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(54) **A device for positioning a protecting element for at a corner of stack of tiles to be packed**

Vorrichtung zur Positionierung eines Schutzelementes an einer Ecke eines Stapels von zu
verpackenden Fliesen

Dispositif de positionnement d'un élément de protection destiné à un coin de pile de carreaux devant
être emballé

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(73) Proprietor: **Nuova Sima S.p.A.
40026 Imola (BO) (IT)**

(72) Inventor: **Bardi, Maurizio
41043 Formigine (MO) (IT)**

(74) Representative: **Dall'Olio, Christian et al
INVENTION S.r.l.
Via delle Armi, 1
40137 Bologna (IT)**

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Description

[0001] The present invention relates to the technical sector concerning production and packing of tiles, for example tiles made of a ceramic material.

[0002] In particular, the invention relates to a device usable for the application and the positioning of a protecting element ("corner piece") at a corner, for example an upper corner, of a stack of tiles, before the stack of tiles is packed inside a relative packaging or cardboard pack.

[0003] Usually the tiles, once the production cycle thereof has been completed, are compacted and stacked one above the other to form a series of stacks of tiles; each of the stack thus-formed is then destined to be conveyed towards the station responsible for the packing thereof in cardboard packs or plastic stretch or heat-shrinking material.

[0004] In this regard, the stacks of tiles are arranged, spaced apart from each other, above a conveyor line, for example constituted by a conveyor belt or by a pair of looped straps, which is activated intermittently to convey the stacks, one after the other, to the packing station.

[0005] The line is activated intermittently, that is, in a stepped fashion, such that at each pause the stack of tiles that has reached the packing station can be subjected to the packing/packaging operations.

[0006] At present, before packaging and with the aim of protecting the tiles from breakage once packed, and preventing damage thereto during the pack/package storing operations, during transport to the final destination thereof and during loading/unloading operations, a specially-deputed operative manually positions protecting elements (corner pieces) at each of the upper corners of the stack of tiles. This operation is done when a stack of tiles is halted along the conveyor line.

[0007] The "corner pieces" are elements having an angular shape, being an L-shape, for example made of plastic or cardboard, provided between the two wings of the "L" with a sort of a lip or small wall that is destined to rest on the top tile of the stack of tiles when the two wings of the "corner piece" are placed in contact against the side walls of the stack of tiles.

[0008] The corner pieces are then incorporated together with the stack of tiles inside the packing/packaging of cardboard or stretch plastic or heat-shrink plastic, remaining "trapped" between the cardboard and the stack of tiles, giving the final package an increase in resistance to shocks exactly at the edges which are at greatest risk of collisions, impacts, etc.

[0009] Clearly the use of the manual-type operations by a suitable operative for the application and positioning of the "edge protection" is not optimal in relation to the automatic or semi-automatic modes with which other production line operations are carried out, such as stacking, packing, etc.

[0010] Document US 5.564.254 discloses an apparatus for positioning a protecting element at a corner of a

stack of tiles to be packed according to the preamble of claim 1.

[0011] Therefore, the aim of the present invention is to disclose a device for positioning a protecting element ("corner piece") at an edge of a stack of tiles, before the stack of tiles is packaged inside a relative pack or packaging made of cardboard or stretch plastic or heat-shrinking plastic.

[0012] A particular aim of the present invention is to provide a device which can, in a totally automatic way, collect the protecting elements from a respective storage location and position them at the edges of a stack of tiles resting on a relative conveying line used for the transfer of the tile stack towards a packaging station.

[0013] This aim is attained by a device for the positioning of protecting elements ("corner pieces") at the edges of a stack of tiles in accordance with the contents of claim 1.

[0014] Further advantageous features of the device that is the object of the present invention are set down in the various claims dependent upon claim 1.

[0015] The characteristics of the device for positioning of the protecting elements on the corners of a stack of tiles and the characteristics of the store for containing the protecting elements, provided with the present invention, are shown in the following description, made with reference to the accompanying drawings in which:

figures 1A, 1B, 1C, 1D are perspective views of the device of the present invention in its entirety, according to a possible embodiment and in different and successive operating steps of collecting a protecting element from a vertically-disposed store and a subsequent positioning and release of the protecting element at a corner, for example an upper corner, of a stack of tiles paused on a conveyor line (stack of tiles and conveyor line visible only in figure 1D for reasons of clarity);

figures 2A, 2B, 2C, 2D illustrate lateral views of the device of the present invention in different operational phases of figures 1A, 1B, 1C, 1D;

figures 3A, 3B are lateral views of two further possible preferred embodiments of the device object of the present, where only some significant components of these two further embodiments are illustrated; these embodiments can be used for example in the case of removal of protecting elements from a horizontally-arranged store;

figures 4A, 4B, 4C, 4D are schematic lateral views of the various possible operating phases of the transfer of a protecting element from the horizontal store to the edge of a stack of tiles in the case of two embodiments of figures 3A, 3B;

figure 5 shows a perspective view of the store for

containing the protecting elements of the present invention, usable with the device of the previous figures;

figure 6 shows a second plan view of the store according to figure 5, while figure 7 shows the view according to section A-A of figure 6;

figure 8 shows the use of a system for the application and positioning of protecting elements at edges of a stack of tiles stationed along a conveyor line, the system comprising four operating groups each of which is given by combination of the device and of the store of the preceding figures in the case where the tiles to be packed exhibit a quadrilateral shape, i.e. with four edges.

[0016] With reference to the figures reference (D) denotes the device for positioning a protecting element (S) at a corner of a stack (P) of tiles to be packed. As illustrated for example in figure 1D, or for example in figures 2A to 2D, or in figures 4A to 4D, the stack (P) of the tiles is positioned on a conveyor line (L) (for example a belt or a pair of belts or closed-loop chains) which can be operated intermittently to convey the stack (P) of tiles to a packing station (not shown) in which the stack of tiles is to be packaged in a pack made of cardboard, stretch plastic or heat-shrinking plastic.

[0017] Before the stack (P) of tiles reaches the packing station, and during a pause in the advancement of the conveyor line (W), the device (D) of the present invention will apply a protecting element (S) at an edge of the stack (see for example figure 4D).

[0018] In the accompanying figures preferred but not exclusive embodiments of the device (D) of the present invention are illustrated, used for positioning the protecting element (S) at for example the top corner of the stack of tiles. The device can also be used to position the protecting element at a lower corner of the stack of tiles, simply by adjusting the position thereof with respect to the position of the stack of tiles arranged on the conveyor line (L).

[0019] The protecting element (S) to be positioned on the corner of the stack of tiles by the device (D) according to the present is contained in a store (M) which is located laterally to the conveyor line (L) of the stacks of tiles, and can be arranged vertically (as for example shown in figures 1A to 1D and 2A to 2D), or horizontally (as for example shown in figures 3A, 3B and 4A to 4D).

[0020] The store (M) that contains the protecting elements (S) can also be arranged according to different orientations, and not necessarily in a horizontal or vertical arrangement as in the accompanying figures.

[0021] In cases where the tiles exhibit a quadrangular shape (for example rectangular or square), as shown for example in the accompanying figures, four corresponding devices for the application of the protecting elements will be used, one on each of the four corners.

[0022] The device (D) provided by the present invention comprises a frame (1), which is positioned at the side of the conveying line (L), between the line (L) and the store (M) in a position corresponding to a pause position of a stack (P) of tiles along the line (L) during the stepped advancing; pick-up means (2) which are activated to grip a protecting element (S) and deactivated for the subsequent release of the protecting element (S); and a support element (3), for supporting the pick-up means (2), the support element (3) being constrained rotatably to the frame (1).

[0023] The device further comprises actuator means (4, 41, 42) for alternately rotating the support element (3) with respect to the frame (1) between a first position (Z1), in which the pick-up means (2) are facing towards the store (M), such as to enable activation of the pick-up means (2) for picking up a protecting element (S) (see for example figure 1A, 2A, 4A), and a second position (Z2), in which the pick-up means (2) are facing towards a corner of the stack (P) of tiles paused on the line (L), in order to enable deactivation of the pick-up means (2) such as to release the protecting element (S) at the corner (see for example figure 1D, 2D, 4C).

[0024] In particular, the actuator means (4, 41, 42) are activatable such as to set the support element (3) in rotation such as to bring and position the pick-up means (2) into the first position (Z1) facing towards the store (M), in order to enable activation of the pick-up means (2) for gripping a protecting element (S), and the actuator means (4, 41, 42), after the protecting element (S) has been picked up by the pick-up means (2), are also activatable to set in rotation the support element (3) such as to bring and position the pick-up means (2) in the second position (Z2) facing towards a corner of the stack (P) of tiles paused on the line (L), in order to enable deactivation of the pick-up means (2) for the release of the protecting element (S) at the corner.

[0025] In this way, when a stack of tiles (P) reaches the device, and during a pause in the advancement of the line (L), the pick-up means (2) can be positioned facing towards the store (M) and activated to pick up a protecting element (S) and then brought, following the rotation of the support element (3) by the actuator means (4, 41, 42), to a position facing towards a corner of the stack (P) of tiles for the release of the protecting element (S) at the corner and following deactivation thereof.

[0026] According to the position of the frame (1) and therefore the support element (3) and the pick-up means (2) borne thereby, with respect to the store (M) and the height of the stack (P) of tiles, on the conveyor line (L), the pick-up means (2) can preferably be translatable alternately with respect to the support element (3) such as to near/distance from the store and the stack of tiles.

[0027] The possibility that the gripping means (2) can be translatable with respect to the support element (3) is also particularly useful and advantageous for extracting the protecting element from the store (M), disengaging it from another higher protecting element present in the

store (M), when the store is arranged vertically, for example, or by a further protecting element flanked thereto, when for example the store is horizontally positioned.

