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(54) Method and device for making a herringbone pattern

(57) Method and device (1) for making a package layer of elongated bricks in herringbone pattern, wherein the layer is made on a substrate and having a horizontal limitation by at least one end jig (12) with a herringbone-shaped stop edge (14) adapted to the bricks used, wherein the bricks supported on a transport surface moving in a first direction towards the end jig, are supplied towards the end jig (12) in consecutive series, to make the package layer, growing from the end jig, wherein the bricks when abutting the end jig (12) or the bricks of the preceding series that have already been incorporated in the package layer, form a point of rotation therewith and by engagement of the transport surface moving at that location are placed in the desired position in the package layer.

EP 1 600 556 A2

Description

[0001] The invention relates to a method for forming a package layer of bricks in herringbone pattern. The invention furthermore relates to a device for forming a package layer of (paving) bricks in herringbone pattern.

[0002] Such methods and device have been known for long, Dutch patent applications 84.01469, 86.00820, 86.02633 and 93.01484 and European patent application 0.256.169 can for instance be referred to.

[0003] Dutch patent application 84.01469 shows a number of different devices, wherein for bringing the bricks in herringbone orientation use is made of a lazy tong mechanism with which two or more series of bricks can be engaged and then can be rotated over 45 degrees in opposite sense. Alternatively use can be made of a number of intertwined chutes adapted to one brick each, that supply the one series of bricks at an angle of 45 degrees and a next series at an angle of 90 degrees thereto, so also at 45 degrees but then in opposite direction. In Dutch patent application 86.00820 comparable arrangements are suggested, as well as an arrangement in which use is made of chutes positioned at both sides of a work surface, which chutes are at an angle of 45 degrees thereto, with which alternately a series of bricks is delivered, which bricks are then already in herringbone pattern.

[0004] In Dutch patent application 86.02633 use is made of a positioning jig that is reciprocally rotatable above a slightly inclined supply surface, with which consecutive series of bricks are alternately oriented at opposite angles of 45 degrees and join the work surface in said orientation.

[0005] In European patent application 0.256.169 bricks are supplied transverse to the work surface and they are subsequently pushed by a herringbone-shaped jig against an opposite end jig or the bricks pushed against it earlier on.

[0006] In Dutch patent application 93.01484 the bricks are supplied in longitudinal series and when delivered to the vibrating work surface they are rotated by an aid, such as a driven roller, to the one or the other side in order to be at 45 degrees and in said orientation to join the bricks on the work surface treated earlier on.

[0007] All known devices are rather complex and/or bulky. The provisions for the various mechanisms render the known device failure prone, due to which they are less suitable for replacing the -expensive- manual labour.

[0008] The chutes used may reduce the complexity, yet the orientation of the bricks is not always reliable.

[0009] It is an object of the invention to provide a method and a device of the type mentioned in the preamble, with which in a failure-proof manner a package layer of bricks in herringbone pattern can be made.

[0010] It is an object of the invention to provide a method and a device of the type mentioned in the preamble, with which with simple means, yet reliably a package layer of bricks in herringbone pattern can be made.

[0011] From one aspect the invention provides a method for making a package layer of elongated bricks in herringbone pattern, wherein the layer is made on a substrate and with horizontal limitation by at least one herringbone-shaped stop surface, wherein the bricks supported on a transport surface moving in a first direction towards the stop surface are supplied towards the stop surface, in consecutive series, to make the package layer, growing, wherein the bricks when abutting the stop surface form a point of rotation therewith and by engagement of the transport surface moving at that location, are placed in the desired position in the package layer.

[0012] For bringing the bricks in the correct herringbone position this method utilises a herringbone-shaped stop surface, that can be formed by a herringbone-shaped end jig (for the first row of bricks) and subsequently by the bricks that are already abutting it (or by a first row of bricks placed in herringbone pattern and subsequently the bricks abutting it), as well as a transport surface that has to be present anyway for the supplying. The process can thus be carried out using few means, and as a result can be carried out failure-free and reliably.

[0013] In a simple embodiment the transport surface is formed by the transport surface of a belt conveyor or the like, so that movement can take place with few vibrations, which would otherwise indeed be the case when the usual vibrating plate is being used.

[0014] Preferably the bricks are supplied on the transport surface with their longitudinal direction substantially transverse to the first direction. A correct position with respect to the end jig and the herringbone pitch is achieved when the mutual centre-to-centre distance of the bricks is L 2, wherein L is a length measure of the bricks, for instance approximately the average length of the bricks.

[0015] In a possible embodiment the bricks supplied according to substantially the same path are supplied on the transport surface in a position - considered according to a second direction, perpendicular to the first direction- with their centre of gravity situated between a first line passing through a vertex of the end jig and being parallel to the first direction and a second line parallel thereto situated at ½ B 2 therefrom, wherein B is a breadth measure of the bricks, for instance approximately the average width of the bricks. The bricks are then at all times properly positioned for both rotational movements to be made.

[0016] It may even be opted for to supply the bricks on the transport surface in consecutive series with their centre of gravity each time according to a same supply line, as a result of which the supply of the bricks, particularly using a supply conveyor, can be simplified. It is preferred here to have the supply line situated in the middle in between the first and the second line, so that

measurement deviations in the bricks and irregularities and roughness in the surface of the bricks cause as little hindrance as possible.

[0017] In an alternative embodiment the bricks of consecutive series are supplied on the transport surface in respective shifted positions when considered according to a second direction, perpendicular to the first direction. Different starting positions are chosen here for the bricks of consecutive series. Preferably the distance between the lines of motion of the centres of gravity of bricks of consecutive series supplied according to substantially the same path is smaller than L - ½ B 2, wherein B is a breadth measure of the brick and L is a length measure of the brick.

[0018] In a first possible arrangement the stop surface is moved per series of bricks by a step of ½ B 2, so that the end jig can begin close to the starting position of the bricks and the length of the path to be traversed by the bricks can remain constant.

[0019] In a second alternative possible arrangement the stop surface is held stationary. The stop surface will then be situated at a larger distance from the starting position of the bricks, which due to the reliable manner of supplying does not have to be a problem for the accuracy of the supply and rotation of the bricks.

[0020] From a further aspect the invention provides a method for making a package layer of elongated bricks in herringbone pattern, wherein the layer is made on a substrate and having a horizontal limitation by at least one end jig with a herringbone-shaped stop edge adapted to the bricks used, wherein the bricks supported on a transport surface moving in a first direction towards the end jig, are supplied towards the end jig in consecutive series, to make the package layer, growing from the end jig, wherein the bricks when abutting the end jig or the bricks of the previous series that has already been incorporated in the package layer, form a point of rotation therewith and by engagement of the transport surface moving at that location are placed in the desired position in the package layer.

[0021] The respective bricks of consecutive rows may in an embodiment be supplied to the package layer by the transport surface, with their centres of gravity each time substantially according to the same path.

[0022] From a further aspect the invention provides a device for making a package layer of elongated bricks in herringbone pattern, comprising a work surface for supporting the package layer in the making, wherein the work surface is horizontally limited by at least one herringbone-shaped stop surface suitable for the bricks used, wherein the work surface is formed by a conveyor surface that can be driven for supplying the bricks according to a first direction to the stop surface, substantially transverse thereto.

