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(54) **SYSTEM AND METHOD FOR COMPACT
AND ORDERLY PACKAGING OF FLOOR
LEVELERS AND THE LIKE**

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ABSTRACT

A system for compact and orderly packaging including a feeding compartment that packages the floor levelers, which are intended for rotary positioning units equipped with spiral distribution rails by a conveyor belt contained in the feeding compartment. Thus, the floor levelers are directed to a sequential conveyor belt, where they are profiled and then directed to a rotating steering device, composed of recesses and a nozzle that moves the floor levelers clockwise and counterclockwise to be arranged in an interleaved and overlapping manner. Then, the arranged and overlapping floor levelers are sent to the angular housing compartments with the aid of a pneumatic actuator with vertical movement, which are internally coated by packages. The floor levelers packaged by the packages are sent to a release mechanism, which is disarmed to send the floor levelers packaged by the packages to an exit conveyor.

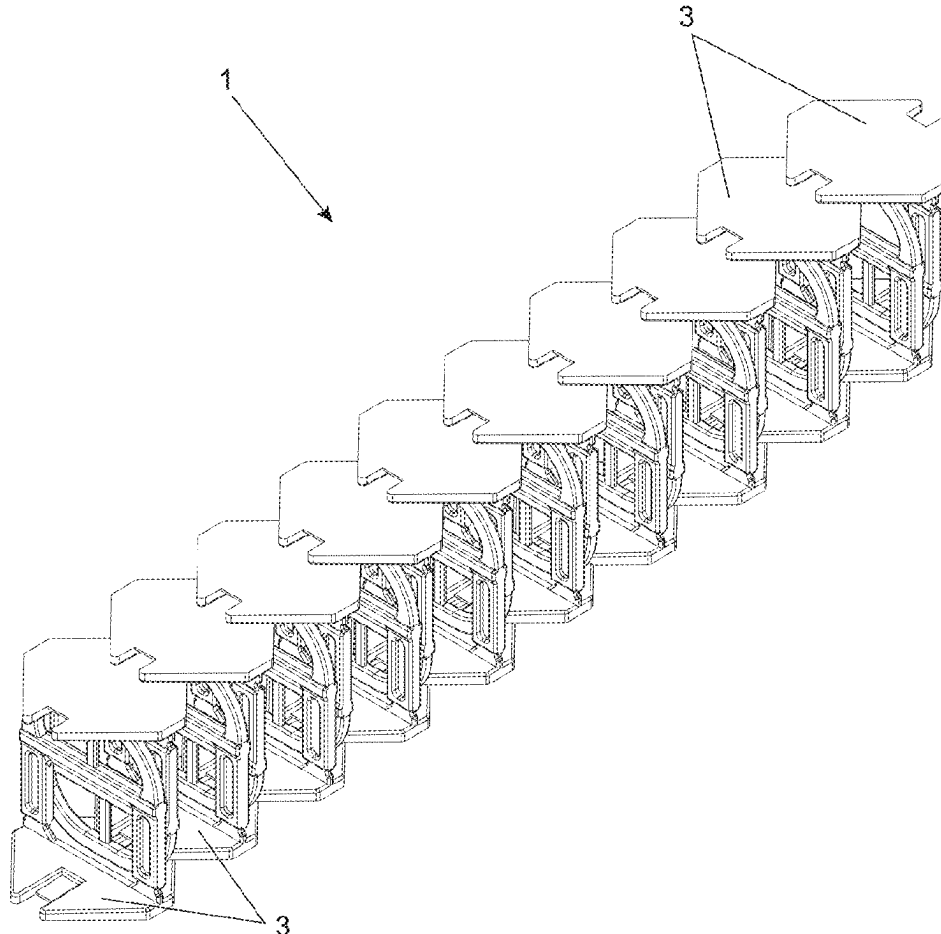


FIG. 1

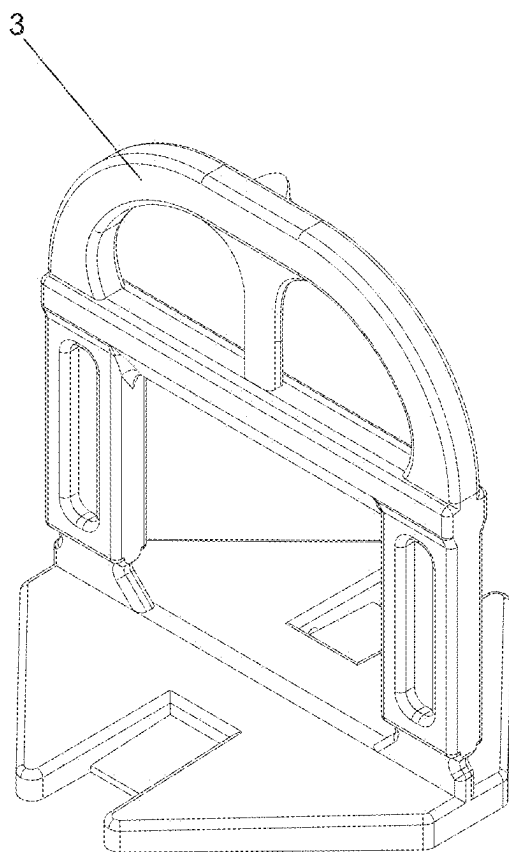


FIG. 2

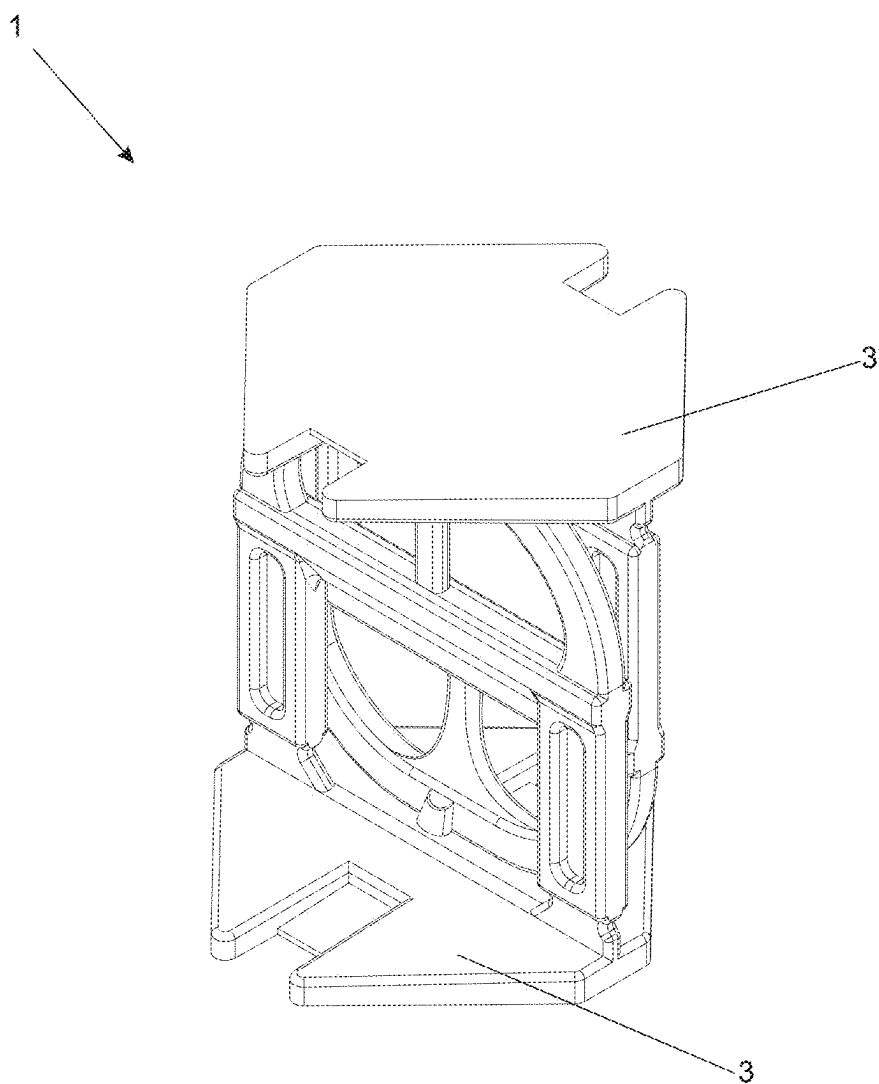


FIG. 3

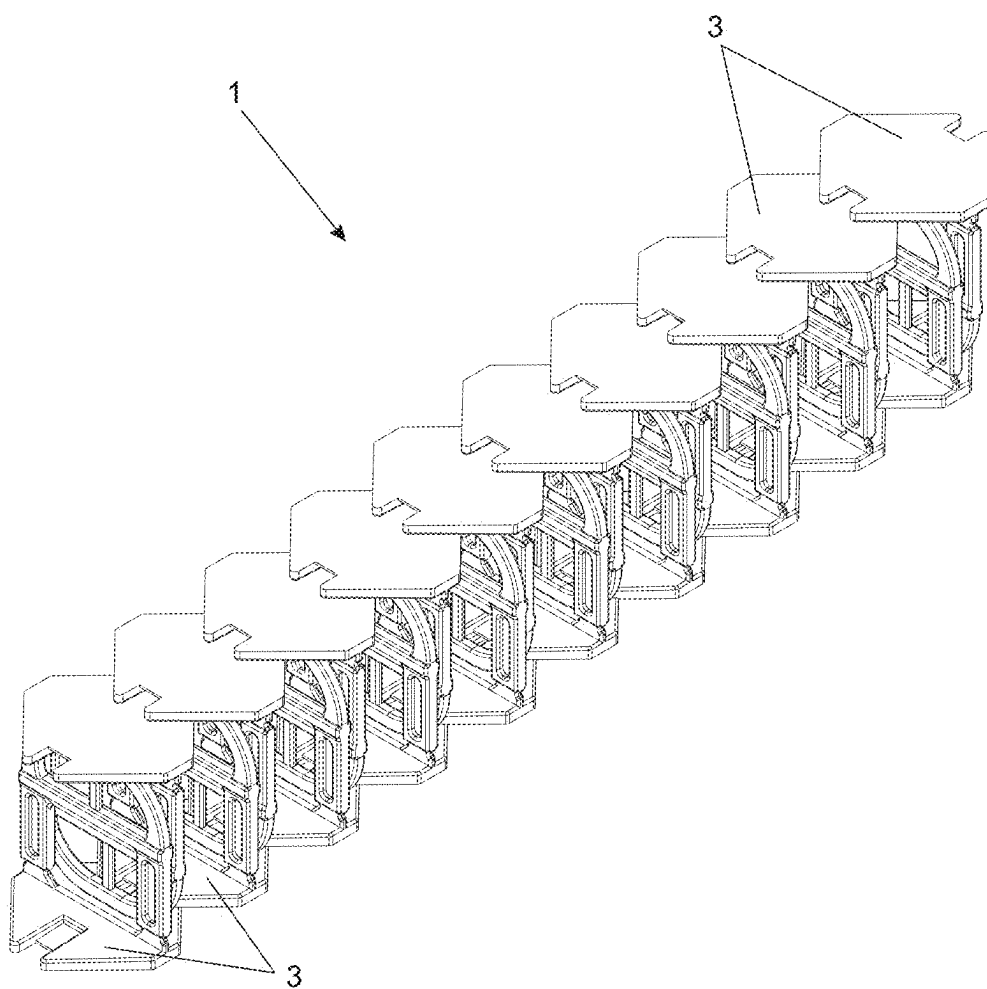


FIG. 4

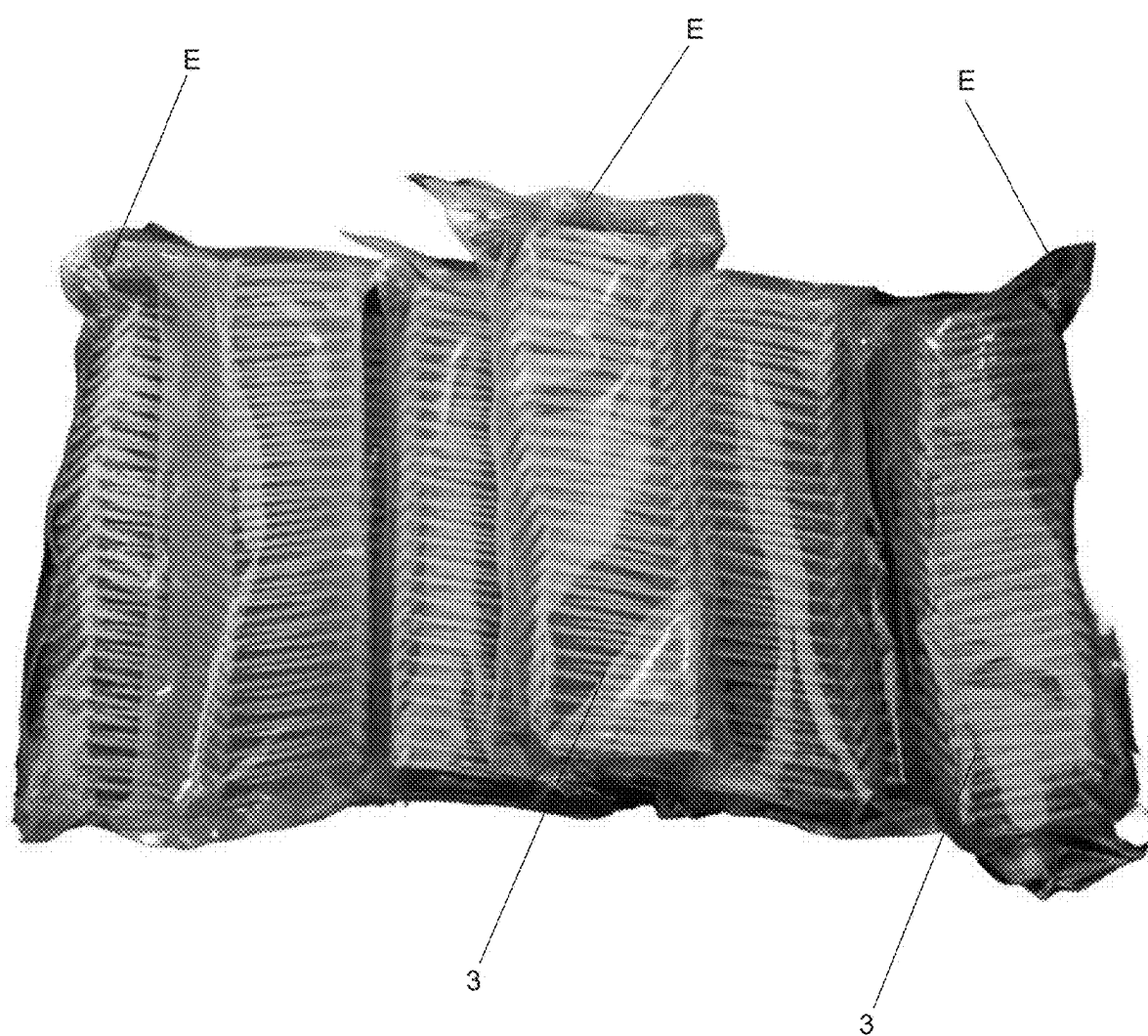


FIG. 5

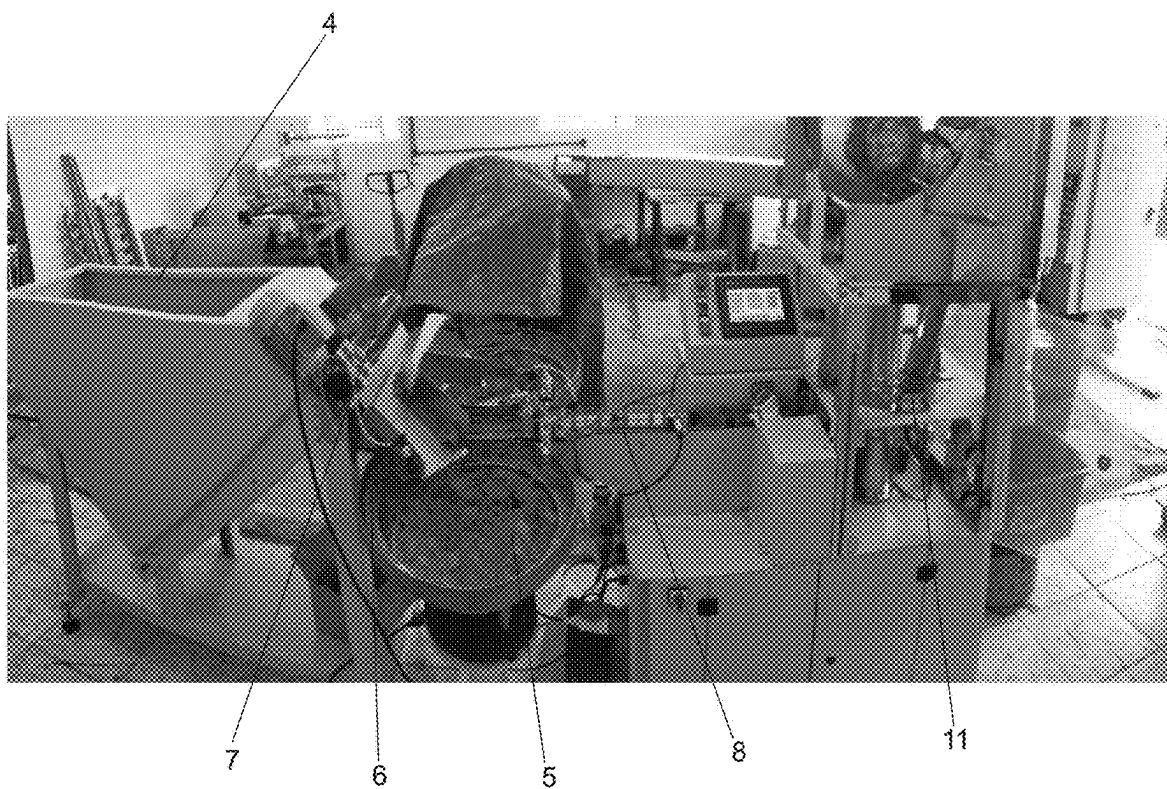


FIG. 6

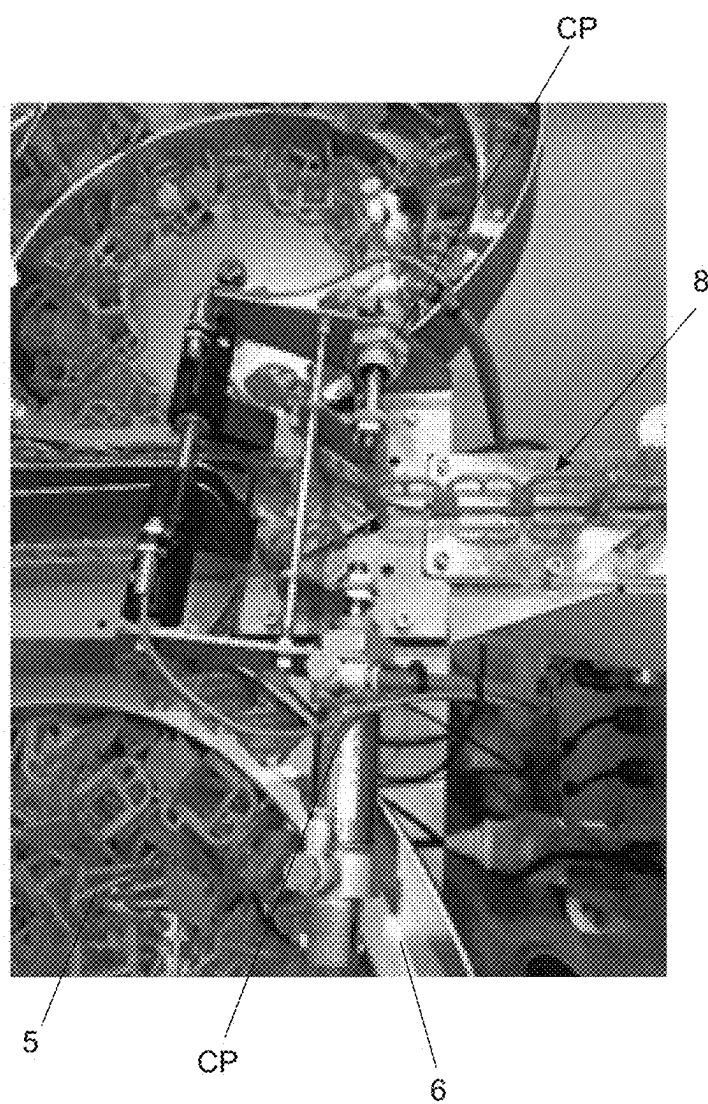


