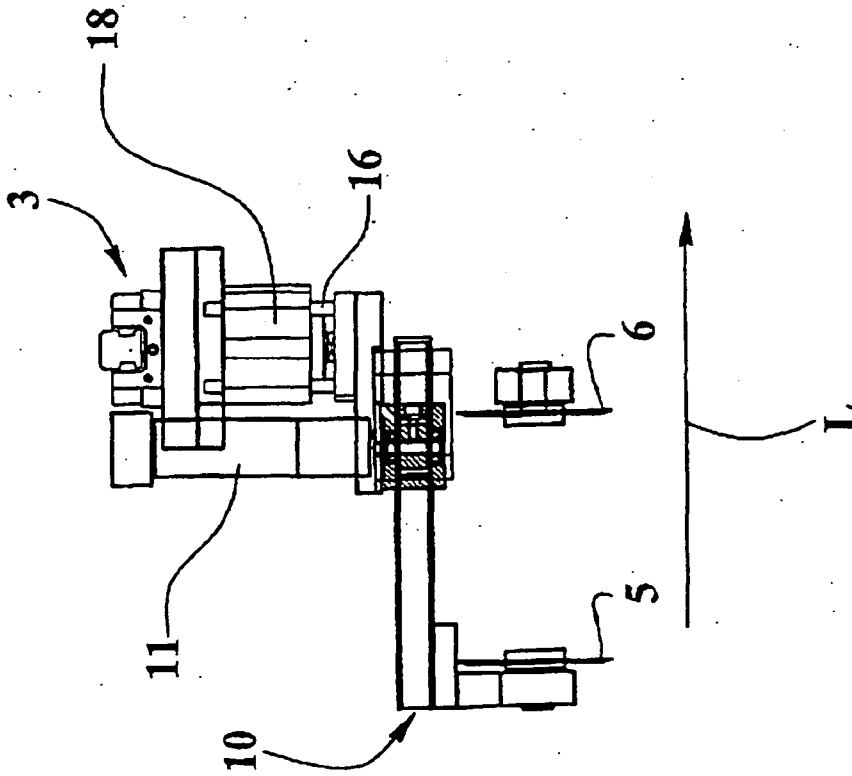


FIG.12

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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