[0023] From a further aspect the invention provides a device for making a package layer of elongated bricks in herringbone pattern, comprising a work surface for supporting the package layer in the making, wherein the work surface is horizontally limited by at least one end jig having a herringbone-shaped stop edge adapted to the bricks used, wherein the work surface is formed by a conveyor surface that can be driven for supplying the bricks according to a first direction to the end jig, substantially transverse to the stop edge thereof. The stop edge can be a standard part, if necessary, having filling pieces that may or may not be flexible, for adjustment to the average sizes of the bricks used.

[0024] In a compact arrangement the device according to the invention comprises a first supply conveyor for the bricks, that is oriented substantially transverse to the first direction for delivering the bricks to the conveyor surface. For controlling the delivery positions of the bricks, the first supply conveyor may be provided with flights for taking along the bricks and keeping them mutually spaced apart, preferably with a mutual centre-to-centre distance of the bricks of approximately L 2.

[0025] Preferably the device according to the invention furthermore comprises a brick deliverer, positioned near the first supply conveyor for delivering the bricks therefrom to the conveyor surface.

[0026] In a first further development the first supply conveyor supports the bricks. The compactness of the device according to the invention is increased when the brick deliverer is placed above the first supply conveyor. In a simple embodiment the brick deliverer comprises a roller including brick engaging blades.

[0027] In a second further development of the first supply conveyor is placed above or at the side of the bricks.

[0028] In that case the brick deliverer may form a support surface for the bricks during movement by the first supply conveyor, which support surface extends over the conveyor surface and is selectively retractable from underneath the supplied bricks in order to deliver them to the conveyor surface. As a result of inertia phenomena the bricks will remain horizontally in their place and end up on the transport surface. A stop for the bricks may optionally be provided which stops the bricks during retraction of the support surface in order to prevent them from indeed moving along with the support surface.

[0029] In a further embodiment the device according to the invention furthermore comprises a filling bunker and sieve bed for supplied bricks.

[0030] In a further embodiment the device according to the invention comprises a second supply conveyor for supply of the bricks to the first supply conveyor. Said second supply conveyor preferably is oriented transverse to the first supply conveyor, that means parallel to the supply direction to the end jig, which makes a compact layout possible. For instance a filling bunker and a sieve bed for the supplied bricks, both incorporated in the device, can be connected to in a manner in which space is used advantageously.

[0031] In an alternative embodiment of the device according to the invention the first supply conveyor connects to the sieve bed or a sorting station positioned in

between. The number of turns of direction for the bricks can then remain limited. The sorting station can then offer the bricks in a direction opposite the first direction, wherein the first supply conveyor is transverse to both. Thus a kind of U-shaped path of displacement of the bricks is formed. The sorting station can be situated parallel to and adjacent to the transport surface.

[0032] In order to complete the device according to the invention it may provided with a pick-up mechanism for picking up a completed package layer from the work surface.

[0033] The device according to the invention can be kept relatively lightweight. The device can be provided with wheels or caterpillar tracks and a trailer coupling for easy transport.

[0034] The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figures 1 A-G show an exemplary embodiment of a device according to the invention, in top view, during consecutive stages of a process cycle;

Figure 2 shows the device of figures 1 A-G, in an end stage of the process cycle;

Figure 3 shows an alternative embodiment of the device of figures 1 A-G;

Figure 4 shows a schematic view of a transverse supplier of bricks in the directions according to the preceding figures;

Figure 5 shows a diagram of the supply lines of consecutive bricks according to a first possible arrangement;

Figure 6 shows a diagram of the supply lines of consecutive bricks according to a second possible arrangement; and

Figure 7 shows a top view of an alternative embodiment of a device according to the invention.

[0035] The device 1 shown in the attached figures comprises a frame 100, that is mobile, for instance drawn by a vehicle, such as a car, and comprises a bunker 2, schematically shown on the right-hand side as considered in the drawing, which bunker receives bricks S from the direction A and delivers them to a sieve bed 3, where sand residues and the like can be separated from the bricks. The sieve bed 3 is made such, for instance with known star scrapers, that they are also transported to a sorting station 4 (direction B), where an employee W is present to place the bricks S coming from the sieve bed in line with the long side against each other on a conveyor belt 5, which conveys in the direction C. A buffer length 6 of bricks S is formed on the conveyor belt 5.

[0036] The bricks S have a breadth measure B and a length measure L, wherein L approximately equals 2B. L and B here are the average length and the average width, respectively, of the brick, optionally including a tolerance added for compensating small irregularities and a joint size (also see Dutch patent application 93.01484).

[0037] Conveyor 7 conveying in transverse direction D, is placed in the device 1 at the end of the buffer length 6, which conveyor, as can be seen in figure 4, circulates about rollers 20a, 20b, one of which is driven using means that are not further shown. The conveyor 7 comprises a belt 21 circulating about the rollers 20a, 20b, on which belt flights 22 have been placed. The flights 22 are placed consecutively at mutual distances T, wherein T corresponds with the length measure L of a brick S, increased by L 2 - L, so that the bricks are at a centre-to-centre distance from each other of L 2.

[0038] The conveyor 7 is intermittently driven, so that, as shown in this example, each time three bricks are offered to a transport surface of a conveyor belt 8. At the end of the buffer 6 means may be provided for temporarily holding up the row of bricks approaching in direction C.

[0039] Above the conveyor 7 a brick deliverer 9 is placed, attached to the frame 100. The brick deliverer 9 is cylindrical and rotatably (direction J) driven about a horizontal axis V. At the outer surface the brick deliverer 9 is provided with blades 16 continuing in axis direction, which at rotation of the brick deliverer 9 are able to push the bricks situated on the conveyor 7 therefrom in the direction E to deliver the bricks to the conveyor belt 8, with their longitudinal axis transverse to the conveyance direction of the conveyor belt 8. The blades 16 rotate just over the flights 21 a,b so that freedom of choice is achieved as regards where to position the bricks for delivering, independent of the blades 16. It is noted that another arrangement of the brick deliverer is also possible, for instance in the form of a transverse belt supporting the bricks and a reciprocating slide pushing the bricks from the transverse belt. Use can also be made of a horizontally reciprocating support plate, which is situated just above the conveyor belt 8 when in an operative position, in which the bricks are supplied by the conveyor 7, and which is pulled away from underneath the bricks in a quick retractive motion so that the bricks -that are already in the desired position- are delivered to the conveyor belt 8. The conveyor can be positioned above the bricks, and be provided with downward extending flights. Near or above the support plate a stop may be provided that prevents the bricks from moving along with the support plate during its retraction. The stop may optionally also serve as guidance during the transport of the bricks by conveyor 7.

[0040] The conveyor belt 8 forms a joined together transport surface moving in the direction F, parallel to the direction E, and during a process cycle, in which a

package layer of bricks is made in herringbone pattern, it can be driven continuously. The bricks S are conveyed in the direction F by the conveyor belt 8, without their orientation in the horizontal plane being changed. The bricks S therefore remain transverse to the direction of movement F with their main axis.

[0041] The bricks S are thus conveyed to a work surface 10, which work surface 10 is limited sideward by an end jig 12 and side guides 11 a, 11 b and downward by the conveyor belt 8 itself. The end jig 12 has a perpendicularly herringbone-shaped edge 14, having vertices 13. In the example of figures 1 and 2 the end jig 1 2 is moved rearward from an initial position situated close to the conveyor 7 stepwise by ½ B 2, in the direction I, which corresponds to the direction F. Instead of an end jig a row of bricks that is already laid and kept in herringbone pattern can also be used.