[0028] As shown in the figures, the protecting elements (S) to be applied on the corners of the stacks of tiles are accumulated stacked on one another, or flanked to one another, internally of the store (M).

[0029] In this regard, the device (D) comprises an actuator element (23) for setting the pick-up means (2) in alternating translation with respect to the support element (3).

[0030] The actuator element (23), when the pick-up means (2) are positioned in the first position (Z1) facing towards the store (M), is activatable to translate the pick-up means (2) towards the store (M) in order to enable picking up the lowest (or first) protecting element (S) from the stack of pick-up elements present in the store (M), following activation of the pick-up means (2), and thereafter is activatable such as to translate the pick-up means (2) distantly from the store (M) such as to extract the protecting element (S) from the stack and thereafter extract it from the store (M) (see for example figures 1B, 1C and figures 2B, 2C and 4B).

[0031] Further, and preferably, the actuator element (23), following rotation of the support element (3) with which rotation (3) the pick-up means (2), with the protecting element (S) supported thereby, are positioned in the second position (Z2) facing towards a corner of the stack (P) of tiles, is also activatable such as to translate the pick-up means (2) towards the corner such as to enable release of the protecting element (S) on the corner following deactivation of the pick-up means (2) (see for example figures 2D, 4D).

[0032] According to various preferred though not-exclusive embodiments of the device (D), illustrated in the various appended figures, the gripping means (2) can comprise, for example, a plate (21) and at least a sucker means (V) borne by the plate (21) and connectable to a source of depression, while the support element (3) comprises a jacket (31) and two guide stems (22) freely slidable in the jacket (31) and constrained to the plate (21).

[0033] In further possible embodiments, not illustrated, the pick-up means (2), in the place of the sucker pick-up means, can have pick-up organs in the form of pliers or the like.

[0034] The above-cited actuator element (23) in turn comprises a piston (23) predisposed in the jacket (31) such that an end thereof is external of the jacket (31) and connected to the plate (21), the piston (23) being activatable, for example hydraulically or pneumatically, in alternating translation in the jacket (31) such as to set the plate (21) in alternating translation with respect to the jacket (31) of the support element (3) according to the above-described modalities.

[0035] A further detail (not illustrated) of the device (D) provided by the present invention, in the various embodiments thereof, consists in the fact that the frame (1) is configured such that the position of the support element

(3) constrained thereto is adjustable such as to be suited to a height of the stack (P) of tiles with respect to the conveyor line (L). This can enable, as mentioned above, predisposing the device (D) of the present invention such as to be used for positioning a protecting element (S) at an upper corner or a lower corner of the stack of tiles.

[0036] On the basis of a first embodiment of the device as illustrated in figures from 1 A to 1D, from 2A, to 2D, the above-cited actuator means preferably comprise a jack (4), for example hydraulic or pneumatic, borne by the frame (1) and hinged by an end thereto to the support element (3).

[0037] Preferably, and for example when the store (M) containing the protecting elements (S) is arranged vertically laterally to the line (L), the jack (4) is activatable in such a way as to command rotation of the support element (3) with respect to the frame (1) in an alternating rotation movement by an angle of 90°, such as to be able alternatively to position the pick-up means (2) in both the first position (Z1) below and facing the store (M) for picking up a corresponding protecting element (S), and in the second position (Z2) facing towards the corner of the stack (P) of tiles paused on the line (L) on which the protecting element (S) is to be positioned and released (see for example figures from 2A to 2D).

[0038] In a further possible, preferred but not exclusive embodiment of the device (D), as illustrated for example in figure 3A, the actuator means (4, 41, 42) comprise a motor means (41) and a rotation element (44) commandable in rotation by the motor means (41), the rotation element (44) being rigidly fixed on the support element (3); in this way the motor means (41) can activate the support element (3) in rotation via the rotation of the rotation element (44).

[0039] In a further but not exclusive embodiment of the device, as illustrated for example in figure 3B, the actuator means (4, 41, 42), comprise a motor means (42) and a first pulley (46) mounted thereon, and a second pulley (47) rigidly mounted on the support element (3) and connected by means of a belt or chain (48) to the first pulley (46); in this way the motor means (41) can activate the support element in rotation by activating the belt or chain (48).

[0040] In accordance with the latter two embodiments, and for example when the store (M) containing the protecting elements (S) is arranged horizontally laterally to the line (L), the motor means (41, 42) is preferably activatable in such a way as to command rotation of the support element (3) with respect to the frame (1) in an alternating rotation movement by an angle of 180°, such as to be able alternatively to position the pick-up means (2) in both the first position (Z1) facing the store (M), for picking-up a corresponding protecting element (S), and in the second position (Z2) facing towards the corner of the stack (P) of tiles on which the protecting element (S) is to be positioned and released (see for example figures 3A and 3B, or figures from 4A to 4D in which for greater clarity only the positions of the support element (3) with

the relative pick-up means (2) are illustrated, while the other components of the devices in the various embodiments are omitted).

[0041] Further, in a case in which the store (M) is arranged by a flank of the conveyor line of the invention in an inclined orientation with respect to the vertical and/or the end thereof from which the protecting elements is at a different height from the corners on which the protecting elements are to be applied, the motor means (41, 42) can be activatable in such a way as to command the rotation of the support element (3) with respect to the frame in an alternative rotating motion by an angle variable between 90° and 180°, and even greater than 180°.

[0042] Figures 5, 6 and 7 illustrate a store (M) according to the present invention that is particularly suitable for containing protecting elements (S) to be applied on the corners of the stacks (P) of tiles before packing thereof in packaging or cardboard packs, stretch plastic material or heat-shrinking plastic, and usable with the above-described device (D).

[0043] As mentioned in the preamble hereto, the protecting elements (S) to be applied on the corners of the stacks of tiles exhibit an L-shaped angle and are provided with a projecting lip (7) between the wings (A1, A2) of the L-shape; the lip (7) being destined to rest on the upper surface of the stack of tiles when the protecting element (S) is applied by the device (D) against a corner of the stack (P).

[0044] Owing to the presence of the lip (7), when the protecting elements (S) are stacked on one another (or one following another), each lip (7) of each element (S) laterally contacts the lip (7) of the element stacked above it.

[0045] Consequently, for the thickness of the lip (7), a lateral displacement of the protecting elements (S) is created, progressively as they are stacked on one another, such as to increase the volume of the stack of protecting elements (S).

[0046] In this regard, the present invention discloses a store (M) having a special shape which enables the above drawback to be obviated.

[0047] The store (M) is formed by a U-shaped profiled element (8) which seen in cross-section exhibits a base (81) and two lateral wings (82, 83), where end portions (820, 830) of the two wings (82, 83) are partially folded internally towards the base (81) such as to define a sort of internal housing of the element (8) of such dimensions as to be able to house internally thereof the protecting elements (S) stacked on one another and arranged with the relative lip (7) facing towards the base (81).

[0048] The profiled element (8) has at an end thereof retaining means for releasably retaining the protecting elements, for example straps or flexible walls made of a plastic material, from which the device collects and extracts a corresponding protecting element.

[0049] Further, in particular, the store (M) is provided with a cylindrical element (9) arranged longitudinally over a whole longitudinal length of the base (81) of the U-

shaped element (8) in such a way as to abut the lip (7) of each of the protecting elements (S) when they are stacked on one another (or one following another) and arranged in the housing.

5 **[0050]** The presence of the cylindrical element (9) abutting the lip (7) of the protecting elements is such that each thereof is forced to incline externally of the housing.

[0051] In this way, by maintaining the various protecting elements (S) arranged one above another (or one following or flanked to another) in the housing inclined externally, lateral displacement of the elements is prevented, which would instead occur if they were arranged perfectly vertically one above another.

10 **[0052]** The end portions (820, 830) of the two wings (82, 83) of the U-shaped element (8) are folded internally towards the base (81) defining, with the wings (82, 83), an angle of greater than or equal to 90°.

[0053] The store (M) can be mountable on the frame (1) of the device (D) in such a way that the profiled element (8) is arranged vertically.

20 **[0054]** Alternatively the store (M), in a further use, can be mountable on the frame (1) of the device (D) in such a way that the profiled element (8) is horizontally arranged or arranged in any inclined orientation.

25 **[0055]** Figure 8 illustrates a system for applying and positioning protecting elements (S) at the stack (P) of tiles before packing them, which uses a device (D) and a store (M) as disclosed in the present invention and as previously described in detail.

30 **[0056]** The system is preferably usable for positioning protecting corner-shaped elements (S) at corners of stacks (P) of tiles positioned on a conveyor line (L) activatable in a stepped motion such as to convey the stacks (P) of tiles one after another to a packing station.

35 **[0057]** It comprises at least an operating group (G1, G2, G3, G4), given by a combination of a device (D) as described herein above, and a store (M) as described herein above, for each of corners the stacks (P) of tiles.

[0058] Each of the each of the device (D)-store (M) operating group (G1, G2, G3, G4) is positionable laterally to the conveyor line (L) in a position corresponding to a pause position of the stack (P) of tiles and in such a way as to be facing a corresponding corner of the stack (P) of tiles.

45 **[0059]** In the particular case of figure 8, where the tiles have a quadrangular shape, the system will comprise four operating groups, each of which comprises a combination of a device (D) and a store (M) as disclosed by the present invention and as described herein above.

50 **[0060]** From the above it emerges clearly that the present invention provides a device which automatically and effectively enables collecting angular-shaped protecting elements from a store thereof and transferring and positioning them at the corners of stacks of tiles before packing them in relative packs or packages made of cardboard, stretch plastic or heat-shrink plastic materials.