FIG. 7

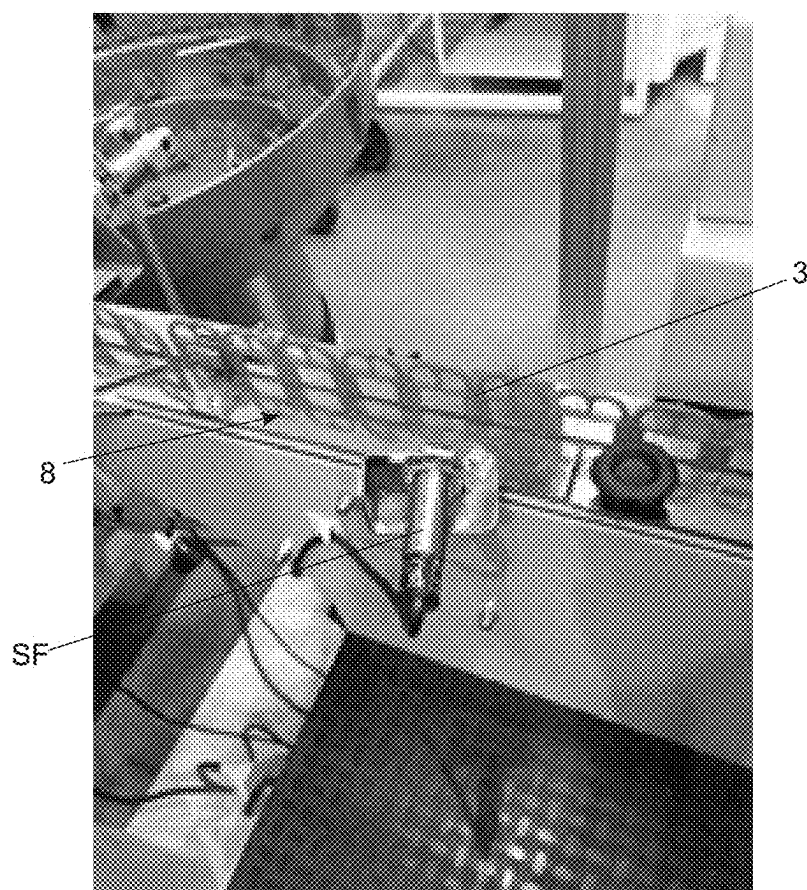


FIG. 8

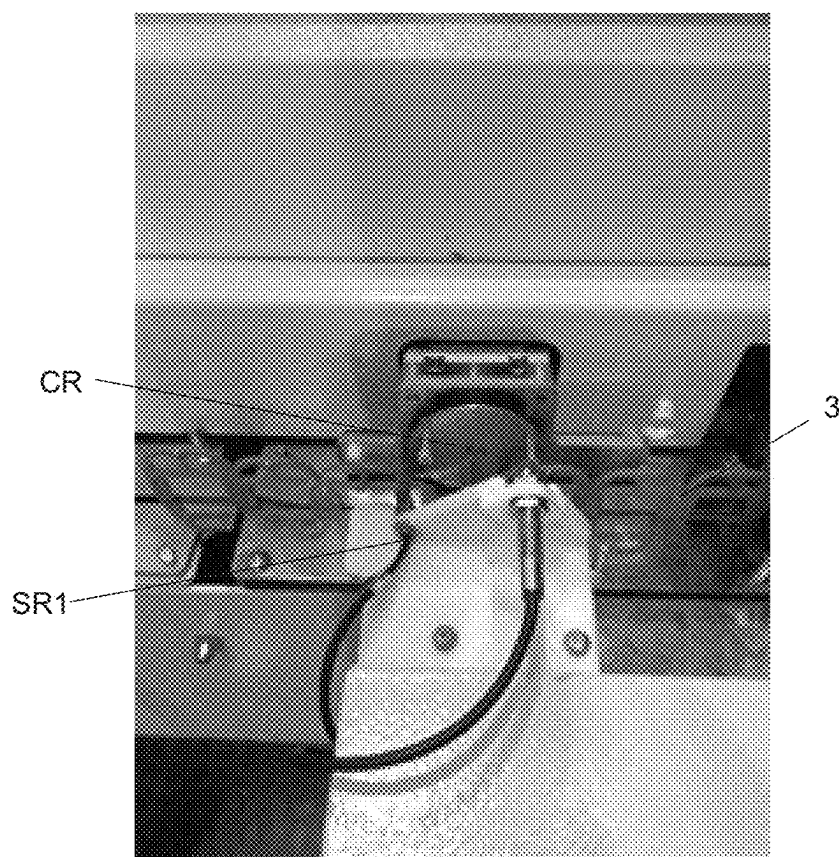


FIG. 9

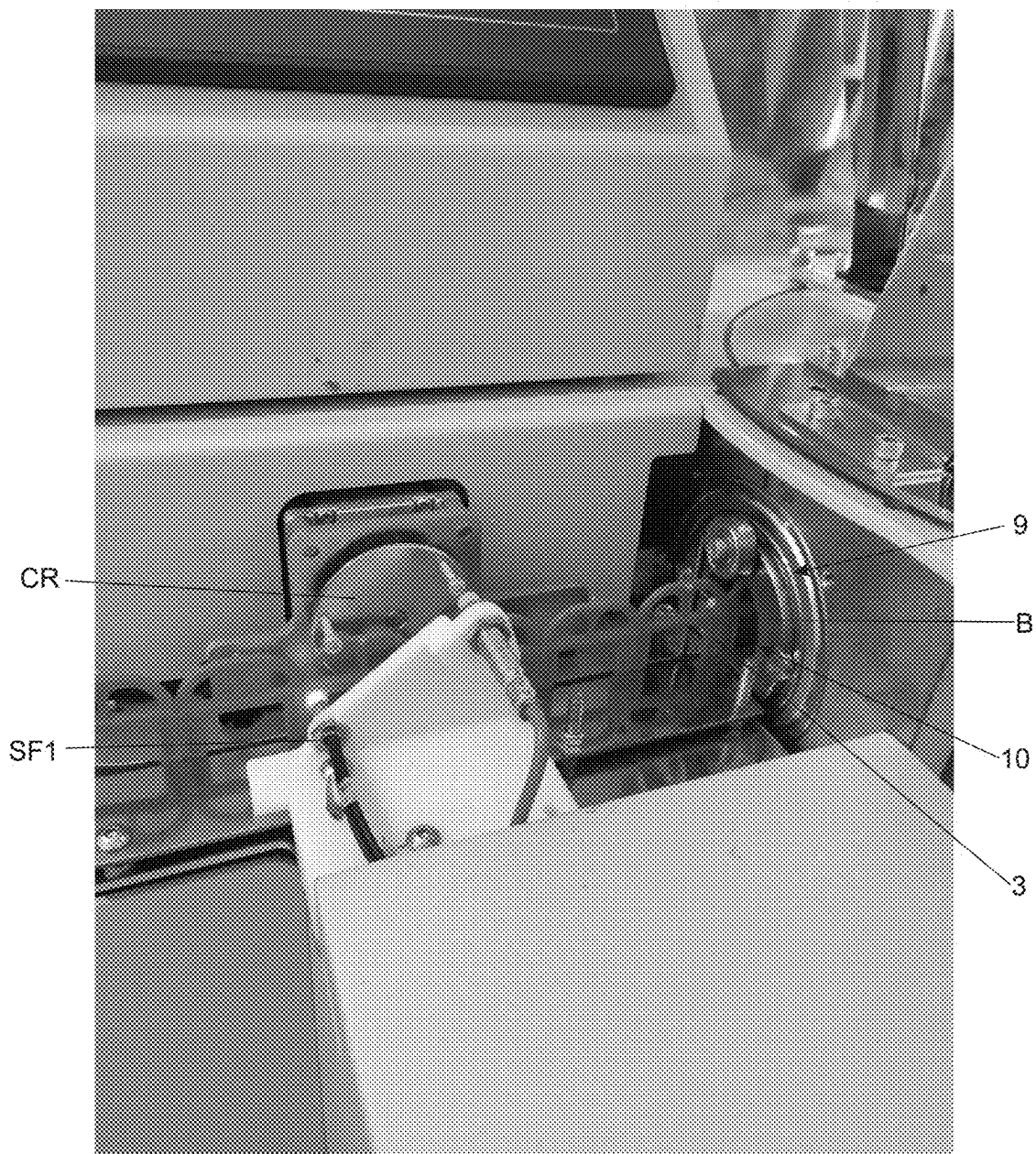


FIG. 10 P

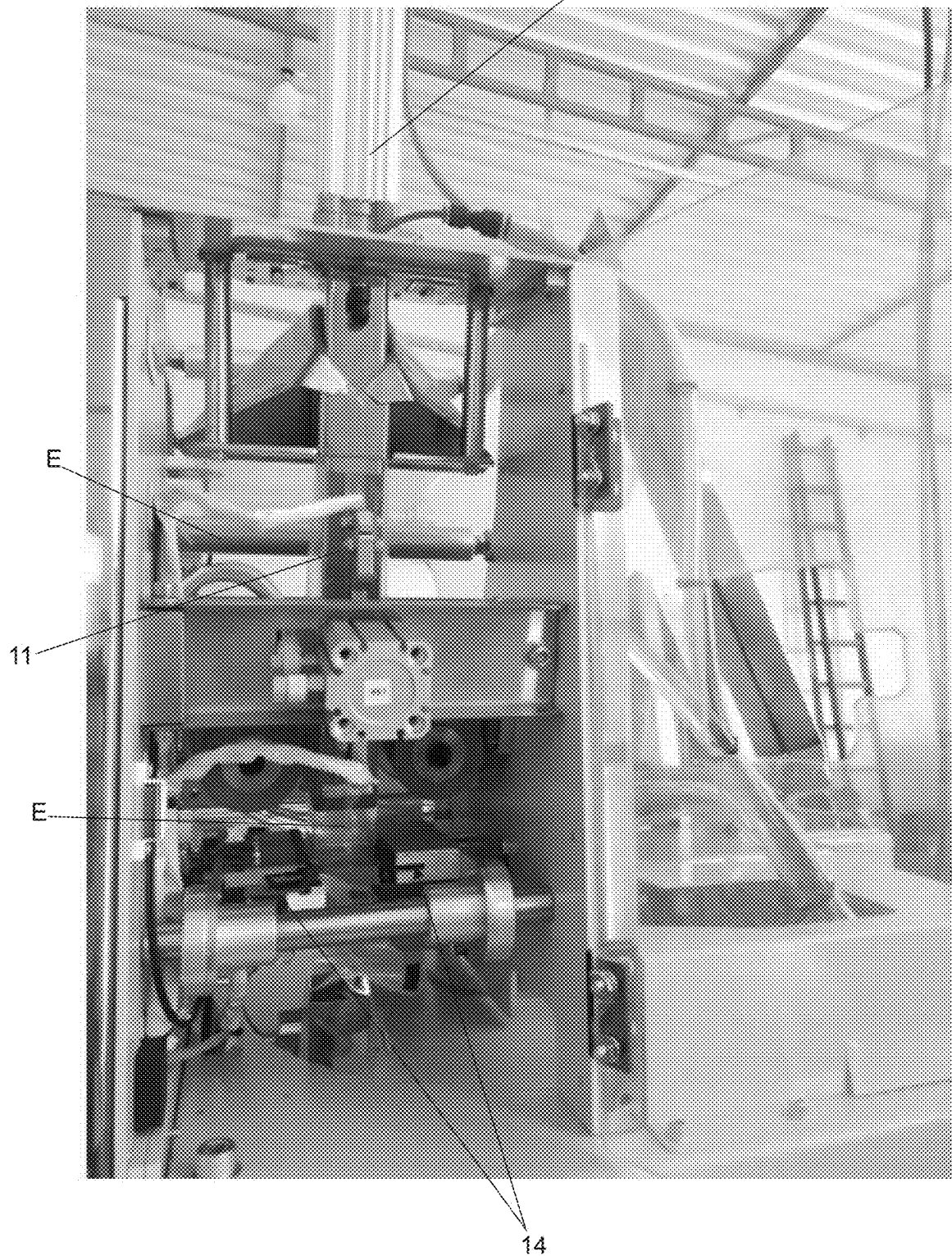


FIG. 11

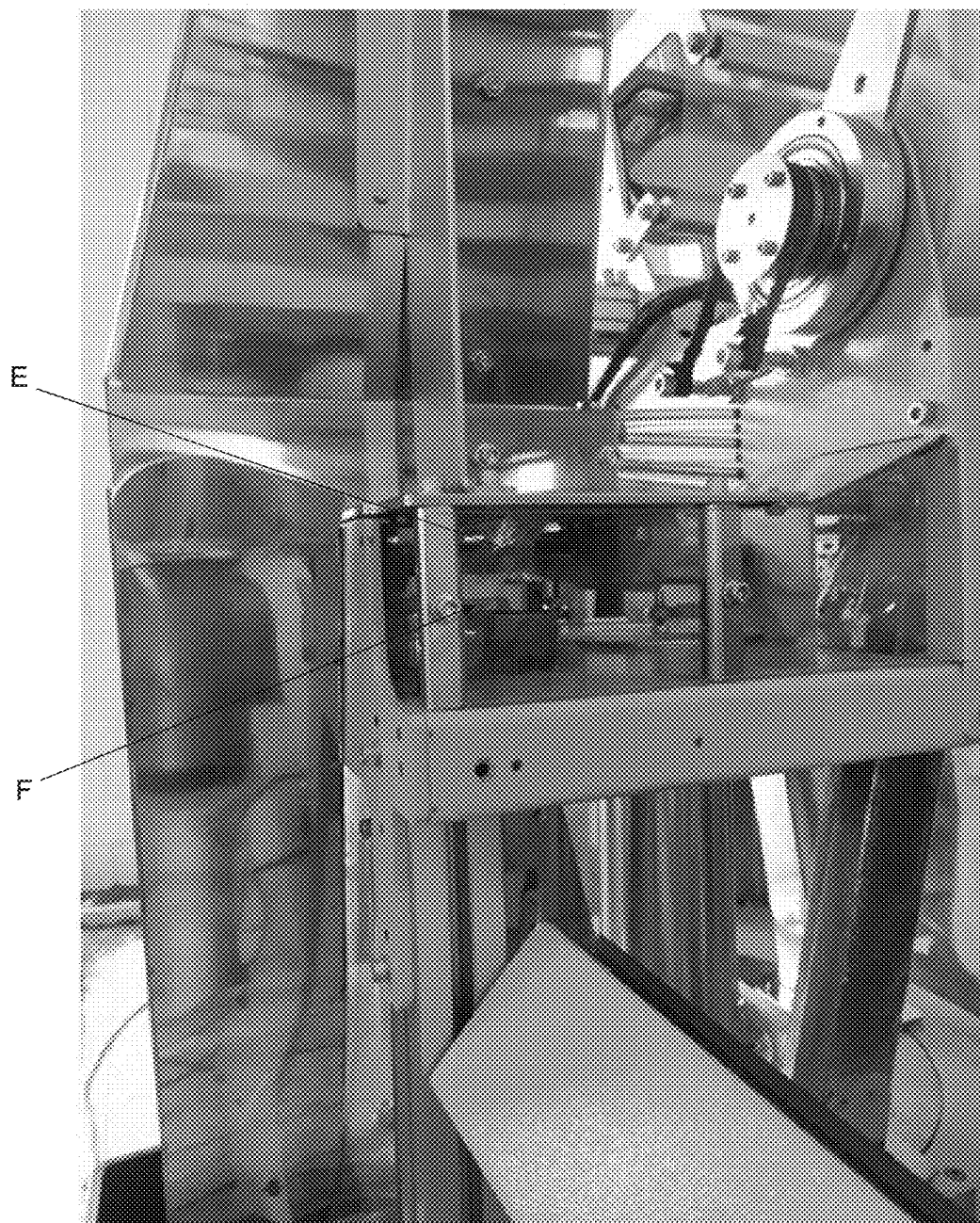


FIG. 12

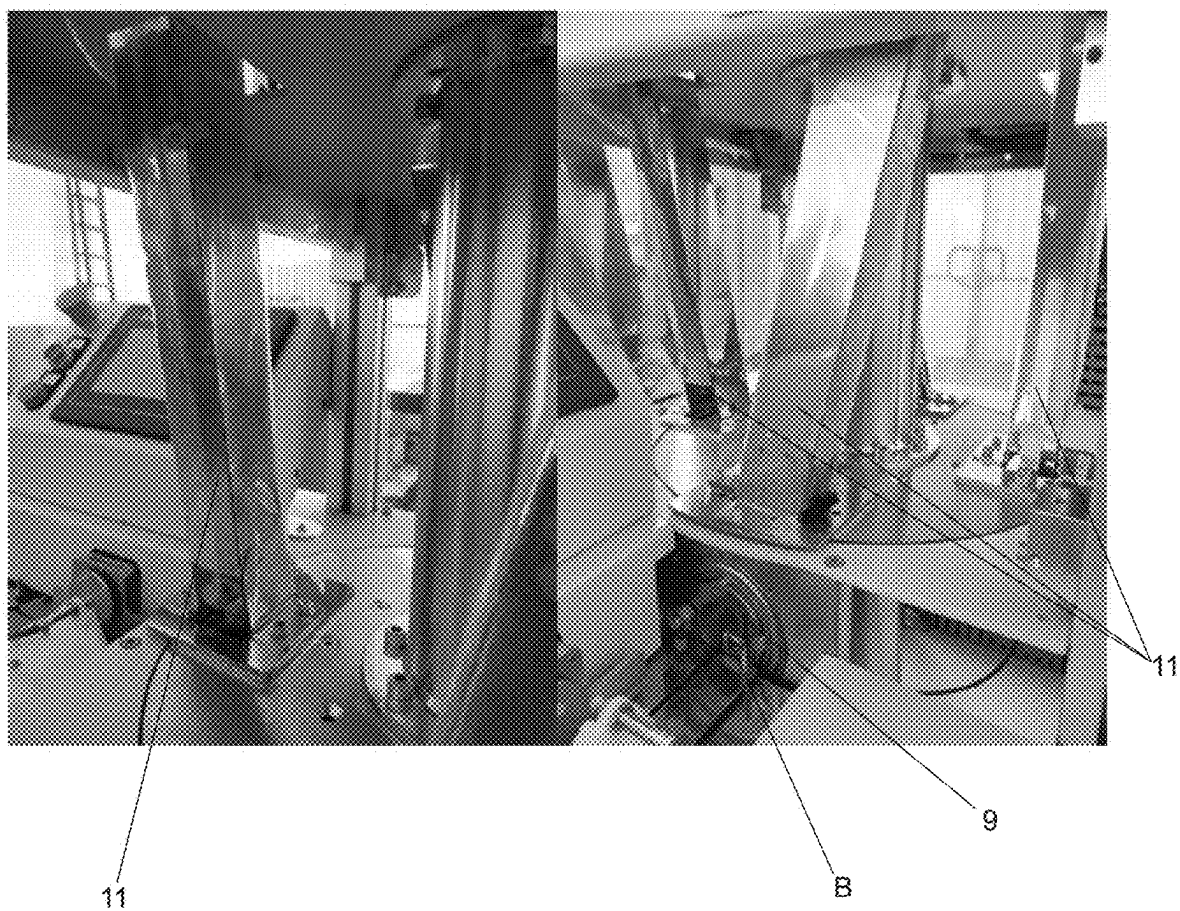
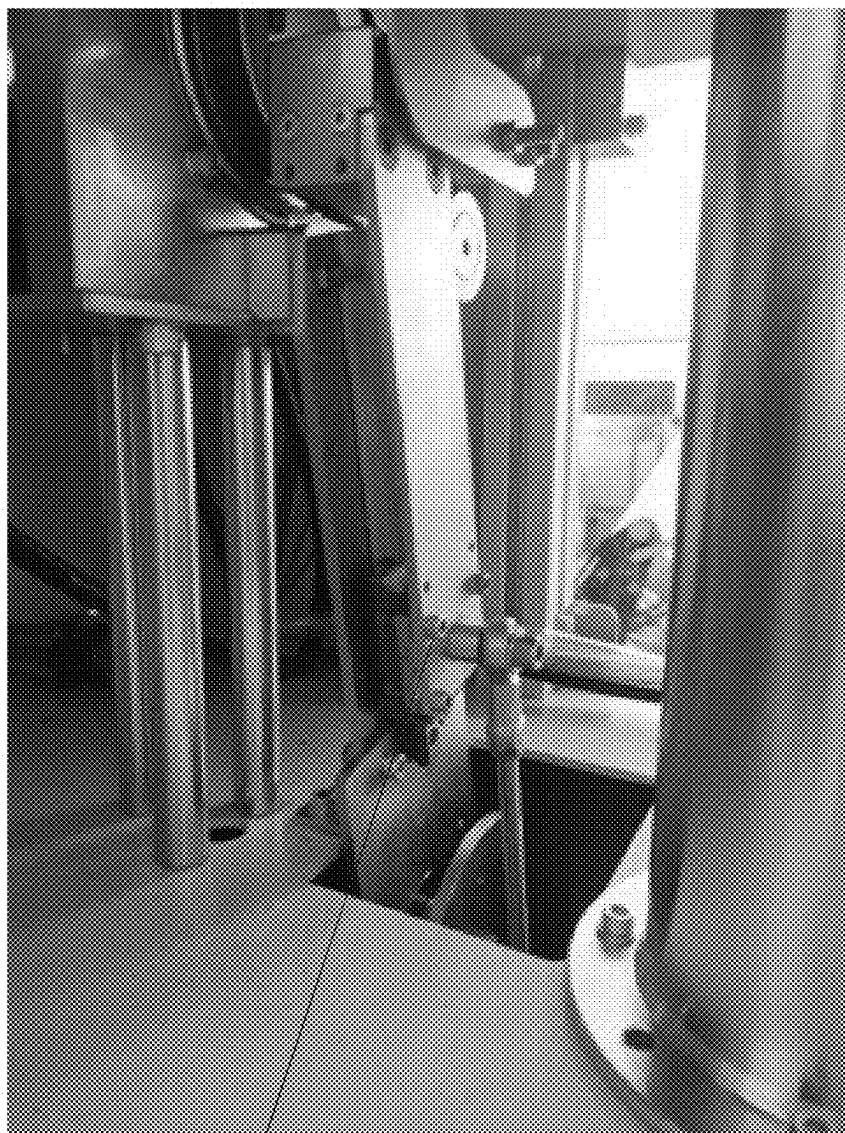