[0042] In figure 1A the moment is shown that the first bricks S1 are pushed from the conveyor belt 21 in the direction E by the rotating brick deliverer 9 and delivered to the conveyor belt 8. They are subsequently conveyed in the direction F by the conveyor belt 8, until the bricks S1 with their leading long side abut the tips or vertices 13 of the end jig 12. The position of the bricks S is such that the centre of gravity Z thereof is at a side adjacent to a line h1 through vertex 13, parallel to the direction F (also see figure 5 and 6). As the bricks S at the location of the vertices 13 are stopped, and the conveyor belt 8 keeps engaging the bricks S1 for movement, a moment G is exerted on the bricks S1. As a result the bricks S1 are tilted about the vertices 13, and finally, as shown in figure 1C, will abut the perpendicularly herringbone-shaped edge 14 of the end jig 12 with a longitudinal plane and a transverse plane. The size of the zigzag-shape of the edge 14 may be adapted to the size of the bricks S, for which the contents of European patent application 0.164.146 in particular can also be referred to, the contents of which are to be considered included herein.

[0043] The bricks S1 that have already been placed against the edge 14 are now part of an end jig for the next series of bricks S2. With their upstream vertices p they form a stop point for the next row of bricks S, shown in the figure 1 D and 1 E. The vertices p of the bricks S already placed are on respective lines h2, that are parallel to the direction F (also see figures 5 and 6). The centres of gravity of the bricks S2 are at the side of said line h2 facing the line h1. The distance between the lines h1 and h2 is ½ B 2. The vertex about which the row of bricks S2 now treated will rotate/tilt, is shifted ½ B 2 with respect to the last vertex that was formed by the edge 14 itself. The bricks S2 now considered will therefore tilt in opposite direction, direction H, and take the position as shown in figure 1 F. In their turn the bricks S2 of said second row form new vertices for the subsequent series of bricks S3, which vertices p are in the line h1 . The bricks S3 of the next row will therefore be tilted again in the same direction (G) as the first row of bricks S1 .

[0044] This process can be repeated again and again, until the desired surface in herringbone pattern is achieved, for instance as shown in figure 2. The supply is then stopped for a short while, and the belts 7 and 8 are stopped, and with means that are not further shown, particularly with a hydraulic lift arm provided with a pick-up frame including suction cups, the formed package layer of bricks in herringbone pattern can be lifted from the -stationary- conveyor belt 8 in order to place this package in the project.

[0045] As soon as the package of bricks has been lifted from the belt conveyor 8 the end jig 12 can be passed back to an initial position, and the entire process can be carried out again.

[0046] It is noted that the device 1 can be equipped with means (not shown) for cleaning the bricks before they arrive on the work surface 10. To that end the cleaning means can be placed along the track 6, to clean the head ends, and along the belt 7, to the clean the longitudinal sides or stretchers.

[0047] The device 1 can in a simple way be built up with failure-proof means. Vibrations can remain limited to those that are connected to the use of the sieve bed 3. The device itself produces relatively little noise and can therefore be used in residential areas. The device according to the invention may furthermore be kept lightweight and compact. The space that can be seen in the figures between the brick deliverer 9 and the bunker 2 can be utilised for a motor compartment and for supporting the pick-up frame with suction cups.

[0048] As the orientation of the bricks S on the conveyor belt 8 does not change in the track until the end jig or bricks already laid are contacted, keeping the end jig 12 stationary is also an option. This is shown in figure 3, in which the end jig 12' is shown in an arrangement that is fixed as to position. The distance over which the bricks S are conveyed in the direction F is then larger, but this does not need to be a problem.

[0049] By means of the conveyor 7, the bricks S held still in approximately the same location, considered in transverse direction D, can be offered to the brick deliverer 9. The centres of gravity Z of the bricks then always have to be within the lines h1 and h2, which offers some freedom, as long as one stays within that range. Keeping the conveyor still at exactly the same location again and again is another option, wherein in order to be certain the centres of gravity will have to be held on a supply line in the middle in between the lines h1 and h2. All this is further elucidated in figure 5, see line l1.

[0050] Keeping the conveyor still for the one series of bricks at a location differing from the location for the next series of bricks is also another option. This is shown in figure 6 in which it can be seen that the bricks S1 with their centre of gravity Z move according to a line l2, that is situated at a distance that is smaller than ½ L from the line h1 and that the bricks S2 with their centre of gravity Z move according to a line 13, that is situated at a distance that is smaller than ½L from the line h2. The max-

imum distance between the lines l2 and l3 then is ½ L + ½ L, reduced by ½ B 2 (being the overlap).

[0051] In the embodiment of figure 7 the bunker 102 and the sieve bed 103 deliver the bricks in the same direction A, but now directly to the conveyor 107 that brings the bricks in front of the conveyor belt 108. The conveyor belt 108 is in this case rotated a quarter of a turn with respect to comparable conveyor belt 8 of the device according to the preceding figures. In this way a highly compact arrangement can be achieved, wherein the number of times the bricks have to be turned in the direction of movement can be cut by one. An end jig 112 and side guides 111 a and 111 b are also shown.

Claims

1. Method for making a package layer of elongated bricks in herringbone pattern, wherein the layer is made on a substrate and with horizontal limitation by at least one herringbone-shaped stop surface, wherein the bricks supported on a transport surface moving in a first direction towards the stop surface are supplied towards the stop surface, in consecutive series, to make the package layer, growing, wherein the bricks when abutting the stop surface form a point of rotation therewith and by engagement of the transport surface moving at that location, are placed in the desired position in the package layer.

2. Method according to claim 1, wherein the stop surface for the first row of bricks of the package layer is formed by a herringbone-shaped end jig.

3. Method according to claim 1 or 2, wherein the stop surface for rows of bricks following a first row of bricks of the package layer that are already in herringbone pattern, is formed by said first row of bricks.

4. Method according to claim 1, 2 or 3, wherein the transport surface is formed by the transport surface of a belt conveyor or the like.

5. Method according to any one of the preceding claims, wherein the bricks are supplied on the transport surface with their longitudinal direction substantially transverse to the first direction, wherein the mutual centre-to-centre distance of the bricks preferably is L 2, wherein L is a length measure of the bricks.

6. Method according to claim 5, wherein the bricks supplied according to substantially the same path are supplied on the transport surface in a position -considered according to a second direction, perpendicular to the first direction- with their centre of gravity situated between a first line passing through a vertex of the end jig and being parallel to the first direction and a second line parallel thereto situated at ½ B 2 therefrom, wherein B is a breadth measure of the bricks, wherein preferably the bricks are supplied on the transport surface in consecutive series with their centre of gravity each time according to a same supply line, wherein preferably the supply line is situated in the middle in between the first and the second line.

7. Method according to claim 5, wherein the bricks of consecutive series are supplied on the transport surface in respective shifted positions when considered according to a second direction perpendicular to the first direction, wherein preferably the distance between the lines of motion of the centres of gravity of bricks of consecutive series supplied according to substantially the same path is smaller than L - ½ B 2, wherein B is a breadth measure of the brick and L is a length measure of the brick.