[0061] The use of the device of the invention further

does not require any modifying interventions or variations to the structures of the production, stacking and packing of tiles already in existence, as it is easily positionable by a flank of the conveyor line (L) already existing and used for transferring, in a stepped advancement, tiles once they have been ordered and stacked one on another on the other towards the packing station.

[0062] In particular, the device, in combination with a relative containing store of the protecting elements, can be positioned between the stacking station of the tiles and the packing station at a pause position of the stacks of tiles during transfer thereof towards the packing station.

[0063] Further, with the store (M) the present invention as described herein above provides a particularly effective way of accumulating a series of angular-shaped protecting elements by predisposing them one above another (either on a flank or one following another), and has a transversal dimension that is particularly small.

[0064] The above has been described by way of non-limiting example, and any eventual constructional variants are understood to fall within the scope of the following claims.

Claims

1. A device for positioning a protecting element at a corner of a stack of tiles to be packed, the stack (P) of tiles being positioned on a conveyor line (L) that is activatable in stepped motion such as to convey the stack (P) of tiles to a packing station and the protecting element (S) being predisposed internally of a store (M) situated laterally to the line (L) and exhibiting an "L"-shaped angular shape and being provided with a lip (7) projecting between the wings of the "L", the device (D) comprising:

a frame (1), positionable by a flank of the conveyor line (L), between the line (L) and the store (M), in a position corresponding to a pause position of a stack (P) of tiles along the line (L) during stepped advancement;

pick-up means (2), the pick-up means (2) being activatable for picking up a protecting element (S) and deactivatable for subsequent release of the protecting element (S);

a support element (3), for supporting the pick-up means (2), the support element (3) being constrained rotatably to the frame (1), **characterized in that** the device (D) comprising actuator means (4, 41, 42) for alternately rotating the support element (3) with respect to the frame (1) between a first position (Z1), in which the pick-up means (2) are facing towards the store (M), such as to enable activation of the pick-up means (2) for picking up a protecting element (S), and a second position (Z2), in which

the pick-up means (2) are facing towards a corner of the stack (P) of tiles paused on the line (L), in order to enable deactivation of the pick-up means (2) such as to release the protecting element (S) at the corner, wherein the store (M) is mounted on the frame (1) and it is formed by a U-shaped profiled element (8) having a base (81) and two lateral wings (82, 83), where end portions (820, 830) of the two wings (82, 83) are partially folded internally towards the base (81) such as to define a sort of internal housing of the element (8) of such dimensions as to be able to house internally thereof the protecting elements (S) stacked on one another and arranged with the relative lip (7) facing towards the base (81), and **in that** it comprises a cylindrical element (9) arranged longitudinally over a whole longitudinal length of the base (81) of the U-shaped element (8) in such a way as to abut the lip (7) of each of the protecting elements (S) stacked on one another in the housing such as to incline each of the elements (S) towards the outside and wherein the device (D) comprises an actuator element (23) for setting the pick-up means (2) in alternating translation with respect to the support element (3), and **in that** the actuator element (23), when the pick-up means (2) are positioned in the first position (Z1) facing towards the store (M), is activatable to translate the pick-up means (2) towards the store (M) in order to enable picking-up the protecting element (S) following activation of the pick-up means (2), and thereafter is activatable such as to translate the pick-up means (2) distantly from the store (M) such as to extract the protecting element (S), and the actuator element (23), following rotation of the support element (3) with which rotation (3) the pick-up means (2), with the protecting element (S) supported thereby, are positioned in the second position (Z2) facing towards a corner of the stack (P) of tiles, is activatable such as to translate the pick-up means (2) towards the corner such as to enable release of the protecting element (S) on the corner following deactivation of the pick-up means (2).

2. The device of claim 1, **characterised in that** the pick-up means (2) comprise a plate (21) and at least a pick-up sucker means (V), borne by the plate (21) and connectable to a source of depression, **in that** the support element (3) comprises a jacket (31) and two guide stems (22), freely slidable in the jacket (31) and constrained to the plate (21), and **in that** the actuator element (23) comprises a piston (23) predisposed in the jacket (31) such that an end thereof is external of the jacket (31) and connected to the plate (21), the piston (23) being activatable in alter-

nating translation in the jacket (31).

3. The device of claim 1, **characterised in that** the frame (1) is configured such that the position of the support element (3) constrained thereto is adjustable in such a way as to be suited to a height of the stack (P) of tiles with respect to the conveyor line (L).
4. The device of claim 1, **characterised in that** the actuator means (4, 41, 42) comprise a jack (4) borne by the frame (1) and hinged to a relative end of the support element (3).
5. The device of claim 1, **characterised in that** the actuator means (4, 41, 42) comprise a motor means (41) and a rotation element (44) commandable in rotation by the motor means (41), the rotation element (44) being rigidly fixed on the support element (3).
6. The device of claim 1, **characterised in that** the actuator means (4, 41, 42) comprise a motor means (42) and a first pulley (46) commandable in rotation by the motor means (42), and **in that** it comprises a second pulley (47) rigidly mounted on the support element (3) and connected by means of a belt (48) to the first pulley (46) such as to be set in rotation by the motor means (42).
7. The device of claim 4, **characterised in that** the jack (4) is activatable in such a way as to command rotation of the support element (3) with respect to the frame (1) in an alternating rotation movement, such as to be able alternatively to position the pick-up means (2) in both the first position (Z1) below a store (M) containing the protecting elements arranged vertically laterally to the conveyor line (L), for picking-up a corresponding protecting element (S), and in the second position (Z2) facing towards the corner of the stack (P) of tiles on which the protecting element (S) is to be positioned and released.
8. The device of claim 5 or claim 6, **characterised in that** the motor means (41, 42) is activatable in such a way as to command rotation of the support element (3) with respect to the frame (1) in an alternating rotation movement, such as alternatively to be able to position the pick-up means (2) in both the first position (Z1) facing towards a store (M) containing the protecting elements (S) arranged horizontally or vertically laterally to the conveyor line (L), for picking-up a corresponding protecting element (S), and in the second position (Z2) facing towards the corner of the stack (P) of tiles on which the protecting element (S) is to be positioned and released.
9. The device of claim 1, **characterised in that** the end portions (820, 830) of the two wings (82, 83) of the

U-shaped element (8) of the store (M) are folded internally towards the base (81) defining, with the wings (82, 83), an angle of greater than or equal to 90°.

10. The device of claim 1, **characterised in that** the store (M) is mounted on the frame (1) in such a way that the profiled element (8) is vertically arranged.
11. The device of claim 1, **characterised in that** the store (M) is mounted on the frame (1) in such a way that the profiled element (8) is horizontally arranged or arranged in any inclined orientation.
12. A system for applying and positioning protecting elements (S) at corners of stacks (P) of tiles positioned on a conveyor line (L) activatable in a stepped motion such as to convey the stacks (P) of tiles one after another to a packing station, **characterised in that** it comprises at least a device (D)-store (M) operating group (G1, G2, G3, G4), given by a combination of a device (D) and a store (M) according to claims 1-11 for each of corners the stacks (P) of tiles, each of the device (D)-store (M) operating group (G1, G2, G3, G4) being positionable laterally to the conveyor line (L) in a position corresponding to a pause position of the stack (P) of tiles and in such a way as to be facing a corresponding corner of the stack (P) of tiles.

Patentansprüche

1. Vorrichtung zur Positionierung eines Schutzelementes an einer Ecke eines Stapels von zu verpackenden Fliesen, wobei der Stapel (P) von Fliesen auf einer Fördererlinie (L) angeordnet ist, die im Schrittbetrieb aktivierbar ist, um den Stapel (P) von Fliesen zu einer Verpackungsstation zu befördern, und wobei das Schutzelement (S) im Inneren eines Magazins (M) vorbereitet ist, das seitlich zu der Linie (L) angeordnet ist, und eine "L"-förmige Winkelform aufweist und mit einer Lippe (7) ausgestattet ist, die zwischen den Flügeln der "L"-Form hervorragt, wobei die Vorrichtung (D) Folgendes beinhaltet:

einen Rahmen (1), der an einer Seite der Fördererlinie (L), zwischen der Linie (L) und dem Magazin (M) in einer Position angeordnet werden kann, die einer Pausenposition eines Stapels (P) von Fliesen entlang der Linie (L) während des Schrittvorschubs entspricht; Aufnahmemittel (2), wobei diese Aufnahmemittel (2) zum Aufnehmen eines Schutzelementes (S) aktiviert und zum anschließenden Ausgeben des Schutzelementes (S) deaktiviert werden können; ein Trägerelement (3) zum Tragen der Aufnah-

memittel (2), wobei das Trägerelement (3) drehbar am Rahmen (1) befestigt ist, **dadurch gekennzeichnet, dass** die Vorrichtung (D) Folgendes beinhaltet:

Stellantriebsmittel (4, 41, 42) zum abwechselnden Drehen des Trägerelementes (3) relativ zum Rahmen (1) zwischen einer ersten Position (Z1), in der die Aufnahmemittel (2) dem Magazin (M) zugewandt sind, um die Aktivierung der Aufnahmemittel (2) zum Aufnehmen eines Schutzelementes (S) zu ermöglichen, und einer zweiten Position (Z2), in der die Aufnahmemittel (2) einer Ecke des Stapels (P) von Fliesen zugewandt sind, der sich auf der Linie (L) in Pausenposition befindet, um die Deaktivierung der Aufnahmemittel (2) zu ermöglichen, so dass das Schutzelement (S) an der Ecke ausgegeben wird, worin das Magazin (M) auf dem Rahmen (1) montiert ist und durch ein U-förmiges Profilelement (8) gebildet wird, das eine Basis (81) und zwei seitliche Flügel (82, 83) aufweist, wobei Endabschnitte (820, 830) der zwei Flügel (82, 83) teilweise nach innen zur Basis (81) hin gefaltet sind, um eine Art Aufnahme innerhalb des Profilelements (8) zu bilden, die aufgrund ihrer Abmessungen dafür geeignet ist, in ihrem Innern die Schutzelemente (S) aufzunehmen, die übereinander gestapelt und jeweils mit zur Basis (81) hin ausgerichteter Lippe (7) angeordnet sind, und worin das Magazin (M) ein zylindrisches Element (9) aufweist, das in Längsrichtung über die gesamte Länge der Basis (81) des U-förmigen Elementes (8) derart angeordnet ist, dass es so gegen die Lippe (7) jedes der in der Aufnahme übereinander gestapelten Schutzelemente (S) anschlägt, dass jedes der Elemente (S) nach außen hin geneigt wird, und worin die Vorrichtung (D) ein Stellantriebselement (23) beinhaltet, um die Aufnahmemittel (2) in eine abwechselnde Translationsbewegung relativ zu dem Trägerelement (3) zu versetzen und worin das Stellantriebselement (23), wenn die Aufnahmemittel (2) in der ersten Position (Z1) dem Magazin (M) zugewandt angeordnet sind, aktiviert werden kann, um die Aufnahmemittel (2) zu dem Magazin (M) hin zu bewegen, um das Aufnehmen des Schutzelementes (S) infolge der Aktivierung der Aufnahmemittel (2) zu ermöglichen, und im Anschluss daran aktiviert werden kann, um die Aufnahmemittel (2) vom Magazin (M) weg zu bewegen, so dass das Schutzelement (S) daraus entnommen wird, und

worin das Stellantriebselement (23), infolge der Drehung des Trägerelementes (3), durch welche die Aufnahmemittel (2) mit den von ihnen getragenen Schutzelementen (S) in die einer Ecke des Stapels (P) von Fliesen zugewandte zweite Position (Z2) gedreht werden, derart aktivierbar ist, dass die Aufnahmemittel (2) zu der Ecke hin bewegt werden, um die Ausgabe des Schutzelementes (S) an der Ecke durch die Deaktivierung der Aufnahmemittel (2) zu ermöglichen.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Aufnahmemittel (2) eine Platte (21) beinhalten und zumindest ein Greifsaugerelement (V) beinhalten, das von der Platte (21) getragen wird und an eine Unterdruckquelle angeschlossen werden kann, und dadurch, dass das Trägerelement (3) einen Mantel (31) und zwei Führungsschäfte (22) beinhaltet, die frei in dem Mantel (31) gleiten können und an der Platte (21) befestigt sind, und dadurch, dass das Stellantriebselement (23) einen Kolben (23) beinhaltet, der in dem Mantel (31) derart vorgesehen ist, dass sich eines seiner Enden außerhalb des Mantels (31) befindet und mit der Platte (21) verbunden ist, wobei der Kolben (23) in eine abwechselnde Translationsbewegung innerhalb des Mantels (31) versetzt werden kann.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Rahmen (1) so ausgelegt ist, dass die Position des daran befestigten Trägerelementes (3) so einstellbar ist, dass sie einer Höhe des Stapels (P) von Fliesen relativ zu der Fördererlinie (L) angepasst werden kann.
4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Stellantriebsmittel (4, 41, 42) eine Hebevorrichtung (4) beinhalten, die von dem Rahmen (1) getragen wird und scharnierbeweglich mit einem entsprechenden Ende des Trägerelementes (3) verbunden ist.
5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Stellantriebsmittel (4, 41, 42) ein Antriebsmittel (41) und ein Rotationselement (44) beinhalten, das durch die Antriebsmittel (41) in Drehung versetzt werden kann, wobei das Rotationselement (44) fest mit dem Trägerelement (3) verbunden ist.
6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Stellantriebsmittel (4, 41, 42) ein Antriebsmittel (42) und eine erste Riemenscheibe (46) beinhalten, die durch die Antriebsmittel (42) in Drehung versetzt werden kann, und dadurch, dass sie eine zweite Riemenscheibe (47) beinhaltet, die

fest auf dem Trägerelement (3) montiert und über einen Riemen (48) mit der ersten Riemenscheibe (46) so verbunden ist, dass sie durch die Antriebsmittel (42) in Drehung versetzt werden kann

7. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Hebevorrichtung (4) derart aktiviert werden kann, dass sie die Drehung des Trägerelementes (3) relativ zum Rahmen (1) in einer abwechselnden Drehbewegung ansteuert, so dass die Aufnahmemittel (2) abwechselnd sowohl in der ersten Position (Z1) unterhalb eines Magazins (M) angeordnet werden können, das die vertikal angeordneten Schutzelemente seitlich an der Fördererlinie (L) enthält, um ein entsprechendes Schutzelement (S) aufzunehmen, als auch in der zweiten Position (Z2), in der sie der Ecke des Stapels (P) von Fliesen zugewandt sind, an der das Schutzelement (S) angeordnet und ausgegeben werden soll.
8. Vorrichtung nach Anspruch 5 oder Anspruch 6, **dadurch gekennzeichnet, dass** die Antriebsmittel (41, 42) aktiviert werden können, um die Drehung des Trägerelementes (3) relativ zum Rahmen (1) in einer abwechselnden Drehbewegung anzusteuern, so dass die Aufnahmemittel (2) abwechselnd sowohl in der ersten Position (Z1) angeordnet werden können, in der sie einem Magazin (M) zugewandt sind, das die horizontal oder vertikal seitlich an der Fördererlinie (L) angeordneten Schutzelemente (S) enthält, um ein entsprechendes Schutzelement (S) aufzunehmen, als auch in der zweiten Position (Z2), in der sie der Ecke des Stapels (P) von Fliesen zugewandt sind, an der das Schutzelement (S) angeordnet und ausgegeben werden soll.
9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Endabschnitte (820, 830) der zwei Flügel (82, 83) des U-förmigen Elementes (8) des Magazins (M) nach innen zur Basis (81) hin gefaltet sind, so dass sie mit den Flügeln (82, 83) einen Winkel von größer oder gleich 90° bilden.
10. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Magazin (M) derart auf dem Rahmen (1) montiert ist, dass das Profilelement (8) vertikal angeordnet ist.
11. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Magazin (M) derart auf dem Rahmen (1) montiert ist, dass das Profilelement (8) horizontal oder in geneigter Ausrichtung angeordnet ist.
12. System zur Anbringung und Anordnung von Schutzelementen (S) an Ecken von Stapeln (P) von Fliesen, die auf einer Fördererlinie (L) angeordnet sind, welche im Schrittbetrieb aktiviert werden kann, um

die Stapel (P) von Fliesen nacheinander zu einer Verpackungsstation zu befördern, **dadurch gekennzeichnet, dass** es zumindest eine Vorrichtung (D)-Magazin (M)-Arbeitsgruppe (G1, G2, G3, G4) für jede der Ecken der Stapel (P) von Fliesen beinhaltet, die aus der Kombination einer Vorrichtung (D) und eines Magazins (M) nach den Ansprüchen 1-11 besteht, wobei jede Vorrichtung (D)-Magazin (M)-Arbeitsgruppe (G1, G2, G3, G4) seitlich an der Fördererlinie (L) in einer Position angeordnet werden kann, die einer Pausenposition des Stapels (P) von Fliesen entspricht, so dass sie jeweils einer entsprechenden Ecke des Stapels (P) von Fliesen zugewandt ist.

Revendications

1. Un dispositif de positionnement d'un élément de protection au niveau d'un coin d'une pile de carreaux à emballer, la pile (P) de carreaux étant positionnée sur une ligne de transport (L) qui peut être activée selon un mouvement à pas de manière à transporter la pile (P) de carreaux à une station d'emballage et l'élément de protection (S) étant prédisposé à l'intérieur d'un magasin (M) situé latéralement à la ligne (L), et présentant une forme angulaire en « L » et étant doté d'une lèvre (7) saillant entre les ailes du « L », le dispositif (D) comprenant :

un châssis (1), pouvant être positionné sur un côté de la ligne de transport (L), entre la ligne (L) elle-même et le magasin (M), dans une position correspondant à une position de pause d'une pile (P) de carreaux le long de la ligne (L) durant l'avance à pas ;

des moyens de prélèvement (2), lesdits moyens de prélèvement (2) pouvant être activés pour le prélèvement d'un élément de protection (S) et désactivés pour la relâche suivante dudit élément de protection (S) ;

un élément de support (3), pour supporter les moyens de prélèvement (2), ledit élément de support (3) étant contraint de façon rotative au châssis (1),

caractérisé en ce que le dispositif (D) comprend des moyens actionneurs (4, 41, 42) pour tourner en alternance l'élément de support (3) par rapport au châssis (1) entre une première position (Z1), dans laquelle les moyens de prélèvement (2) sont orientés vers le magasin (M), de manière à permettre l'activation des moyens de prélèvement (2) pour prélever un élément de protection (S), et une deuxième position (Z2), dans laquelle les moyens de prélèvement (2) sont orientés vers un coin de la pile (P) de carreaux arrêtée sur la ligne (L), de manière à permettre la désactivation des moyens de prélèvement (2) pour relâcher l'élément de protection

