

Description

The present invention relates to a method of and an apparatus for stacking a predetermined number of elongated tape-like articles, such as slide fasteners, in a stack ready to be bundled with a band or to be packed in a box.

U.S. Pat. No. 4,610,124, issued Sept. 9, 1986, and U.S. Pat. No. 4,570,422, issued Feb. 18, 1986, respectively disclose a method of and an apparatus for automatically bundling slide fasteners.

CH-A-484 818 discloses a method of stacking sheet-like articles, comprising the steps of: receiving the sheet-like articles in horizontal posture one by one at regular intervals at a first position disposed above a tray; releasing the individual sheet-like article to fall upon receipt at the first position; receiving the successive sheet-like articles from the first position in horizontal posture at a second position between the first position and the tray to store the successive sheet-like articles in a stack; releasing all of the stored sheet-like articles from the second position to fall in horizontal posture as a set onto the tray when the number of the stored articles reaches a first predetermined value; and repeating the last-named receiving and releasing until the number of sets of the articles stacked on the tray reaches a second predetermined value, and an apparatus for stacking sheet-like articles, the articles being discharged successively from a machine, said apparatus comprising; a frame; a horizontal first discharger supported on said frame at a first position for receiving the articles in horizontal posture, said first discharger being openable at a bottom thereof; a first closing and opening unit for opening said first discharger to release the individual articles upon receipt to fall; a horizontal second discharger supported on said frame at a second position between said first discharger and the tray for receiving the successive sheet-like articles from said first discharger to store the articles in horizontal posture in a stack, said second discharger being openable at a bottom thereof; a second closing and opening unit for opening said second discharger to release all of the stored articles from said second discharger as a set to fall when the number of the stored articles reaches a predetermined value; and a horizontal tray for receiving successive sets of the articles from said second discharger one set over another set.

However, CH-A-484 818 is concerned with feeding and stacking bundles of paper sheets, such as newspapers, rather than tape-like articles, which present different problems from newspapers in feeding and stacking them.

EP-A-0 133 701 discloses a method and apparatus for bundling tape-like articles in a web, using a gripper mechanism to grip ends of the

web. The articles are stacked in the web one by one.

In the prior art, finished slide fasteners discharged from a slide fastener finishing machine at regular time intervals are successively conveyed to a position above a bundling station and then fall on a tray in the bundling station. When the number of the slide fasteners thus stacked on the tray reaches a predetermined value, such a stack of the slide fasteners is bundled with a band and is then removed from the tray. The bundling and removing of each stack of the slide fasteners must be finished by the time a succeeding slide fastener falls on the tray. Practically, however, since the bundling and removing operation is slow, the subsequent discharging of the finished slide fasteners must be retarded or temporarily discontinued in order to be timed with the bundling and removing operation, which is laborious, thus causing only a limited rate of production. Another problem with the prior art is that the pile of the finished slide fasteners tends to become disorderly as the pile progressively grows.

The present invention seeks to provide a method of and an apparatus for stacking a predetermined number of elongated tape-like articles in an orderly fashion so that the stack of articles can be bundled easily and reliably, irrespective of the rate at which the successive articles are discharged from a finishing machine.

According to a first aspect of the present invention, there is provided a method of stacking flexible articles, comprising the steps of:-

- a) receiving the articles in horizontal posture, one by one at regular intervals, at a first position disposed above a tray;
- b) releasing each individual article upon receipt at said first position, so that the article falls toward a second position;
- c) receiving the successive articles from said first position in horizontal posture at the second position, to store said articles in a stack at said second position, said second position being between said first position and said tray;
- d) releasing all of the stack of articles at said second position, to fall in horizontal posture as a set onto the tray when the number of the stacked articles at said second position reaches a certain value; and
- e) repeating steps a) to d) until a predetermined plural number of sets of said articles have been stacked on the tray;

characterised in that the articles are tape-like articles for stacking in a bundling or packing station, the articles being fed down a chute and being then inserted, by means of air jets from first nozzle means, into a first pallet at said first position;

in that the tape-like articles, while in said first pallet, are sprayed from above with air from second

nozzle means located above said first pallet, to keep said tape-like articles at least substantially flat;

in that the tape-like articles are received and stored in said stack at said second position in a second pallet;

and in that the stack of tape-like articles in said second pallet is sprayed from above with air from third nozzle means located above said second pallet, said second pallet having openings to allow air to escape to prevent occurrence of turbulent flows.