8. Method according to any one of the preceding claims, wherein the stop surface is moved per series of bricks by a step of ½ B 2, wherein B is a breadth measure of the bricks.

9. Method according to any one of the preceding claims, wherein the stop surface is held stationary.

10. Method according to any one of the preceding claims, wherein the respective bricks of consecutive rows are supplied to the package layer by the transport surface, each time with their centres of gravity substantially according to the same path.

11. Device for making a package layer of elongated bricks in herringbone pattern, comprising a work surface for supporting the package layer in the making, wherein the work surface is horizontally limited by at least one herringbone-shaped stop surface suitable for the bricks used, for instance a herringbone-shaped end jig, wherein the work surface is formed by a conveyor surface that can be driven for supplying the bricks according to a first direction to the stop surface, substantially transverse thereto.

12. Device according to claim 11, furthermore comprising a first supply conveyor for the bricks, that is oriented substantially transverse to the first direction for delivering the bricks to the conveyor surface, wherein preferably the first supply conveyor is provided with flights for taking along the bricks and keeping them mutually spaced apart, preferably with a mutual centre-to-centre distance of the bricks of approximately L 2.

13. Device according to claim 11, furthermore compris-

ing a brick deliverer, positioned near the first supply conveyor for delivering the bricks therefrom to the conveyor surface.

14. Device according to claim 12 or 13, wherein the first supply conveyor supports the bricks.

15. Device according to claim 14, wherein the brick deliverer is placed above the first supply conveyor.

16. Device according to claim 15, wherein the brick deliverer comprises a roller including brick engaging blades.

17. Device according to claim 12 or 13, wherein the first supply conveyor is placed above or at the side of the bricks.

18. Device according to claim 13 and 17, wherein the brick deliverer forms a support surface for the bricks during movement by the first supply conveyor, which support surface extends over the conveyor surface and is selectively retractable from underneath the supplied bricks in order to deliver them to the conveyor surface.

19. Device according to any one of the claims 11-18, furthermore comprising a filling bunker and sieve bed for supplied bricks.

20. Device according to any one of the claims 11-18, furthermore comprising a second supply conveyor for supply of the bricks to the first supply conveyor, wherein preferably the second supply conveyor is oriented transverse to the first supply conveyor.

21. Device according to claim 19 and 20, wherein the second supply conveyor connects to the sieve bed or a sorting station positioned in between.

22. Device according to claim 19, when depending on claim 12, wherein the first supply conveyor connects to the sieve bed or a sorting station positioned in between.

23. Device according to any one of the claims 11-22, provided with means for cleaning the bricks, for cleaning the stretchers and/or the head sides of the bricks.

24. Device according to any one of the claims 11-23, provided with a pick-up mechanism for picking up a completed package layer from the work surface.

25. Device according to any one of the claims 11-24, provided with wheels or caterpillar tracks and a trailer coupling.

26. Device according to any one of the claims 11-25, wherein the operation surface is also limited by side guides or side jigs.

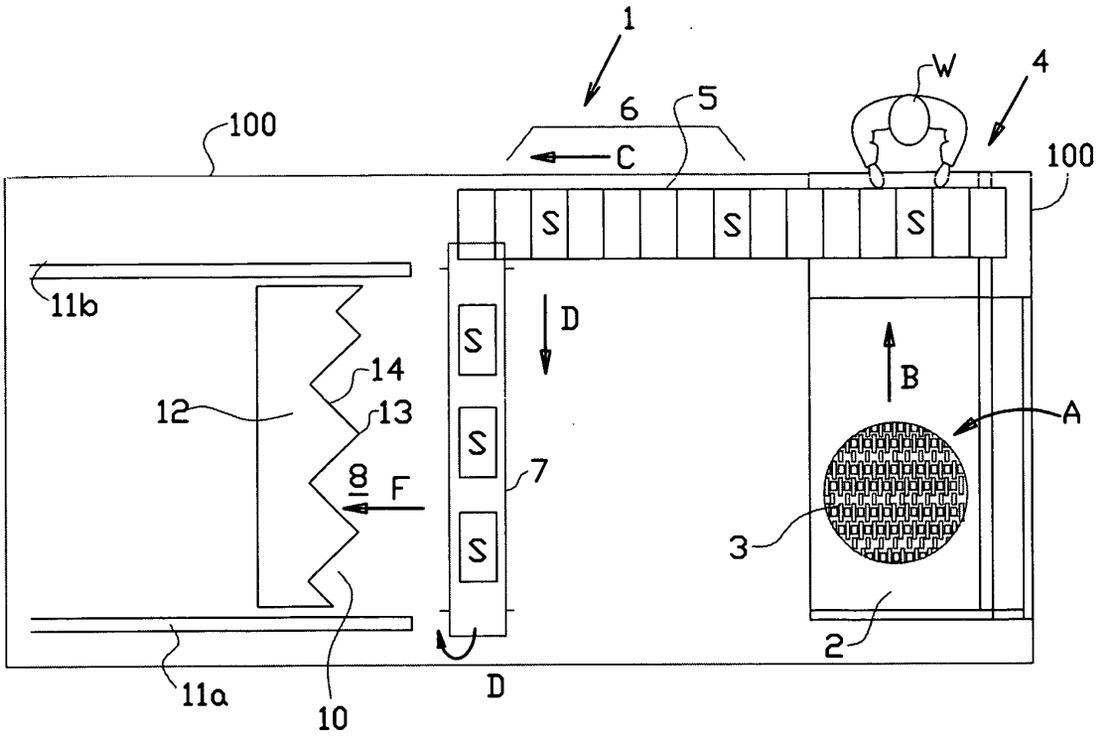
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FIG. 1A

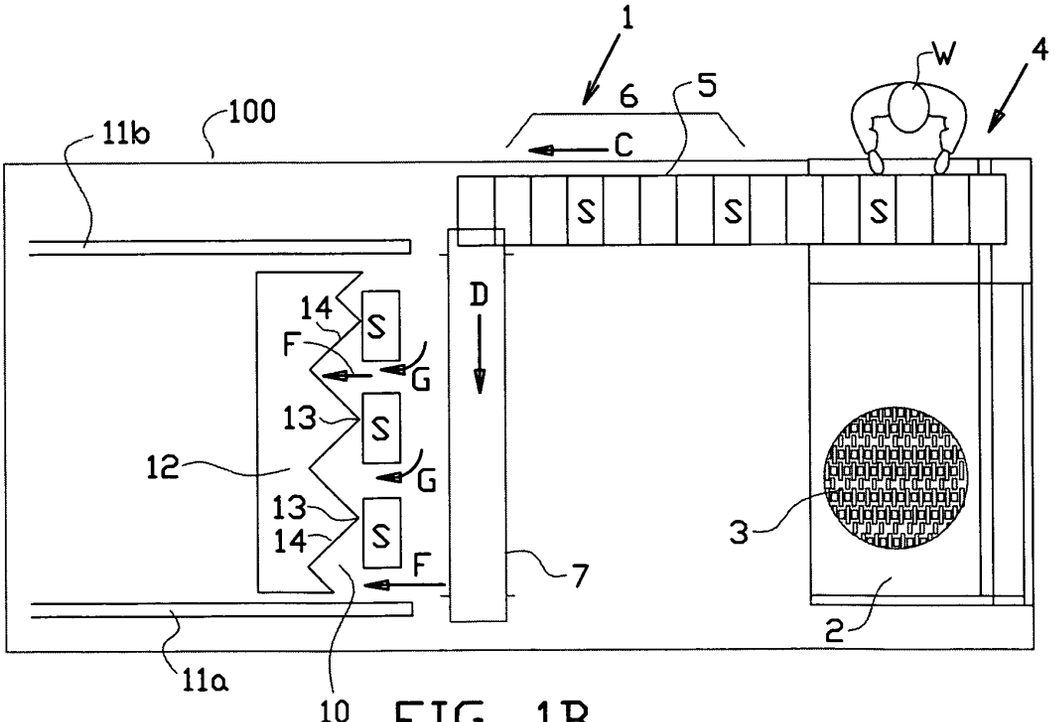
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FIG. 1B