(S) au niveau de ce coin,

où le magasin (M) est monté sur le châssis (1) et est constitué d'un élément profilé en « U » (8) ayant une base (81) et deux ailes latérales (82, 83), où des portions d'extrémité (820, 830) desdites deux ailes (82, 83) sont partiellement pliées intérieurement vers la base (81) de manière à définir une sorte de logement intérieur de l'élément (8) de dimensions telles à pouvoir y loger intérieurement les éléments de protection (S) empilés les uns sur les autres et disposés avec la lèvre (7) respective orientée vers la base (81), et

en ce qu'il comprend un élément cylindrique (9) disposé longitudinalement sur toute la longueur longitudinale de la base (81) de l'élément en « U » (8) de manière à servir de butée à la lèvre (7) de chacun des éléments de protection (S) empilés les uns sur les autres dans le logement afin d'incliner chacun desdits éléments (S) vers l'extérieur, et où le dispositif (D) comprend un élément actionneur (23) pour déplacer les moyens de prélèvement (2) en translation alternée par rapport à l'élément de support (3), et **en ce que** ledit élément actionneur (23), quand les moyens de prélèvement (2) sont positionnés dans la première position (Z1) orientés vers le magasin (M), peut être activé pour déplacer les moyens de prélèvement (2) par translation vers le magasin (M) afin de permettre le prélèvement de l'élément de protection (S) suite à l'activation des moyens de prélèvement (2), puis peut être activé pour déplacer par translation les moyens de prélèvement (2) à distance du magasin (M) afin d'extraire l'élément de protection (S), et ledit élément actionneur (23), suite à la rotation de l'élément de support (3), ladite rotation de l'élément de support (3) déterminant le positionnement des moyens de prélèvement (2), avec l'élément de protection (S) qu'ils supportent, dans la deuxième position (Z2) orientés vers un coin de la pile (P) de carreaux, peut être activé afin de déplacer par translation les moyens de prélèvement (2) vers le coin pour permettre la relâche de l'élément de protection (S) sur ledit coin suite à la désactivation des moyens de prélèvement (2).

2. Le dispositif selon la revendication 1, **caractérisé en ce que** les moyens de prélèvement (2) comprennent une plaque (21) et au moins un organe à ventouse (V) de prélèvement, supporté par la plaque (21) et pouvant être raccordé à une source de vide, **en ce que** l'élément de support (3) comprend une chemise (31) et deux tiges de guidage (22), pouvant coulisser librement dans la chemise (31) et assujetties à la plaque (21), et **en ce que** l'élément actionneur (23) comprend un piston (23) prédisposé dans

la chemise (31) de manière à ce qu'une extrémité de celui-ci soit à l'extérieur de la chemise (31) et raccordée à la plaque (21), le piston (23) pouvant être activé en translation alternée dans la chemise (31).

3. Le dispositif selon la revendication 1, **caractérisé en ce que** le châssis (1) est configuré de manière à ce que la position de l'élément de support (3), qui est contraint à celui-ci, soit réglable afin d'être adaptée à une hauteur de la pile (P) de carreaux par rapport à la ligne de transport (L).
4. Le dispositif selon la revendication 1, **caractérisé en ce que** les moyens actionneurs (4, 41, 42) comprennent un vérin (4) porté par le châssis (1) et articulé à une extrémité correspondante de l'élément de support (3).
5. Le dispositif selon la revendication 1, **caractérisé en ce que** les moyens actionneurs (4, 41, 42) comprennent un organe moteur (41) et un élément de rotation (44) pouvant être commandé en rotation par ledit organe moteur (41), l'élément de rotation (44) étant fixé de façon rigide sur l'élément de support (3).
6. Le dispositif selon la revendication 1, **caractérisé en ce que** les moyens actionneurs (4, 41, 42) comprennent un organe moteur (42) et une première poulie (46) pouvant être commandée en rotation par ledit organe moteur (42), et **en ce qu'il** comprend une deuxième poulie (47) montée de façon rigide sur l'élément de support (3) et reliée par l'intermédiaire d'une courroie (48) à la première poulie (46) de façon à être mise en rotation par l'organe moteur (42).
7. Le dispositif selon la revendication 4, **caractérisé en ce que** le vérin (4) peut être activé de manière à commander la rotation de l'élément de support (3) par rapport au châssis (1) selon un mouvement de rotation alternée, afin de pouvoir positionner en alternance les moyens de prélèvement (2) à la fois dans la première position (Z1) en-dessous d'un magasin (M) contenant les éléments de protection disposés à la verticale latéralement à la ligne de transport (L), pour prélever un élément de protection (S) correspondant, et dans la deuxième position (Z2) orientés vers le coin de la pile (P) de carreaux sur lequel l'élément de protection (S) en question doit être positionné et relâché.
8. Le dispositif selon la revendication 5 ou la revendication 6, **caractérisé en ce que** l'organe moteur (41, 42) peut être activé de manière à commander la rotation de l'élément de support (3) par rapport au châssis (1) selon un mouvement de rotation alternée, afin de pouvoir positionner en alternance les

moyens de prélèvement (2) à la fois dans la première position (Z1) orientés vers un magasin (M) contenant les éléments de protection (S) disposés à l'horizontale ou à la verticale latéralement à la ligne de transport (L), pour prélever un élément de protection (S) correspondant, et dans la deuxième position (Z2) orientés vers le coin de la pile (P) de carreaux sur lequel l'élément de protection (S) en question doit être positionné et relâché.

9. Le dispositif selon la revendication 1, **caractérisé en ce que** les portions d'extrémité (820, 830) des deux ailes (82, 83) de l'élément en « U » (8) du magasin (M) sont pliées intérieurement vers la base (81) définissant, avec lesdites ailes (82, 83), un angle supérieur ou égal à 90°.
10. Le dispositif selon la revendication 1, **caractérisé en ce que** le magasin (M) est monté sur le châssis (1) de manière à ce que l'élément profilé (8) soit disposé à la verticale.
11. Le dispositif selon la revendication 1, **caractérisé en ce que** le magasin (M) est monté sur le châssis (1) de manière à ce que l'élément profilé (8) soit disposé à l'horizontale ou disposé selon une quelconque orientation inclinée.
12. Un système pour appliquer et positionner des éléments de protection (S) au niveau de coins de piles (P) de carreaux situées sur une ligne de transport (L) pouvant être activée selon un mouvement à pas de manière à transporter lesdites piles (P) de carreaux les unes après les autres à une station d'emballage, **caractérisé en ce qu'il** comprend au moins un groupe opérationnel (G1, G2, G3, G4) dispositif (D) - magasin (M), défini par la combinaison d'un dispositif (D) et d'un magasin (M) selon les revendications 1-11 pour chacun des coins des piles (P) de carreaux, chaque groupe opérationnel (G1, G2, G3, G4) dispositif (D) - magasin (M) pouvant être positionné latéralement à la ligne de transport (L) dans une position correspondant à une position de pause de la pile (P) de carreaux et de manière à être en face d'un coin correspondant de la pile (P) de carreaux.