FIG. 13



A

FIG. 14

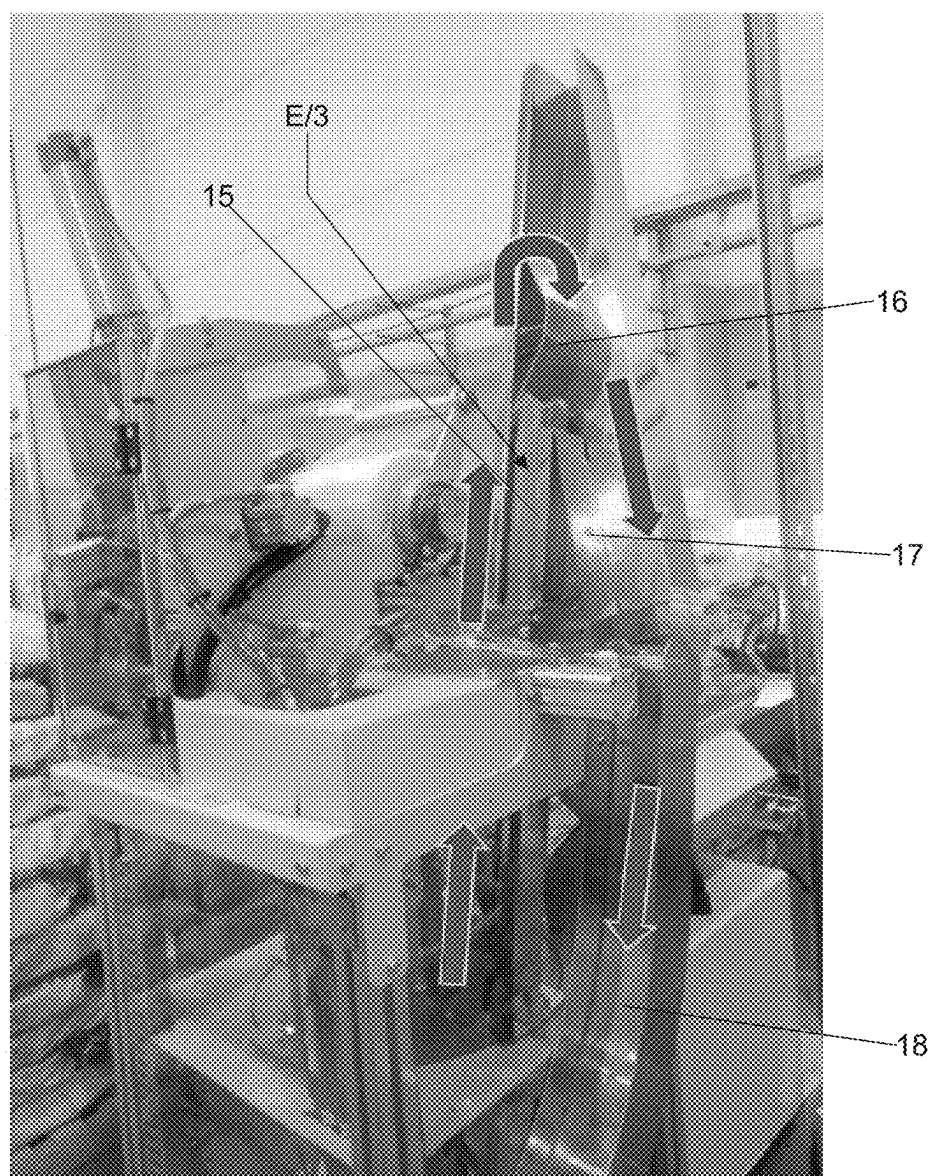
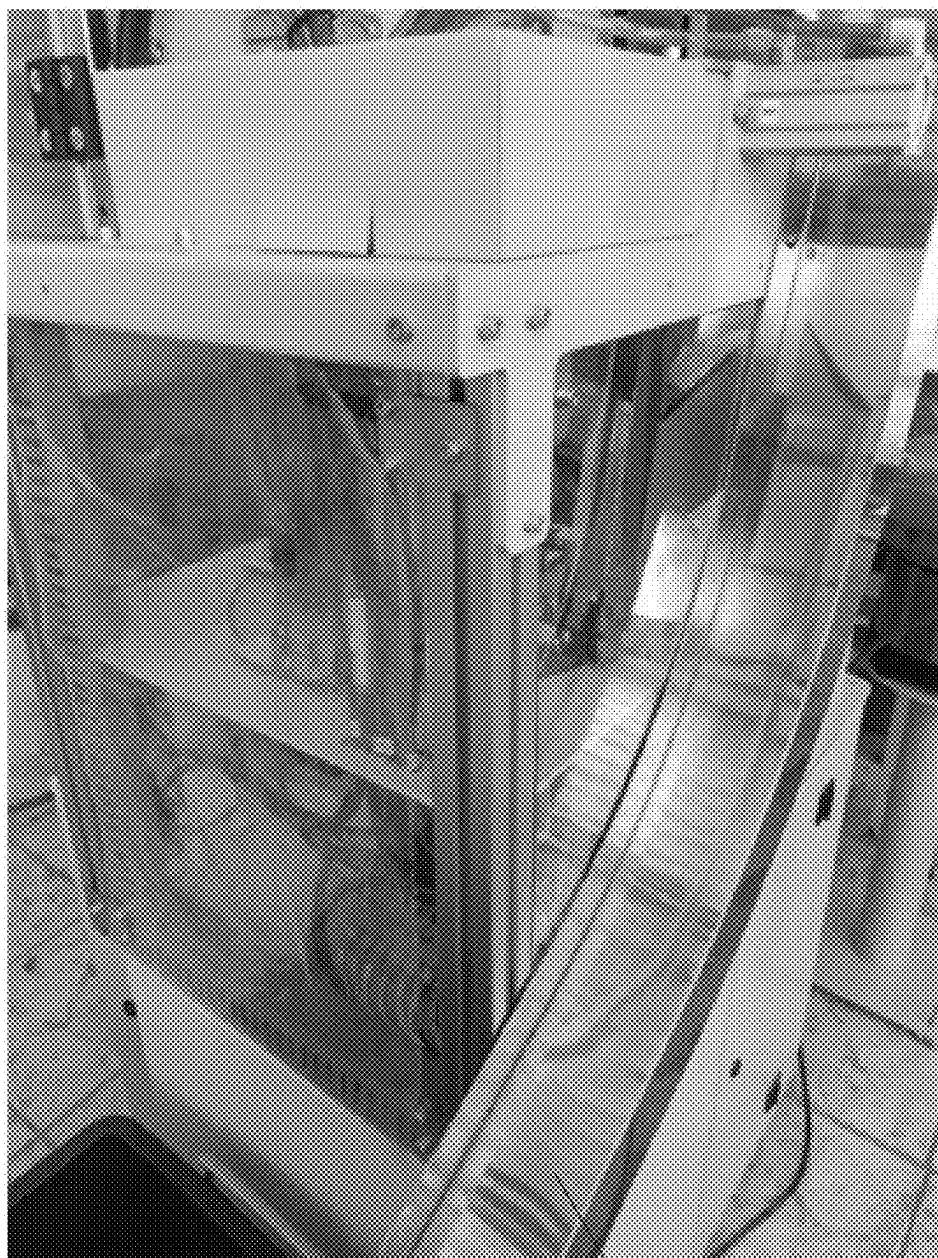


FIG. 15



SYSTEM AND METHOD FOR COMPACT AND ORDERLY PACKAGING OF FLOOR LEVELERS AND THE LIKE

FIELD

[0001] This invention relates to a system and method for compact and orderly packing of floor levelers. The field of application is focused on the logistic and industrial packaging sector, more particularly on automated solutions for the optimization of space and efficiency in the packaging and transportation of small construction items. This invention aims to provide a packaging method that standardizes the measurements and geometry of the packages, promoting a substantial improvement in the occupation of storage and transport space, in addition to improving the visual presentation of the products to facilitate identification and attract the consumer, minimizing the environmental impact by reducing the consumption of packaging material.