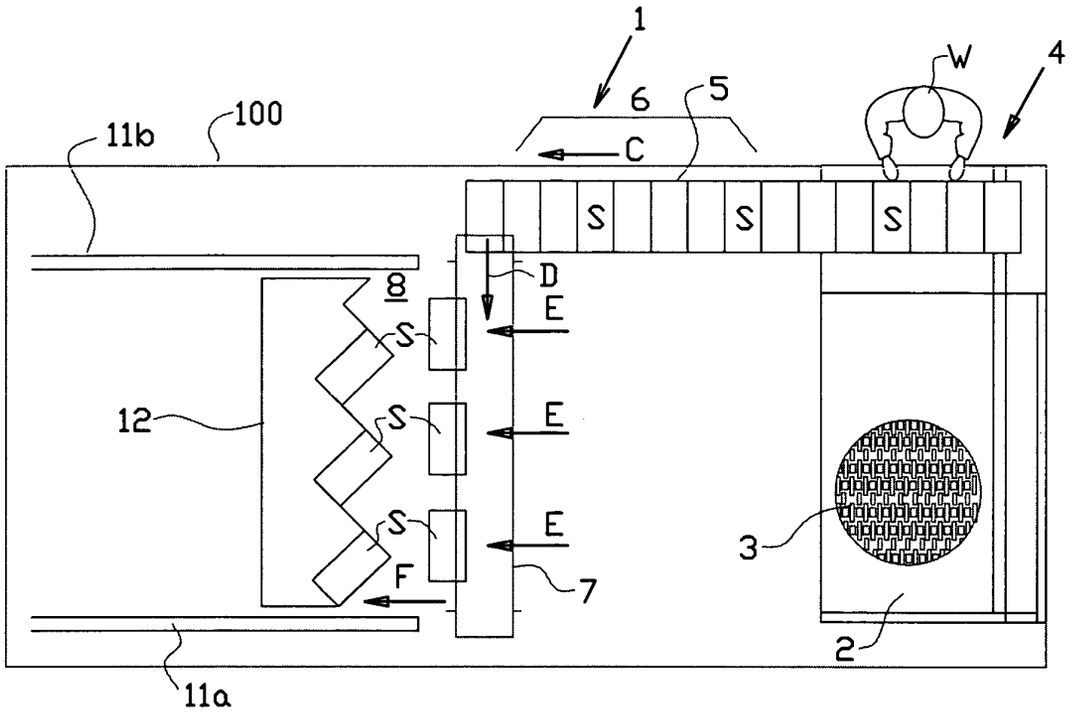
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FIG. 1C

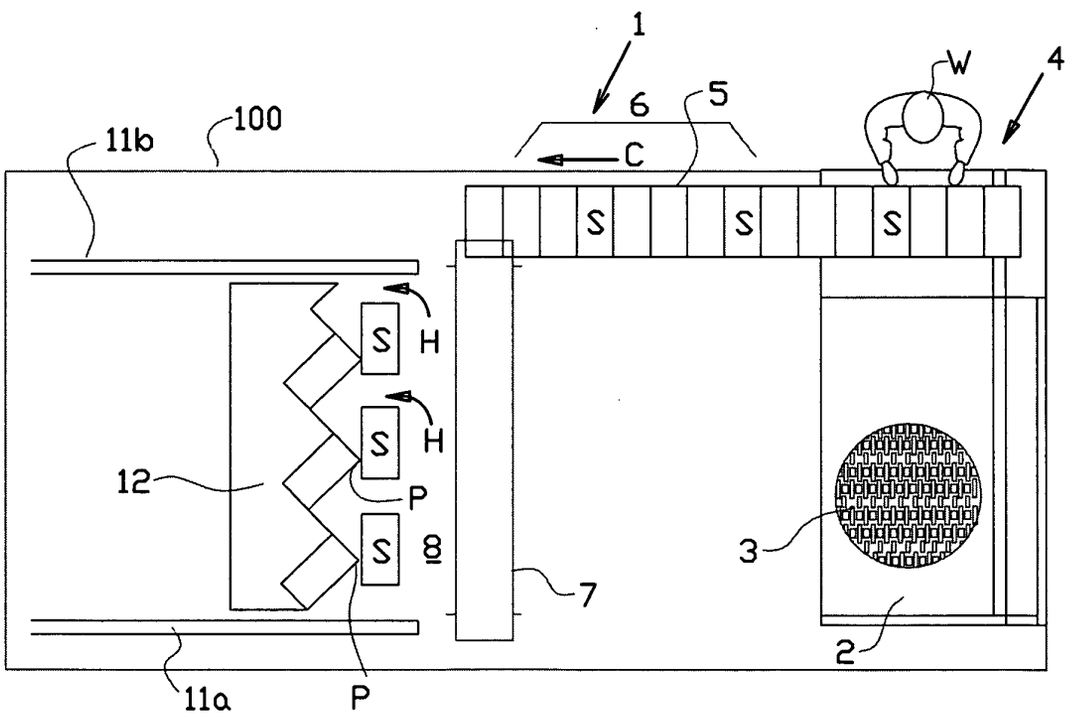
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FIG. 1D