According to a second aspect of the present invention, there is provided an apparatus for stacking flexible articles, the articles being received in horizontal posture, one by one at regular intervals, said apparatus comprising:-

a frame; means for feeding the articles into the apparatus; a horizontal first discharger for receiving the articles in horizontal posture, the discharger being supported on said frame at a first position disposed above a tray, said first discharger being openable at a bottom thereof; a first closing and opening unit for opening said first discharger to release each individual article upon receipt in said first discharger; a horizontal second discharger supported on said frame at a second position to receive the successive articles from said first discharger in horizontal posture and store said articles in a stack, said second position being between said first position and said tray, said second discharger being openable at a bottom thereof; a second closing and opening unit for opening said second discharger to release all of the stack of articles to fall in horizontal posture as a set onto the tray when the number of stacked articles in the second discharger reaches a certain value;

characterised in that the apparatus is an apparatus for stacking tape-like articles in a bundling or packing station;

in that the first discharger comprises a first horizontal pallet;

in that the second discharger comprises a second horizontal pallet;

in that said feeding means comprises a chute;

and in that the apparatus further comprises:-

first nozzle means to provide air jets to insert the articles from said chute into said first pallet;

second nozzle means located above said first pallet for spraying air jets downwardly onto the tape-like articles while they are in said first pallet; and

third nozzle means located above said second pallet for spraying air jets downwardly onto the tape-like articles while they are in the second pallet, said second pallet having openings to allow air to escape to prevent the occurrence of turbulent flows.

Many other advantages, features and additional

objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying drawings in which a structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

Figure 1 is a perspective view, with parts broken away, of an apparatus embodying the present invention;

Figure 2 is a side elevational view, partly in cross section, of the apparatus; and

Figures 3A through 3J are schematic views illustrating a sequence of steps of a method according to the present invention.

Figures 1 and 2 show an apparatus for piling or stacking a predetermined number of elongated tape-like articles F, such as finished slide fasteners, in an orderly fashion ready to be bundled by a bundling apparatus 6.

The stacking apparatus generally comprises a first pallet 2 horizontally supported on a pair of frame members 1, a second pallet 3 supported on the frame members 1 and disposed below the first pallet 2 in parallel spaced relation thereto, and a tray 4 disposed below the second pallet 3 in parallel spaced relation thereto. A chute 5 is contiguous to one end of the first pallet 2 for conveying finished slide fasteners F onto the first pallet 2, the slide fasteners F being fed from a slide fastener finishing machine (not shown) into the chute 5 by a pair of feed rollers 21, 22.

The first pallet 2 includes a pair of first wings 8, 8 each having a generally Z-shaped or S-shaped cross section including a flange 10", a bottom wall 10, and a side wall 10' extending between the flange 10" and the bottom wall 10. Each first wing 8 is pivotally connected at an outer edge of the flange 10" to the frame members 1, 1 by means of a pair of hinges 7, 7; the two first wings 8, 8 are pivotally movable between a closed position in which the two first wings 8, 8 are close to each other to jointly define a first longitudinal recess 9 for receiving therein the finished slide fasteners F from the chute 5, and an open position in which confronting inner edges of the bottom walls 10, 10 of the two first wings 8, 8 are remote from each other to open the bottom of the first longitudinal recess 9 for releasing the finished slide fasteners F to fall. In the closed position of the first pallet 2, the two bottom walls 10, 10 assume their horizontal posture, side-by-side close together.

The closing and opening of the first pallet 2 are performed by a first closing and opening unit (hereinafter referred to as "first opening unit") 11. The first opening unit 11, as shown in Figure 1, includes a first air cylinder 12 vertically supported on one of the frame members 1 remote from the chute 5, and a wing holder 13 horizontally fixed to

a piston rod of the first air cylinder 12. The wing holder 13 is moved downwardly and upwardly as the piston rod of the first air cylinder 12 is extended and retracted, respectively. The wing holder 13 has a pair of horizontal slits 14, 14 in which a pair of pins 15, 15 projecting from the respective first wings 8, 8 are horizontally slidably received respectively. As the wing holder 13 is moved downwardly, the two pins 15, 15 of the first wings 8, 8 slide horizontally away from each other in the respective slits 14, 14, thus causing the two first wings 8, 8 to pivotally move about the respective hinges 7, 7 downwardly from the solid-line position of Figure 2 to the phantom-line position of Figure 2. Thus the bottom of the first pallet 2 is opened. Reversely, as the wing holder 13 is moved upwardly, the two pins 15, 15 of the first wings 8, 8 slide horizontally toward each other in the respective slits 14, 14, thus causing the first wings 8, 8 to pivotally move about the respective hinges 7, 7 upwardly from the phantom-line position to the solid-line position. Thus the bottom of the first pallet 2 is closed.