BACKGROUND

[0002] Namely, manufacturers of floor levelers in the most offer their products packed in standardized packaging, in which the pieces remain misaligned and arranged in a non-uniform manner. This practice results in a less optimized space occupation, both in transportation and storage of stocks, resulting in logistic management that demands a greater physical volume. Additionally, the shape and arrangement of these standardized packages do not favor proper stacking and overlapping due to the irregular geometry, presenting challenges regarding efficiency and stability during storage and handling.

[0003] The document BR112019013346-1, published on Dec. 31, 2019, entitled "PACKAGING METHOD, AND PACKAGING MACHINE", deals with a packaging method in which a tube is provided in a forward movement direction, which comprises a push up step in which said tube is actuated in a manner that is transverse to the forward movement direction, push up part of the tube in a push up direction and a sealing and cutting step after which a tube close to an end and a closed and separated package of the tube is obtained. During the push up step, the tube is held transversely, and a break is generated in the push up direction between the actuated and held portions of the tube. The tube is sealed on both sides of the rupture and cut at the height of the rupture. Suitable packaging machine for applying the method.

[0004] However, the above prior art is cited only to compose the state of the art, since it was not possible to obtain any patent reference that contained teachings close to a compact and orderly packaging system and process of floor levelers, as claimed by this invention.

SUMMARY

[0005] This invention contemplates a system and method for automated packaging floor levelers, designed to improve efficiency in space use and logistic management. This invention comprises a series of synchronized mechanisms that ensure the alignment and uniform arrangement of the products within the packages. The system is equipped with components that organize the levelers in an interleaved and overlapping way, resulting in a superior volumetric utilization. In addition, this invention has functionalities that facilitate the stacking and handling of packaging, reducing

operating costs and contributing to a reduction in environmental impact by reducing the material used in packaging. This invention, therefore, brings significant improvements to the construction material logistic sector, offering an efficient solution from the feeding of the levelers to the final delivery of the packaged products.

[0006] This invention contemplates the following objectives:

[0007] It is the object of this invention to provide a packaging system and method that improves the alignment and arrangement of the floor levelers within the packages, overcoming the non-uniform arrangement found in current solutions;

[0008] It is the object of this invention to optimize the use of space both in the transport and storage of floor levelers, by means of an organization that favors the stacking and overlapping of the packages;

[0009] It is the object of this invention to reduce the operating costs associated with the transportation and storage of the floor levelers by providing a package that requires less space and facilitates handling;

[0010] The objective of this invention is to minimize the environmental impact associated with the use of packaging for floor levelers, by reducing the material necessary for their manufacture;

[0011] It is the object of this invention to improve the visual presentation of the floor levelers in the packages to facilitate identification and attract the consumer;

[0012] It is the object of this invention to offer an automated packaging system that integrates the feeding, alignment, overlapping and packaging of the floor levelers, promoting an effective solution from production to delivery to the end customer.

[0013] This invention contemplates the following advantages:

[0014] Increased efficiency in the packaging of floor levelers, by adopting a system that comprises the precise alignment and uniform arrangement of the parts, thus maximizing the space within the packages;

[0015] Improvement in the use of transport and storage space, since this invention contemplates packaging whose dimensions are optimized for stacking and overlapping, reducing the volume necessary for logistic;

[0016] Reduction of operational and logistical costs, since this invention allows the use of less packaging and facilitates handling during the stages of distribution and storage of the products;

[0017] Contribution to environmental sustainability, as this invention enables a significant decrease in the use of packaging materials, reducing waste and ecological impact;

[0018] Improvement of the presentation of the product at the point of sale, since this invention comprises packaging with an attractive look and that allows a quick and effective identification of the content by the consumer;

[0019] Integration and automation of the packaging process, where this invention contemplates a system that organizes, aligns and packages the floor levelers in a sequential and automated manner, increasing productive efficiency and minimizing the need for manual intervention.

BRIEF DESCRIPTION OF DRAWINGS

[0020] The figures mentioned below to better explain the invention in an illustrative and non-limiting manner:

[0021] FIG. 1: perspective view of the floor leveler;

[0022] FIG. 2: perspective view of the interleaved floor levelers;

[0023] FIG. 3: perspective view of the interleaved and overlapping floor levelers;

[0024] FIG. 4: perspective view of the interleaved and overlapping floor levelers packaged by a package;

[0025] FIG. 5: perspective view of the overall packaging system;

[0026] FIG. 6: view of the double-acting pneumatic cylinders coupled with timers;

[0027] FIG. 7: view of the photosensitive presence sensor, which aims to identify the alignment and misalignment of the floor levelers;

[0028] FIG. 8: view of the photosensitive presence sensor with the three-axis rotating cylinder, which pushes the floor levelers towards the rotating steering device;

[0029] FIG. 9: perspective view of the rotating steering device, composed of recesses and a nozzle that moves the floor levelers clockwise and counterclockwise to arrange them in an interleaved and overlapping manner;

[0030] FIG. 10: perspective view of the angular housing compartment internally coated by packages, as well as the actuator devices, which seal and cut the opening of the package and the pneumatic actuators;

[0031] FIG. 11: perspective view of the angular housing compartments lined by packages, further showing the angular closure of said packages;

[0032] FIG. 12: perspective view of the angled housing compartments;

[0033] FIG. 13: perspective view of the pneumatic actuator with vertical movement that assists the angular housing compartments;

[0034] FIG. 14: perspective view of the release mechanism equipped with an exit duct interconnected to a verticalized protrusion, having an angled exit ramp for sending the floor levelers packaged by the packages to an exit conveyor;

[0035] FIG. 15: shows the perspective view of the exit conveyor belt for the floor levelers packaged by the packages.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0036] The system and method for compact and orderly packaging of floor levelers and the like consists of a compact and orderly packaging system (1), object of this invention, which aims to provide the standardization of the measurements and geometry of the packages (E) that pack the floor levelers (3), in addition to promoting a substantial improvement in the occupation of space for storage and transport of these packages (E). The floor levelers (3) are arranged in an interspersed and overlapping manner, allowing precise alignment, which maximizes the quantity of items per volume. The standardization of package dimensions (E) facilitates the stacking and handling of floor levelers (3), reducing logistic costs and environmental impact due to the lower consumption of packaging material (E). In addition, the packaging (E) is designed to be not only functional, but also

to enhance the visual presentation of the floor levelers (3), facilitating identification and attracting the consumer.

[0037] The compact and orderly packaging system (1) is configured by a feeding compartment (4) that holds the floor levelers (3), which are intended for rotary positioning units (5) equipped with spiral distribution rails (6) by means of a conveyor belt (7) contained in the feeding compartment (4). Thus, the floor levelers (3) are directed to a sequential conveyor belt (8), where they pass through two double-acting pneumatic cylinders (CP) coupled with timers, which alternate during the feeding of the floor levelers (3), supplying the quantity and speed that the packaging system (1) needs. Next, the floor levelers (3) are profiled on the sequential conveyor belt (8), passing through a photosensitive presence sensor (SF), which aims to identify the alignment and misalignment of the floor levelers (3) on the sequential conveyor belt (8), so that, if one or more floor levelers (3) is misaligned, the photosensitive presence sensor (SF) sends a signal to the packaging system (1) causing the sequential conveyor belt (8) to stop.

[0038] In time, together with the sequential conveyor belt (8), there is a support configured by a photosensitive presence sensor (SF1), which is installed in front of a three-axis rotating cylinder (CR), which pushes the floor levelers (3) towards the rotating steering device (9). It is worth noting that the photosensitive presence sensor (SF1) has the function of counting the floor levelers (3).

[0039] Next, the floor levelers (3) are directed to a rotating steering device (9), composed of recesses (10) and a nozzle (B) that moves the floor levelers (3) clockwise and counterclockwise to be arranged in an interspersed and overlapping manner. Then, the arranged and overlapping floor levelers (3) are sent to the angular housing compartments (11) with the aid of a pneumatic actuator (A) with vertical movement.