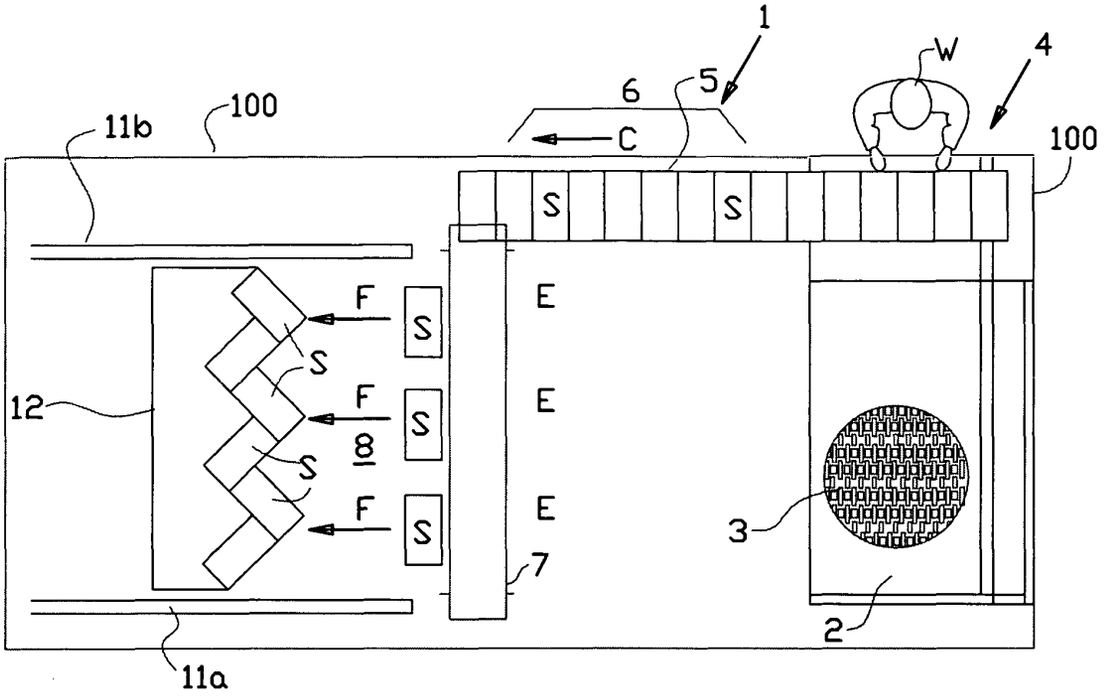
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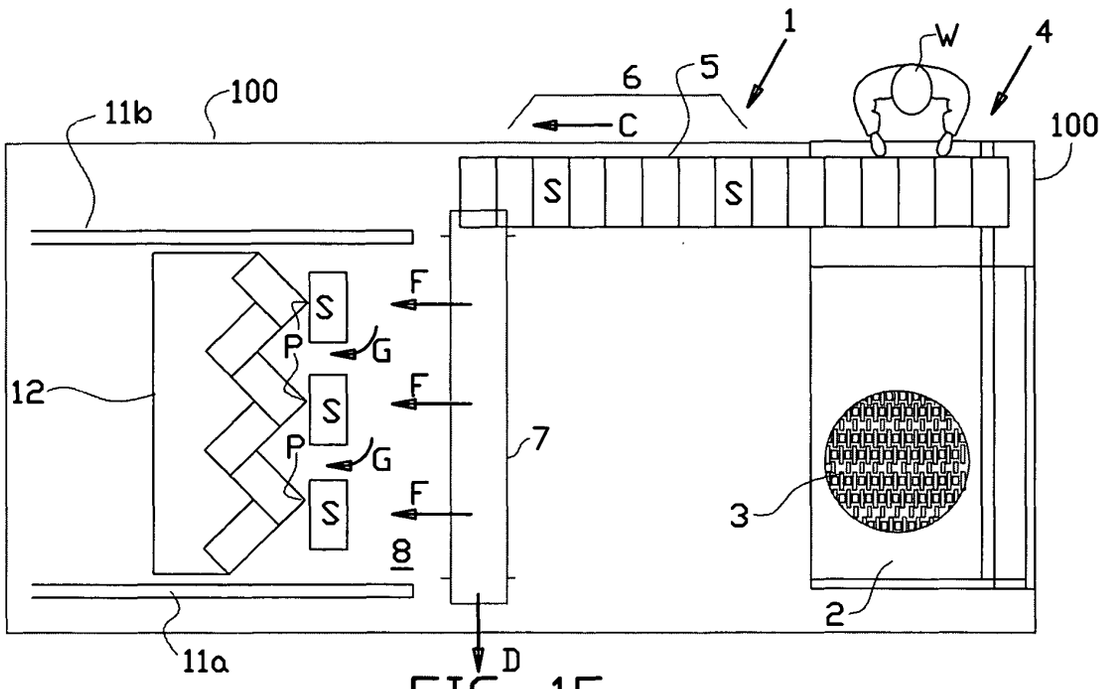
FIG. 1E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6
5
C
11b
100
100
S
S
F
S
P
G
12
F
S
7
P
G
F
S
3
8
2
11a
D

FIG. 1F

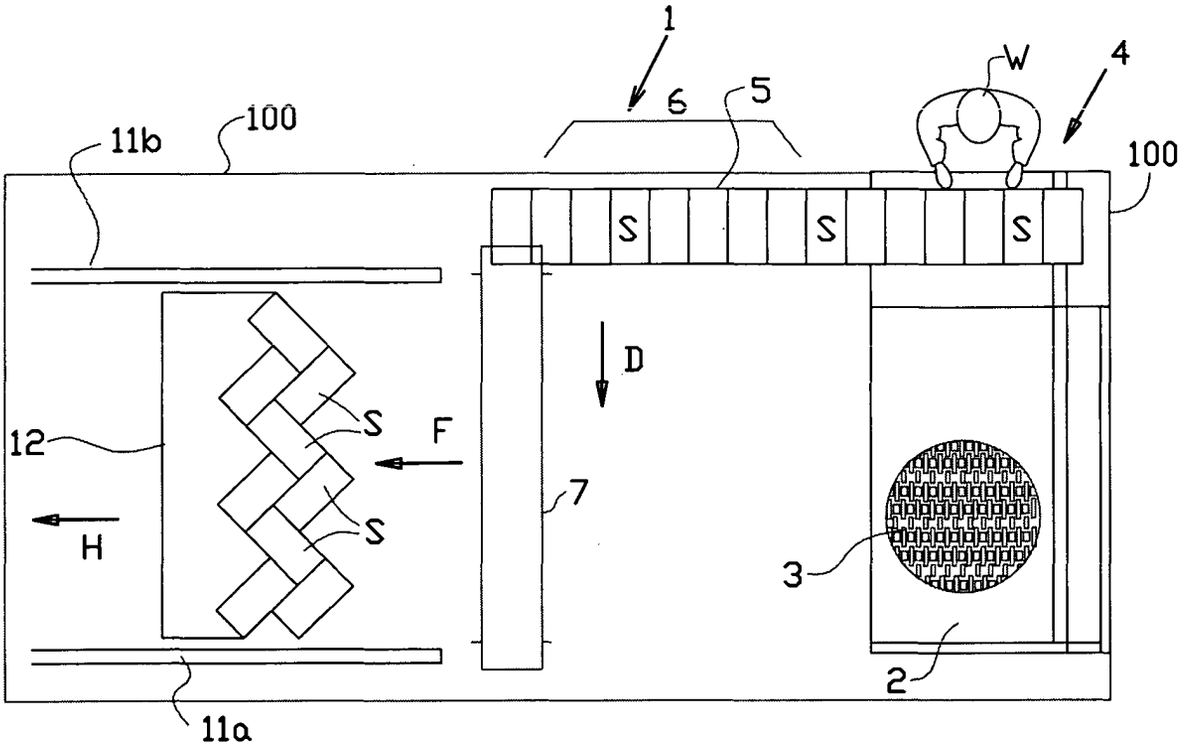
1
6
5
W
4
11b
100
100
S
S
S
D
12
S
F
7
H
S
3
2
11a