As shown in Figure 1, the individual finished slide fastener F having been fed into the chute 5 is inserted into the longitudinal recess 9 of the first pallet 2 by air jets from first and second nozzles 23, 24 disposed at opposite ends of the chute 5. The finished slide fastener F is then stopped at a predetermined position by a stopping unit 17 disposed adjacent to the meeting point of the chute 5 and the first pallet 2. The stopping unit 17 includes a sensor 20 supported by the frame member 1 for detecting the leading end of the finished slide fastener F to issue a first detection signal and also for detecting a slider of the finished slide fastener F, a second air cylinder 18 vertically supported by the frame member 1 and operable, upon receipt of the first detection signal from the sensor 20, to extend its piston rod, and a stop 19 vertically fixed to the piston rod of the second air cylinder 18 and movable, in response to the extension of the piston rod of the second air cylinder 18, to such an extent that the lower end of the stop 19 substantially contacts the upper surface of the finished slide fastener F. When the slider of the finished slide fastener F is brought into contact with the stop 19, the sensor 20 detects the slider to issue a second detection signal to terminate the air jets from the first and second nozzles 23, 24. Thus a predetermined number of the successive finished slide fasteners F are placed in a stack at a predetermined position in the longitudinal recess 9 of the first pallet 2.

Subsequently, when the first pallet 2 is opened upon energization of the first cylinder 12, the finished slide fasteners F fall from the bottom of the first pallet 2 upon receipt from the finishing ma-

chine, remaining their horizontal posture. A third nozzle 16 is supported by the frame members 1 and extends horizontally over the first pallet 2 in vertical alignment with the longitudinal recess 9. The third nozzle 16 is in the form of a pipe having a plurality of apertures for spraying air jets uniformly over the upper surface of the individual slide fastener, thus serving to assist in keeping the slide fastener in horizontal posture while it is falling.

The second pallet 3, like the first pallet 2, includes a pair of second wings 26, 26 each having a generally Z-shaped or S-shaped cross section including a flange 28", a bottom wall 28, and a side wall 28' extending between the flange 28" and the bottom wall 28. Each second wing 26 is pivotally connected at an outer edge of the flange 28" to the frame members 1, 1 by means of hinges 25, 25; the two second wings 26, 26 are pivotally movable between a closed position in which the two second wings 26, 26 are close to each other to jointly define a second longitudinal recess 27 for receiving therein the stack of the finished slide fasteners F released from the first pallet 2, and an open position in which confronting inner edges of the bottom walls 28, 28 of the two second wings 26, 26 are remote from each other to open the bottom of the second longitudinal recess 27 for releasing the finished slide fasteners F to fall.

A pair of fourth nozzles 32, 32 is supported by a pair of support arms 31, 31 fixed to the bottom surface of the first wings 8, 8 of the first pallet 2. Each of the fourth nozzles 32 is in the form of a horizontal pipe having a plurality of apertures for spraying air jets over the stack of the finished slide fasteners F in the second longitudinal recess 27 while the stack is being received by the second pallet 3.

The second pallet 3 is different from the first formed pallet 2 in that a multiplicity of openings 29 (Figure 1) is formed in the side walls and the bottom walls 28, 28. The openings 29 serve as an escape for the air jets from the fourth nozzles 32, 32 to prevent occurrence of turbulent flows, thus preventing the finished slide fasteners F from being dishevelled by the turbulent flows. The second pallet 3 is different from the first pallet 2 also in that with the second pallet 3 closed, the two bottom walls 28, 28 of the opposed second wings 26, 26 slope downwardly toward their confronting inner edges.

The closing and opening of the second pallet 3 are performed by means of a second closing and opening unit (hereinafter referred to as "second opening unit") 30 (Figure 1). Since the second opening unit 30 is similar to the first opening unit 11 in construction and operation, its detailed description is omitted here for clarity. The second opening unit 30 is controlled by a suitable control

circuit (not shown) so as to open the second pallet 3 each time when the number of the finished slide fasteners F stored in the second pallet 3 reaches a selected value, four in the illustrated example. Thus the finished slide fasteners F are supplied a pre-

determined number at a time from the second pallet 3 to the tray 4 disposed below the second pallet 3.