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FIG. 1B

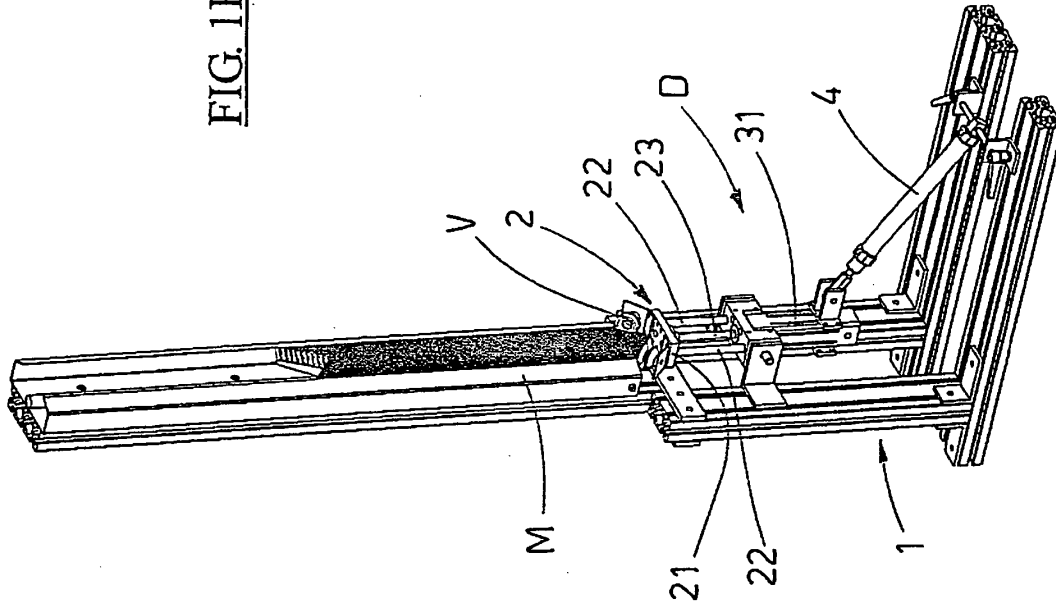


FIG. 1A

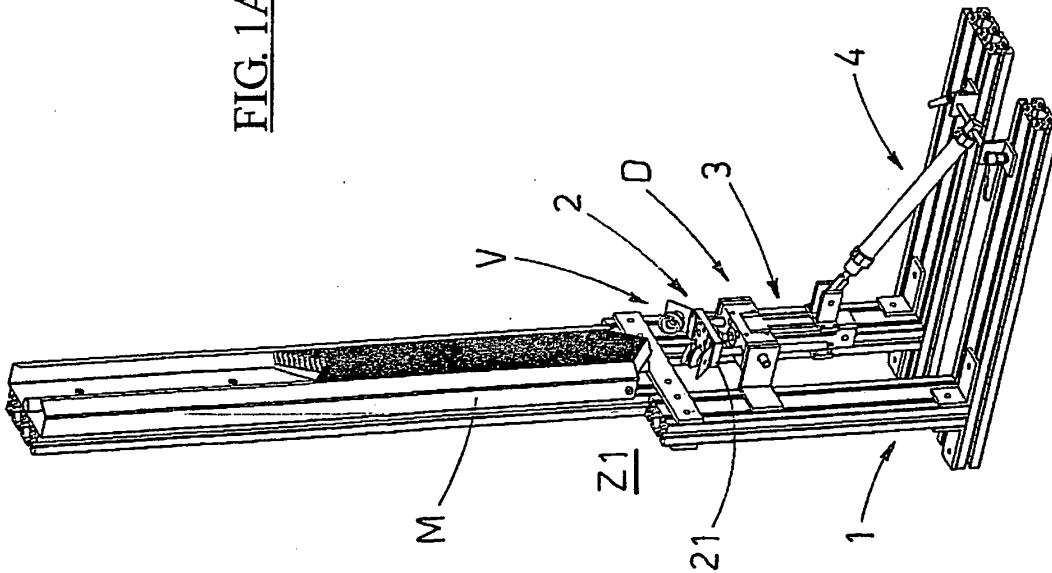


FIG. 1D

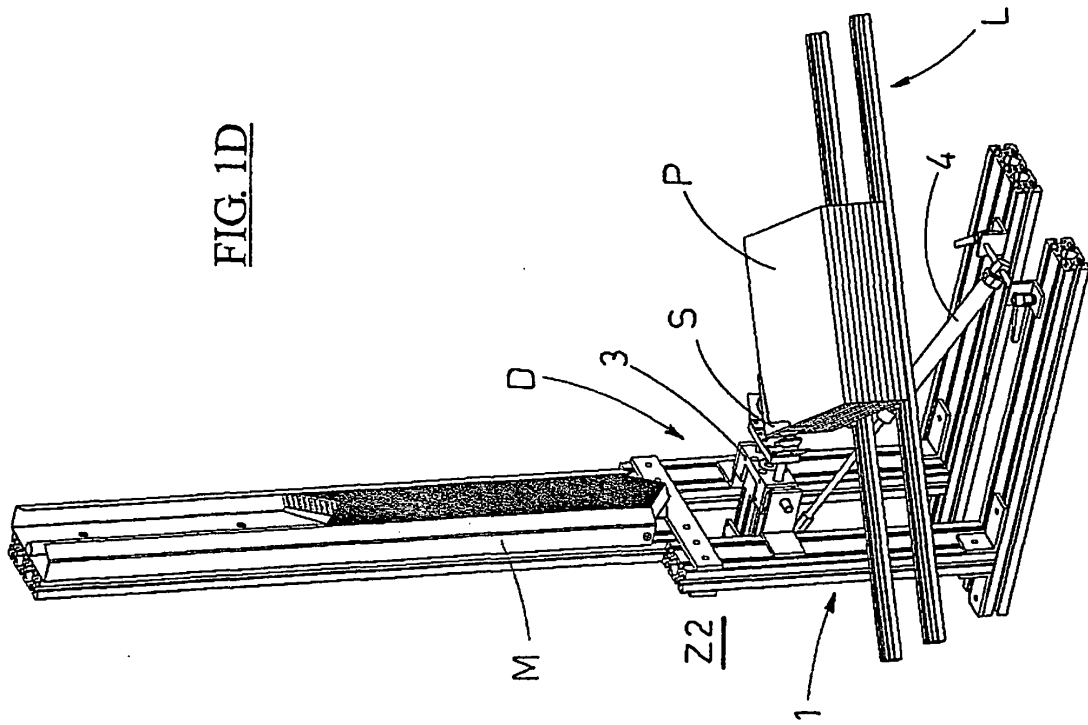
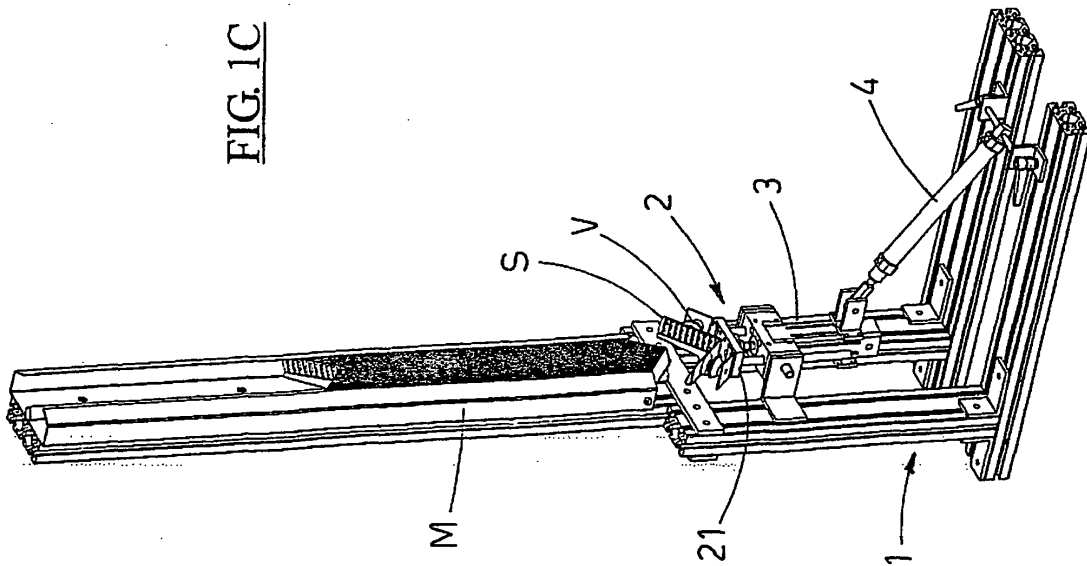
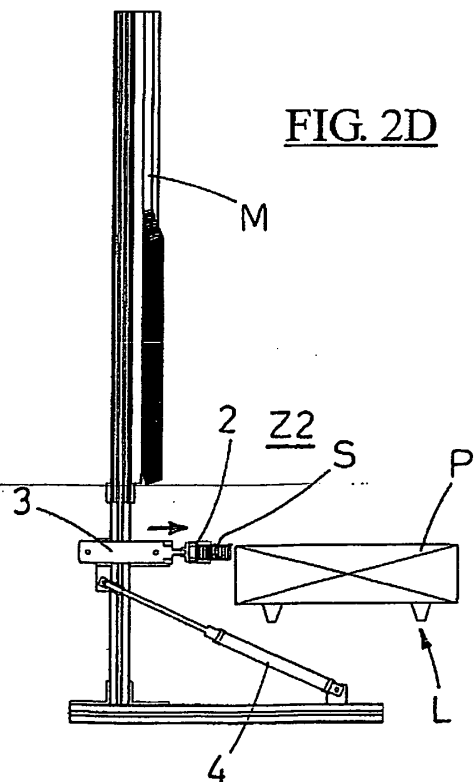
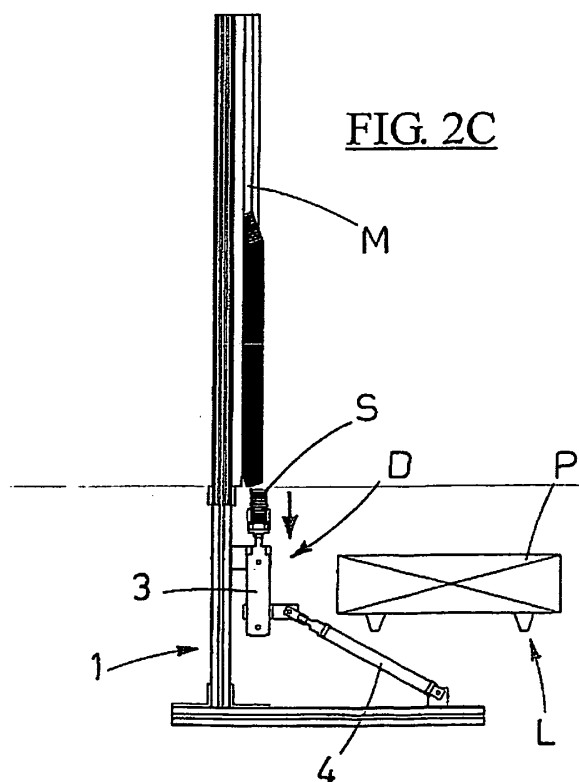
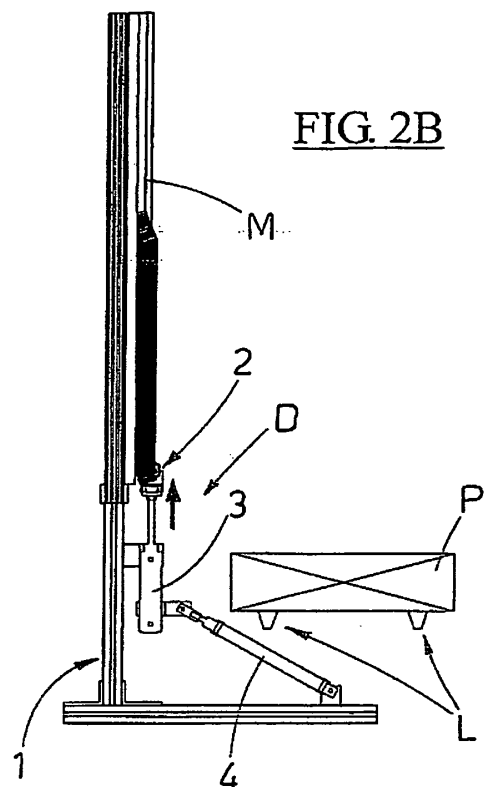
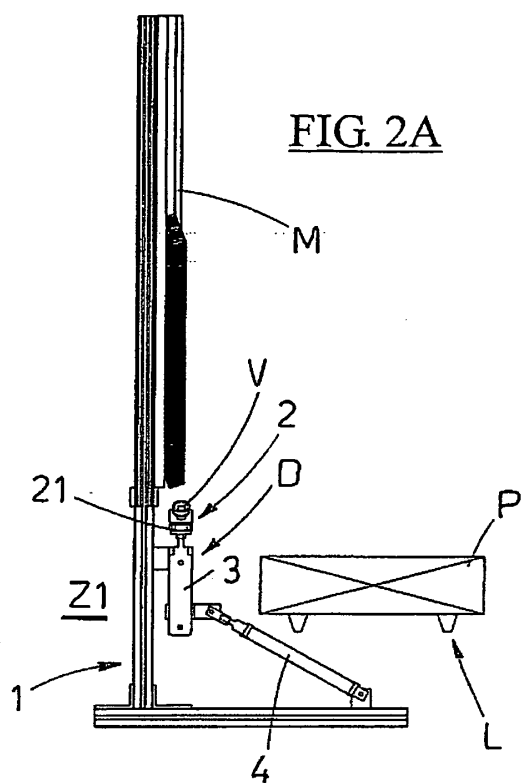