[0040] The angular housing compartments (11) are internally lined by packages (E), whose packages (E) are heat sealed, having both ends sealed at right angles by means of actuating devices (14), which seal and cut the opening of the package (E), also having pneumatic actuators (P) that heat seal the end vertically of the package (E), therefore packaging the floor levelers (3) providing the standardization of the measurements and geometry of the packages (E) that pack the floor levelers (3), in addition to promoting a substantial improvement in the occupation of space for storage and transport of these packages (E). Once this is done, the floor levelers (3) packaged by the packages (E) are sent to a release mechanism (12) configured by an exit duct (15) interconnected to a verticalized protrusion (16), having an exit angled ramp (17) for sending the floor levelers (3) packaged by the packages (E) to an exit conveyor (18).

[0041] The compact and ordered packaging system (1) is composed of a process comprising the following steps:

[0042] In the first step, the conveyor belt (7) of the feeding compartment (4) sends the floor levelers (3) to the rotary positioning units (5) equipped with spiral distribution rails (6);

[0043] In the second step, the spiral distribution rails (6) of the rotating positioning units (5) direct the floor levelers (3) to a sequential conveyor belt (8), where they are profiled before being directed to the rotating steering device (9);

[0044] In the third stage, the floor levelers (3) pass through two double-acting pneumatic cylinders (CP)

coupled with timers, which alternate during the feeding of the floor levelers (3), supplying the quantity and speed that the packaging system (1) needs;

[0045] In the fourth stage, the floor levelers (3) are profiled on the sequential conveyor belt (8), passing through a photosensitive presence sensor (SF), which aims to identify the alignment and misalignment of the floor levelers (3) on the sequential conveyor belt (8), so that, if one or more floor levelers (3) is misaligned, the photosensitive presence sensor (SF) sends a signal to the packaging system (1), causing the sequential conveyor belt (8) to stop;

[0046] In the fifth stage, together with the sequential conveyor belt (8), there is a support configured by a photosensitive presence sensor (SF1), which is installed in front of a three-axis rotating cylinder (CR), which pushes the floor levelers (3) towards the rotating steering device (9), while the photosensitive presence sensor (SF1) has the function of counting the floor levelers (3);

[0047] In the sixth step, the rotating steering device (9) composed of recesses (10) and a nozzle (B) uses the recesses (10) to move the floor levelers (3) clockwise and counterclockwise, organizing them in an interspersed and overlapping manner;

[0048] In the seventh stage, the floor levelers (3) already interleaved and superimposed by the rotating steering device (9) are directed to the angular housing compartments (11), which are internally lined by packages (E), and are pushed and fitted with the aid of a pneumatic actuator (A) with vertical movement, whose packages (E) have both ends sealed at right angles;

[0049] In the eighth stage, since the floor levelers (3) are properly arranged, fitted and interspersed in the angular housing compartments (11) lined by packages (E), the packages (E) already packed by the floor levelers (3) are heat sealed, also having both ends sealed at right angles by means of actuating devices (14), which seal and cut the opening of the package (E), also having pneumatic actuators (P) that heat seal the vertical end of the package (E) with the floor levelers (3) packed in an orderly manner;

[0050] In the ninth step, the floor levelers (3) packed by the packages (E) are sent to a release mechanism (12) equipped with an exit duct (15) interconnected to a verticalized protrusion (16), having an angled exit ramp (17) to send the floor levelers (3) packed by the packages (E) to an exit conveyor (18).

[0051] In summary, the compact and orderly packaging system (1) and process improve the efficiency of the packaging of floor levelers (3), promoting an orderly and precise distribution, while optimizing the use of storage and transport space and functioning as an automated solution from feeding to the final delivery of the packaged packages (E).

1. A system for compact and orderly packaging of floor levelers, comprising: a package for floor levelers, which are packed in a feeding compartment, configured for rotary positioning units equipped with spiral distribution rails by a conveyor belt contained in the feeding compartment; and the floor levelers are directed to a sequential conveyor belt, wherein a compact and orderly packaging system is configured by a rotating directing device which receives the floor levelers from the sequential conveyor belt; the rotating directing device, sends the floor levelers sequentially, stan-

dardized, and organized to angular housing compartments coated by packages, which are heat sealed and sent with the floor levelers ordered and compacted to a release mechanism with exit belt.

2. The system for compact and orderly packaging of floor levelers of claim 1, wherein the compact and orderly packaging system is configured by a rotating steering device equipped with recesses and a nozzle, which rotates the floor levelers clockwise and counterclockwise to profile and organize the floor levelers inside angled housing compartments.

3. The system for compact and orderly packaging of floor levelers of claim 1, wherein the angular housing compartments are internally coated by packages with the aid of a pneumatic actuator with vertical movement.

4. The system for compact and orderly packaging of floor levelers according to claim 3, wherein the packages have both ends sealed at right angles by actuating devices and pneumatic actuators that heat seal and cut the vertical end of the package inside the angular housing compartments, so that the floor levelers are packaged by the packages and configured in standardized measurements and geometries, being sent to a release mechanism.

5. The system for compact and orderly packaging of floor levelers according to claim 4, wherein the release mechanism is provided with an exit duct interconnected to a verticalized protrusion, having an angled exit ramp for sending the floor levelers packaged by the packages to an exit conveyor.

6. The system for compact and orderly packaging of floor levelers of claim 1, wherein the floor levelers, when accessing the sequential conveyor belt, pass through two double-acting pneumatic cylinders coupled with timers, which alternate during the feeding of the floor levelers to the sequential conveyor belt, supplying the quantity and speed that the packaging system needs.

7. The system for compact and orderly packaging of floor levelers according to claim 6, wherein the floor levelers follow profiled on the sequential conveyor belt, passing through a photosensitive presence sensor, which is configured to identify the alignment and misalignment of the floor levelers on the sequential conveyor belt, so that, if one or more floor levelers is misaligned, the photosensitive presence sensor sends a signal to the packaging system causing the sequential conveyor belt to stop.

8. The system for compact and orderly packaging of floor levelers according to claim 7, wherein the sequential conveyor belt has a support configured by a photosensitive presence sensor, which is installed in front of a three-axis rotating cylinder, which pushes the floor levelers towards the rotating steering device, while the photosensitive presence sensor counts the floor levelers.

9. A method for compact and orderly packaging of floor levelers and the like, performed by the system of claim 1, comprising the following steps:

in a first step, the conveyor belt of the feeding compartment sends the floor levelers to the rotary positioning units equipped with spiral distribution rails (6);

in a second step, the spiral distribution rails of the rotating positioning units direct the floor levelers to a sequential conveyor belt, where they are profiled before being directed to the rotating steering device,

in a third stage, the floor levelers pass through two double-acting pneumatic cylinders coupled with tim-

ers, which alternate during the feeding of the floor levelers, supplying the quantity and speed that the packaging system needs;

in a fourth stage, the floor levelers are profiled on the sequential conveyor belt, passing through a photosensitive presence sensor, which is configured to identify the alignment and misalignment of the floor levelers on the sequential conveyor belt, so that, if one or more floor levelers is misaligned, the photosensitive presence sensor sends a signal to the packaging system, causing the sequential conveyor belt to stop;

in a fifth stage, together with the sequential conveyor belt, there is a support configured by a photosensitive presence sensor, which is installed in front of a three-axis rotating cylinder, which pushes the floor levelers towards the rotating steering device, while the photosensitive presence sensor has the function of counting the floor levelers;

in a sixth step, the rotating steering device, composed of recesses and a nozzle, uses the recesses to move the floor levelers clockwise and counterclockwise, organizing them in an interspersed and overlapping manner;

in a seventh stage, the floor levelers, already interleaved and superimposed by the rotating steering device, are directed to the angular housing compartments, which are internally lined by packages, and are pushed and fitted with the aid of a pneumatic actuator with vertical movement, whose packages have both ends sealed at right angles;

in an eighth stage, since the floor levelers are properly arranged, fitted and interspersed in the angular housing compartments lined by packages, the packages already packed by the floor levelers are heat sealed, also having both ends sealed at right angles by actuating devices, which seal and cut the opening of the package, also having pneumatic actuators that heat seal the vertical end of the package with the floor levelers packed in an orderly manner; and

in a ninth step, the floor levelers packed by the packages are sent to a release mechanism equipped with an exit duct interconnected to a verticalized protrusion, having an angled exit ramp to send the floor levelers packed by the packages to an exit conveyor.

* * * * *