The tray 4 is in the form of a gutter or trough having a flat bottom surface. The bundling apparatus 8 is disposed substantially centrally of the tray 4 and includes a binding band B of paper drawn from a roll and extending transversely across the tray 4 on the inside surface thereof, and a stapler 33 for joining prospective opposite ends of the binding band B. For bundling, with a free end of the binding band B (gripped by a gripper, not shown), a predetermined number of the finished slide fasteners F is piled on and across the binding band B in the tray 4. The opposite ends of the binding band B are joined together by the stapler 33 after the binding band B encircles the entire stack of the finished slide fasteners F in the tray 4.

The air jets from the fourth nozzle 32, 32 also serve to assist in preventing the upper finished slide fasteners F from rising or floating off the stack in the tray 4.

With the apparatus thus constructed, the stacking method is performed, as illustrated in Figures 3A through 3J, in a sequence of the following steps: receiving finished slide fasteners F at a first position (the first pallet 2) in horizontal posture one by one at regular intervals, the first position being disposed above the tray 4 in a bundling station; releasing the individual finished slide fastener F to fall upon receipt at the first position; temporarily storing the successive finished slide fasteners F from the first position (first pallet 2) in a stack at a second position (the second pallet 3) disposed between the first position and the tray 4 until the number of the finished slide fastener F stored reaches a first predetermined value, and then releasing such a set of the first predetermined number of the finished slide fasteners F1 to fall onto the tray 4, (Figures 3A and 3B); repeating the storing step of Figures 3A and 3B to provide a second set of the same number of the finished slide fasteners F2 and then releasing the second set of the finished slide fasteners F2 to fall onto the first set of the finished slide fasteners F1 (Figures 3D and 3E); and repeating the storing and releasing steps of Figures 3D and 3E until the number of sets of the finished slide fasteners F1, F2, F3, F4 stacked in the tray 4 reaches a second predetermined value (Figures 3F through 3J). Subsequently, the second predetermined number of sets of the finished slide fasteners F1, F2, F3, F4 are bundled with the binding band B, during which time suc-

ceeding finished slide fasteners F are being successively released from the first position (the first pallet 2) to the second position (the second pallet 3). By the time the number of the finished slide fasteners F thus newly stored at the second position reaches the first predetermined value, such a bundle of the finished slide fasteners F1, F2, F3, F4 is removed out of the tray 4, thus making the tray 4 empty and hence ready to receive the subsequent sets of the finished slide fasteners F1, F2, F3, F4 released from the second position.

According to the present method, since the succeeding finished slide fasteners F discharged from the finishing machine are stored at the second position successively without interruption while a predetermined amount of the finished slide fasteners F1, F2, F3, F4 previously stacked in the tray 4 is being bundled, accurate and efficient bundling of the finished slide fasteners can be achieved without reducing the rate of discharging the finished slide fasteners from the finishing machine, thus causing an improved rate of production. Another advantage of the present method is that partly because the number of the finished slide fasteners to be stored as a set at the second position is small, e.g. a fourth of the total number of the finished slide fasteners to be finally stacked in the tray, and partly because the difference in level or height between the first and second positions is small, the finished slide fasteners can be stacked at the second position in an orderly fashion. Likewise, since the difference in level or height between the second position and the tray, the sets of the finished slide fasteners can be stacked in the tray in an orderly fashion. Further, since the finished slide fasteners stacked at the second position are released to fall into the tray at once as a single set, the individual slide fasteners of the stack in the tray are free from being twisted or curved.

According to the present apparatus, partly because each of the first and second pallets is openable at the bottom, and partly because at least one nozzle extends over each of the first and second pallets for spraying air jets downwardly, it is possible not only to release elongated tape-like articles such as finished slide fasteners to fall in horizontal posture, but also to prevent the piled articles from rising or floating off the stack.

Claims

1. A method of stacking flexible articles (F), comprising the steps of:-

- a) receiving the articles in horizontal posture, one by one at regular intervals, at a first position disposed above a tray (4);
- b) releasing each individual article (F) upon



circuit (not shown) so as to open the second pallet 3 each time when the number of the finished slide fasteners F stored in the second pallet 3 reaches a selected value, four in the illustrated example. Thus the finished slide fasteners F are supplied a pre-

determined number at a time from the second pallet 3 to the tray 4 disposed below the second pallet 3.