FIG. 1C





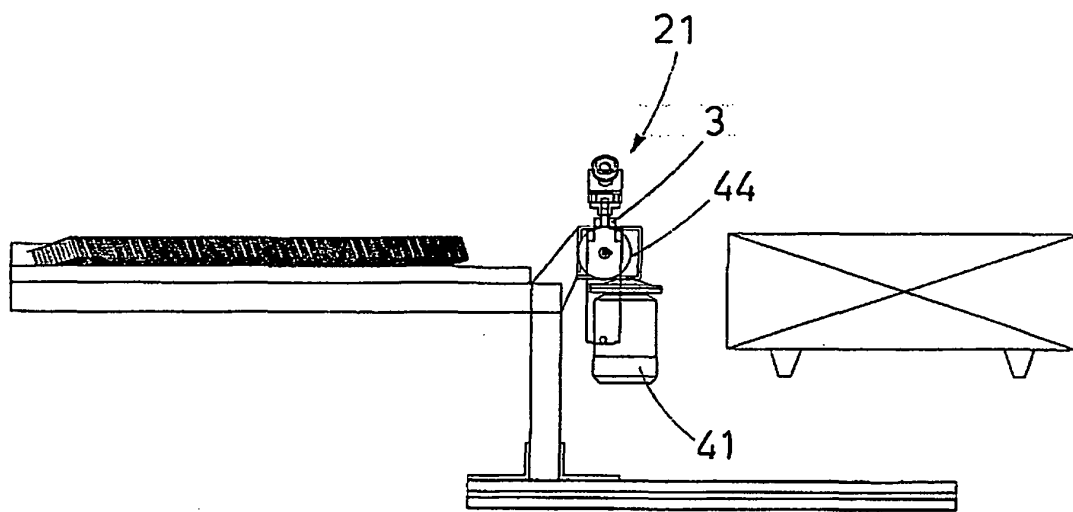


FIG. 3A

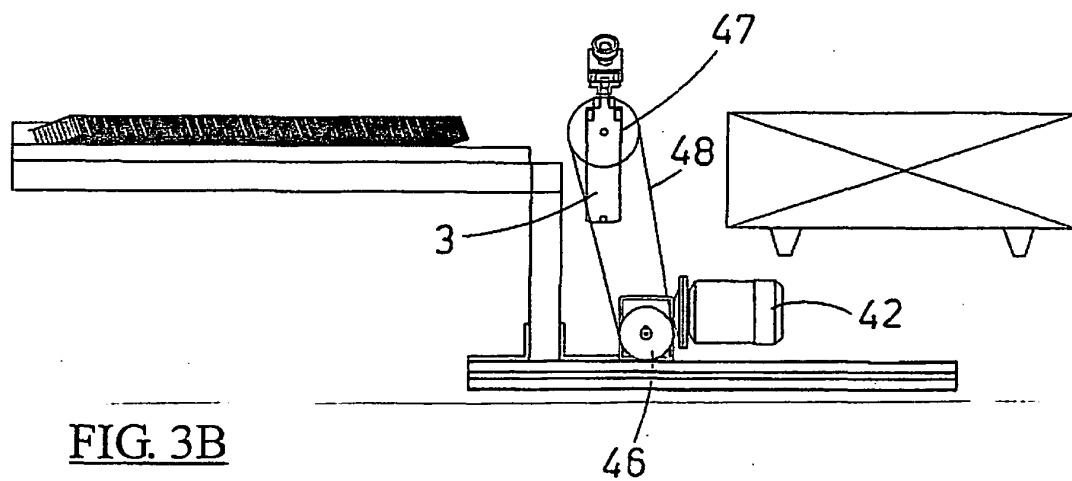


FIG. 3B

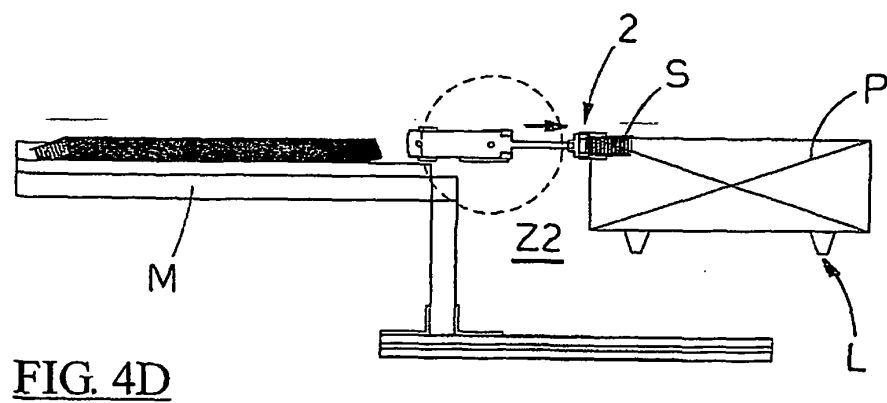
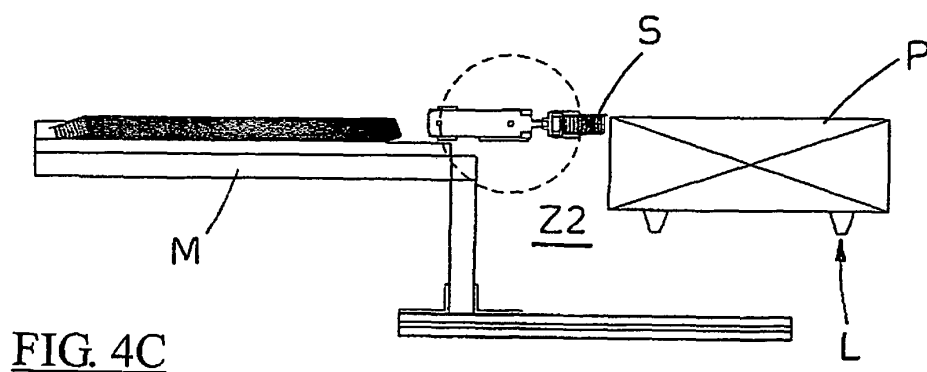
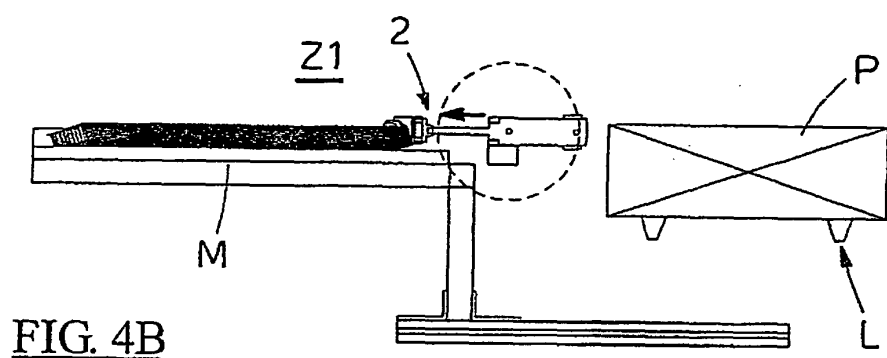
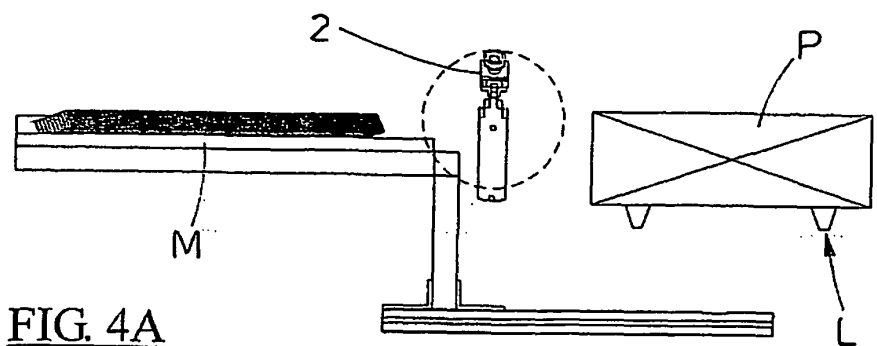
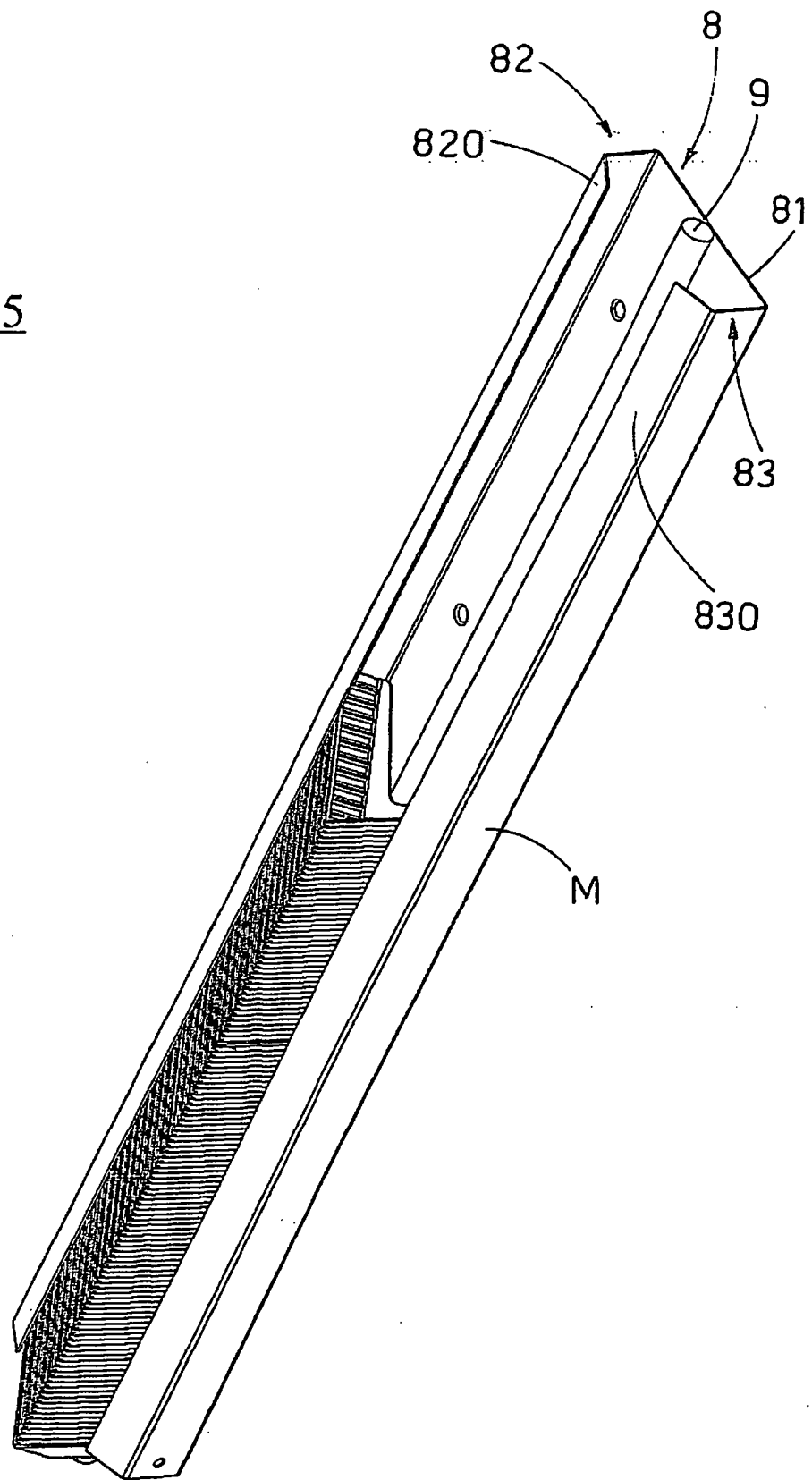