FIG. 1G

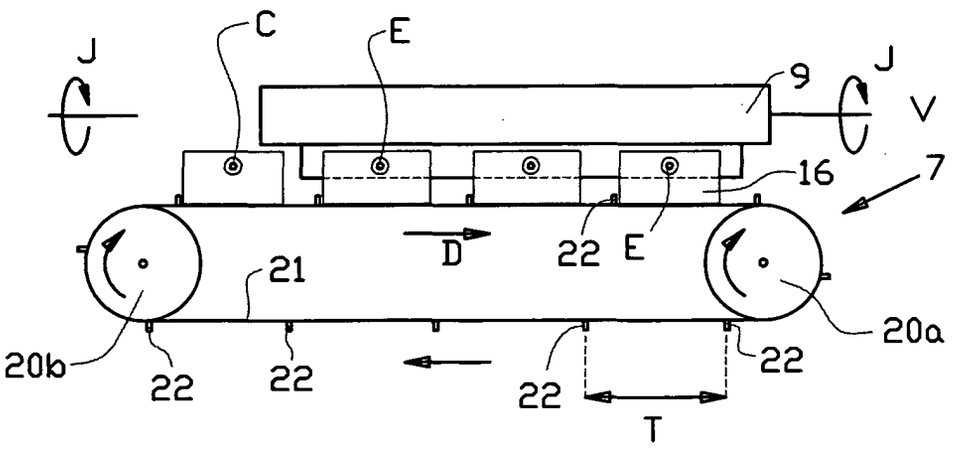
C
E
J
9
J
V
16
7
D
22
E
21
20a
20b
22
22
22
22
T

FIG. 4

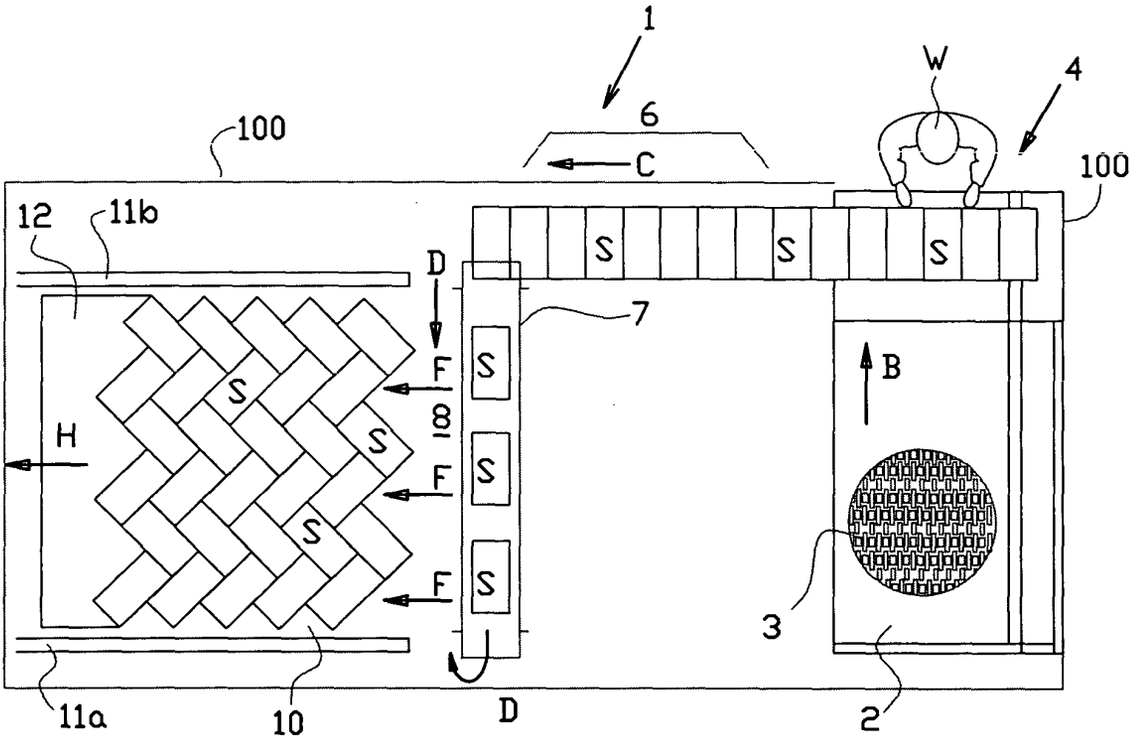
1
W
4
6
C
100
100
12
11b
D
S
S
S
7
F
S
B
H
S
S
F
S
S
F
S
3
11a
10
D
2

FIG. 2

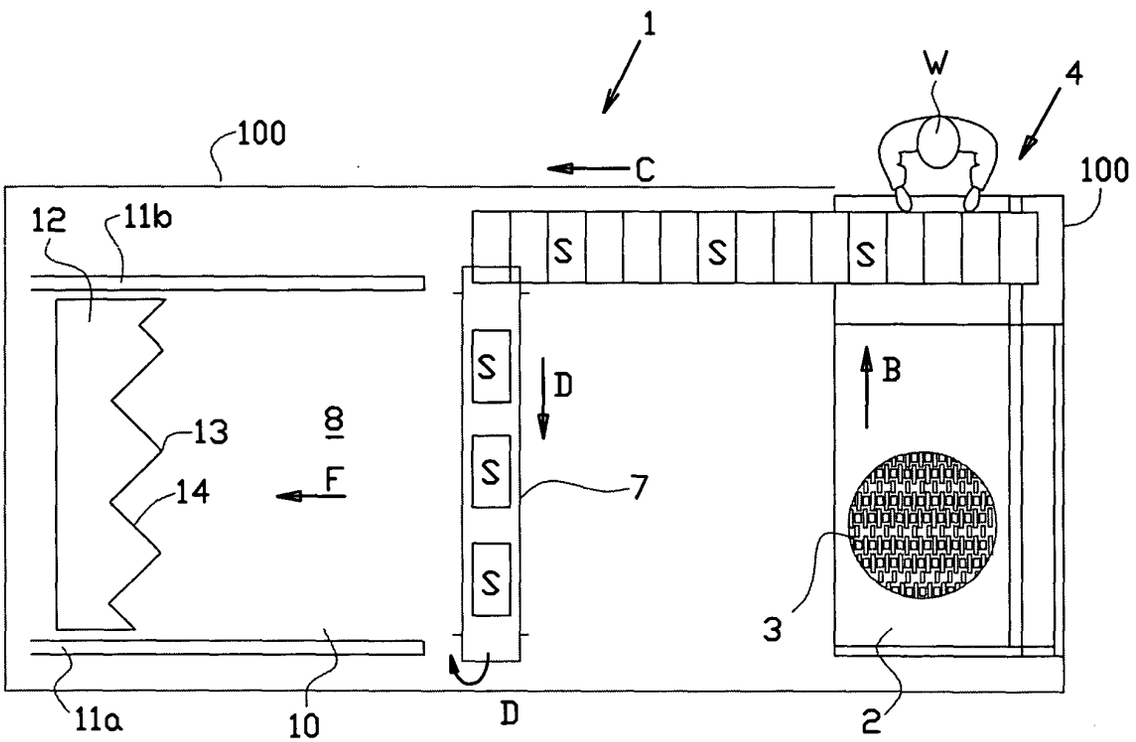
1
W
4
100
C
100
12
11b
S
S
S
S
D
B
13
F
14
7
S
3
11a
10
D
2