The tray 4 is in the form of a gutter or trough having a flat bottom surface. The bundling apparatus 6 is disposed substantially centrally of the tray 4 and includes a binding band B of paper drawn from a roll and extending transversely across the tray 4 on the inside surface thereof, and a stapler 33 for joining prospective opposite ends of the binding band B. For bundling, with a free end of the binding band B (gripped by a gripper, not shown), a predetermined number of the finished slide fasteners F is piled on and across the binding band B in the tray 4. The opposite ends of the binding band B are joined together by the stapler 33 after the binding band B encircles the entire stack of the finished slide fasteners F in the tray 4.

The air jets from the fourth nozzle 32, 32 also serve to assist in preventing the upper finished slide fasteners F from rising or floating off the stack in the tray 4.

With the apparatus thus constructed, the stacking method is performed, as illustrated in Figures 3A through 3J, in a sequence of the following steps: receiving finished slide fasteners F at a first position (the first pallet 2) in horizontal posture one by one at regular intervals, the first position being disposed above the tray 4 in a bundling station; releasing the individual finished slide fastener F to fall upon receipt at the first position; temporarily storing the successive finished slide fasteners F from the first position (first pallet 2) in a stack at a second position (the second pallet 3) disposed between the first position and the tray 4 until the number of the finished slide fastener F stored reaches a first predetermined value, and then releasing such a set of the first predetermined number of the finished slide fasteners F1 to fall onto the tray 4, (Figures 3A and 3B); repeating the storing step of Figures 3A and 3B to provide a second set of the same number of the finished slide fasteners F2 and then releasing the second set of the finished slide fasteners F2 to fall onto the first set of the finished slide fasteners F1 (Figures 3D and 3E); and repeating the storing and releasing steps of Figures 3D and 3E until the number of sets of the finished slide fasteners F1, F2, F3, F4 stacked in the tray 4 reaches a second predetermined value (Figures 3F through 3J). Subsequently, the second predetermined number of sets of the finished slide fasteners F1, F2, F3, F4 are bundled with the binding band B, during which time suc-

ceeding finished slide fasteners F are being successively released from the first position (the first pallet 2) to the second position (the second pallet 3). By the time the number of the finished slide fasteners F thus newly stored at the second position reaches the first predetermined value, such a bundle of the finished slide fasteners F1, F2, F3, F4 is removed out of the tray 4, thus making the tray 4 empty and hence ready to receive the subsequent sets of the finished slide fasteners F1, F2, F3, F4 released from the second position.

According to the present method, since the succeeding finished slide fasteners F discharged from the finishing machine are stored at the second position successively without interruption while a predetermined amount of the finished slide fasteners F1, F2, F3, F4 previously stacked in the tray 4 is being bundled, accurate and efficient bundling of the finished slide fasteners can be achieved without reducing the rate of discharging the finished slide fasteners from the finishing machine, thus causing an improved rate of production. Another advantage of the present method is that partly because the number of the finished slide fasteners to be stored as a set at the second position is small, e.g. a fourth of the total number of the finished slide fasteners to be finally stacked in the tray, and partly because the difference in level or height between the first and second positions is small, the finished slide fasteners can be stacked at the second position in an orderly fashion. Likewise, since the difference in level or height between the second position and the tray, the sets of the finished slide fasteners can be stacked in the tray in an orderly fashion. Further, since the finished slide fasteners stacked at the second position are released to fall into the tray at once as a single set, the individual slide fasteners of the stack in the tray are free from being twisted or curved.

According to the present apparatus, partly because each of the first and second pallets is openable at the bottom, and partly because at least one nozzle extends over each of the first and second pallets for spraying air jets downwardly, it is possible not only to release elongated tape-like articles such as finished slide fasteners to fall in horizontal posture, but also to prevent the piled articles from rising or floating off the stack.

Claims

1. A method of stacking flexible articles (F), comprising the steps of:-

- a) receiving the articles in horizontal posture, one by one at regular intervals, at a first position disposed above a tray (4);
- b) releasing each individual article (F) upon

receipt at said first position, so that the article falls toward a second position;

c) receiving the successive articles from said first position in horizontal posture at the second position, to store said articles in a stack at said second position, said second position being between said first position and said tray (4);

d) releasing all of the stack of articles at said second position, to fall in horizontal posture as a set onto the tray (4) when the number of the stacked articles at said second position reaches a certain value; and

e) repeating steps a) to d) until a predetermined plural number of sets of said articles have been stacked on the tray (4);