FIG. 5



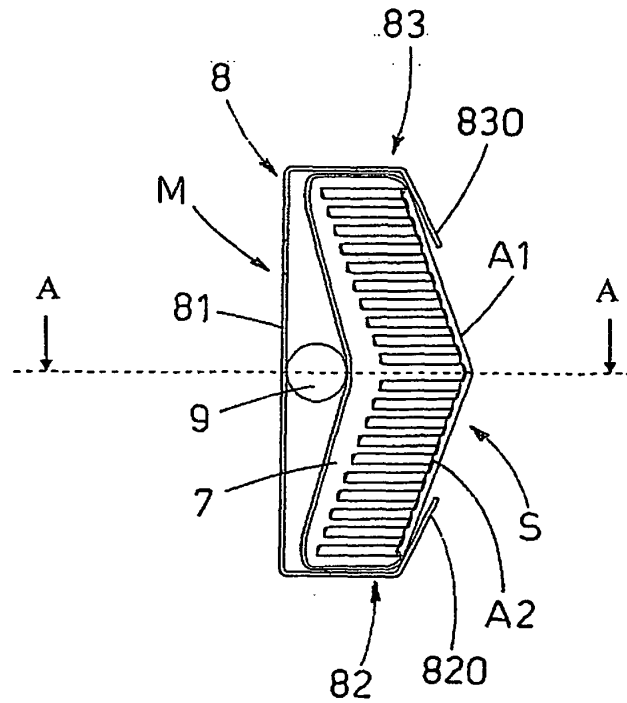
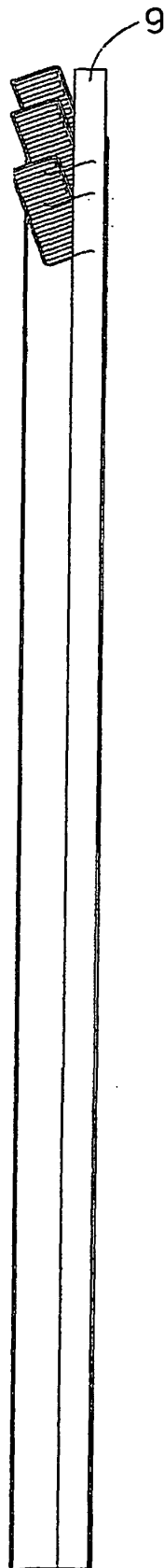
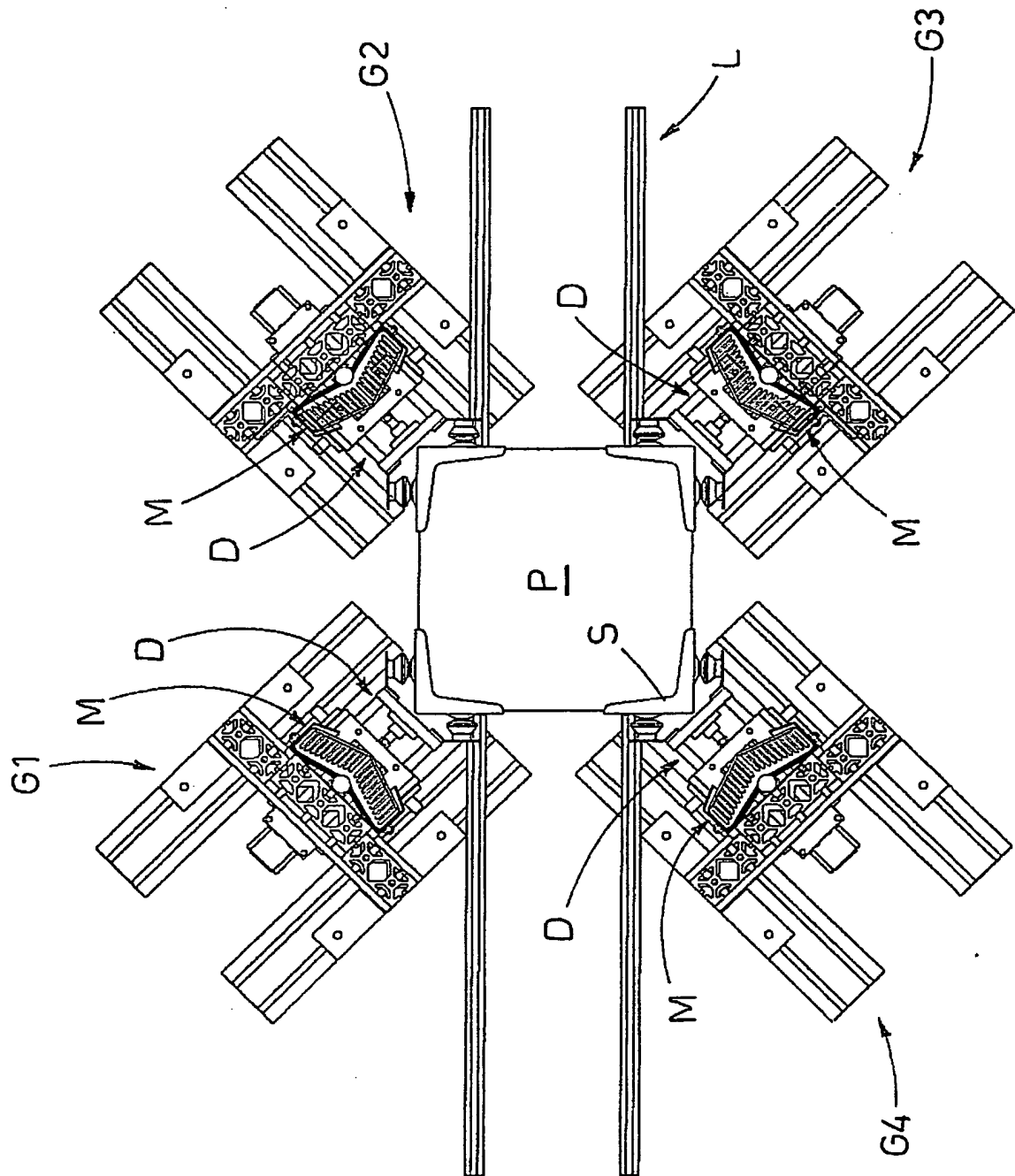


FIG. 6

FIG. 7

FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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