FIG. 3

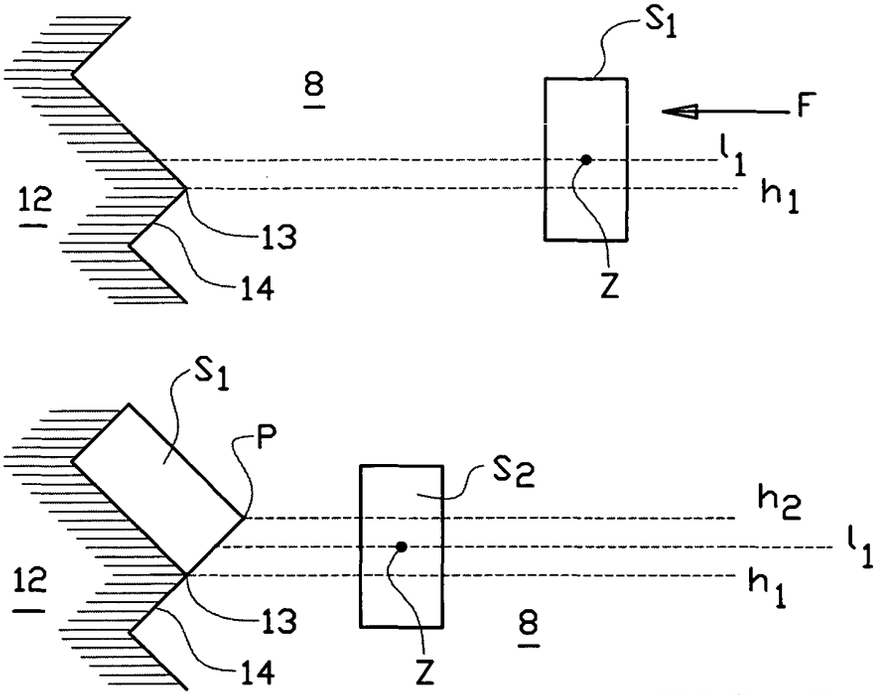
S1
8
F
l1
h1
12
13
14
Z
S1
P
S2
h2
l1
12
h1
13
8
14
Z

FIG. 5

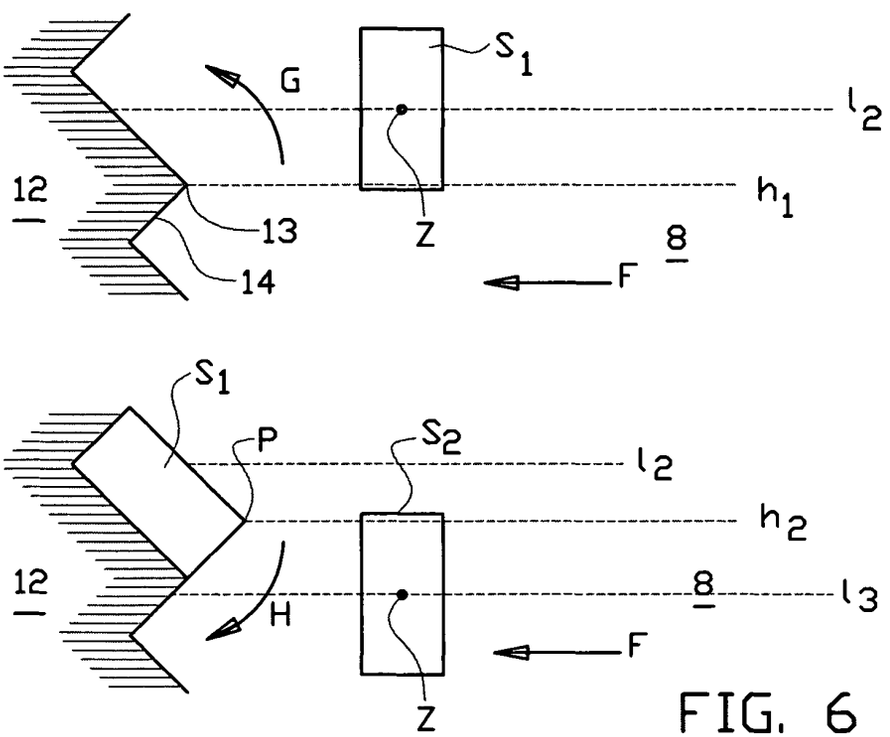
G
S1
l2
12
h1
13
Z
8
14
F
S1
P
S2
l2
h2
12
8
l3
H
F
Z

FIG. 6

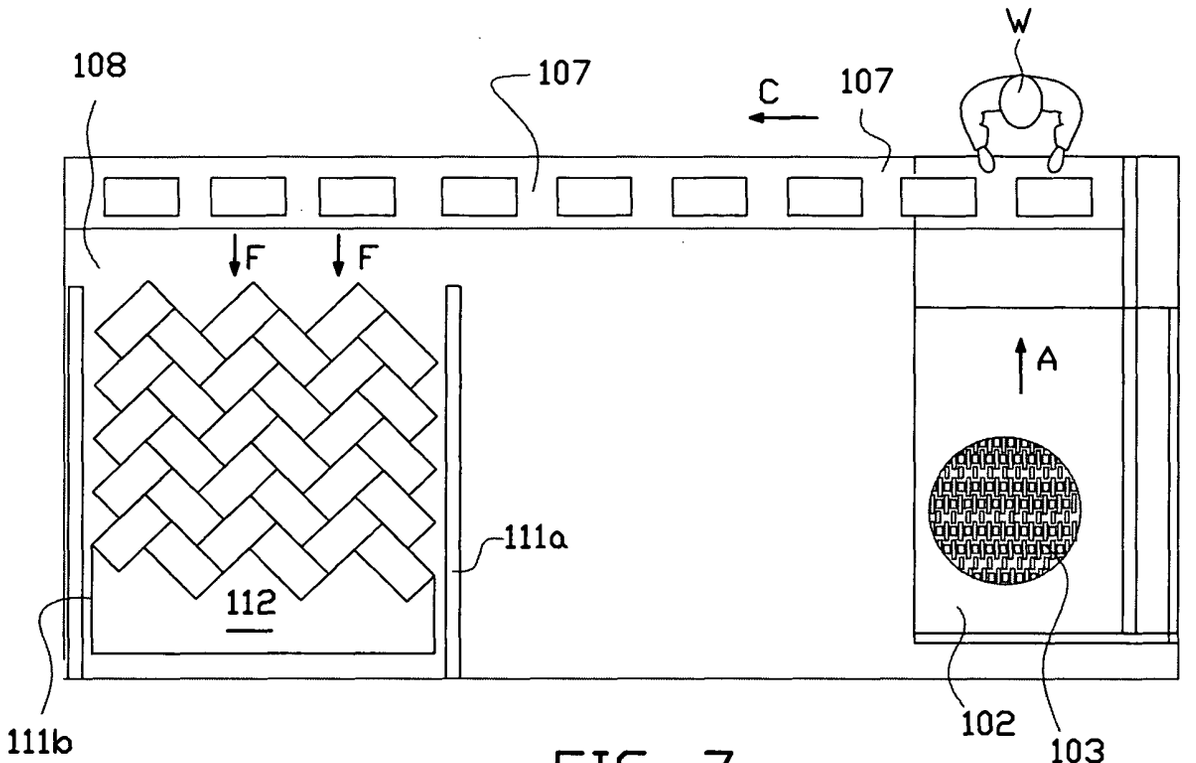

FIG. 7