characterised in that the articles are tape-like articles (F) for stacking in a bundling or packing station, the articles (F) being fed down a chute (5) and being then inserted, by means of air jets from first nozzle means (23, 24), into a first pallet (2) at said first position;

in that the tape-like articles, while in said first pallet (2), are sprayed from above with air from second nozzle means (16) located above said first pallet (2), to keep said tapelike articles at least substantially flat;

in that the tape-like articles (F) are received and stored in said stack at said second position in a second pallet (3);

and in that the stack of tapelike articles in said second pallet (3) is sprayed from above with air from third nozzle means (32) located above said second pallet (3), said second pallet (3) having openings (29) to allow air to escape to prevent occurrence of turbulent flows.

2. An apparatus for stacking flexible articles (F), the articles being received in horizontal posture, one by one at regular intervals, said apparatus comprising:-

a frame (1); means for feeding the articles into the apparatus; a horizontal first discharger for receiving the articles (F) in horizontal posture, the discharger being supported on said frame (1) at a first position disposed above a tray (4), said first discharger being openable at a bottom thereof; a first closing and opening unit for opening said first discharger to release each individual article (F) upon receipt in said first discharger; a horizontal second discharger supported on said frame (1) at a second position

to receive the successive articles (F) from said first discharger in horizontal posture and store said articles (F) in a stack, said second position being between said first position and said tray (4), said second discharger being openable at a bottom thereof; a second closing and opening unit for opening said second discharger to release all of the stack of articles to fall in horizontal posture as a set onto the tray (4) when the number of stacked articles in the second discharger reaches a certain value;

characterised in that the apparatus is an apparatus for stacking tapelike articles (F) in a bundling or packing station;

in that the first discharger comprises a first horizontal pallet (2);

in that the second discharger comprises a second horizontal pallet (3);

in that said feeding means comprises a chute (5);

and in that the apparatus further comprises:-

first nozzle means (23, 24) to provide air jets to insert the articles (F) from said chute (5) into said first pallet (2);

second nozzle means (16) located above said first pallet (2) for spraying air jets downwardly onto the tape-like articles (F) while they are in said first pallet (2); and

third nozzle means (32) located above said second pallet (3) for spraying air jets downwardly onto the tape-like articles (F) while they are in the second pallet (3), said second pallet (3) having openings (29) to allow air to escape to prevent the occurrence of turbulent flows.

3. An apparatus according to claim 2, wherein said first pallet (2) includes a pair of first wings (8), (8) pivotally connected to said frame (1) for movement between a closed position in which said pair of wings (8), (8) is close to each other to jointly define a first longitudinal recess (9) for receiving therein the tapelike articles (F), and an open position in which confronting inner edges of said pair of first wings (8), (8) are remote from each other to open the bottom of said first longitudinal recess (9).

4. An apparatus according to claim 2 or 3, wherein said second pallet (3) includes a pair



of second wings (26), (26) pivotally connected to said frame (1) for movement between a closed position in which said pair of second wings (26), (26) are close to each other to jointly define a second longitudinal recess (27) for receiving therein the successive tape-like articles (F), and an open position in which confronting inner edges of said pair of second wings (26), (26) are remote from each other to open the bottom of said second longitudinal recess (27).

5. An apparatus according to claim 3, or to claim 4 dependent from claim 3, wherein said closing and opening unit (11) includes a first air cylinder (12) vertically supported on said frame (1), and a wing holder (13) horizontally fixed to said first air cylinder (12), said wing holder (13) having a pair of horizontal slits (14), (14) in which a pair of pins (15), (15) each projecting from one end of the respective first wing (8) is horizontally slidably received respectively, said pair of first wings (8), (8) being pivotally movable between said closed position and said open position as said pair of pins (15), (15) is moved toward and away from each other in the respective horizontal slits (14), (14) when said wing holder (13) is moved vertically in response to extending and shrinking of said piston rod of said first air cylinder (12).
6. An apparatus according to claim 4, or to claim 5 dependent from claim 4, wherein said second pallet (3) has a multiplicity of openings (29) in side walls and bottom walls (28), (28) of said second longitudinal recess (27) along the entire length of said second pallet (3).

Revendications

1. Procédé d'empilage d'articles flexibles (F), comprenant les étapes consistant à :
 - a) recevoir les articles disposés horizontalement, un par un, à des intervalles réguliers, à une première position disposée au-dessus d'un plateau (4);
 - b) libérer chaque article individuel (F) après sa réception à ladite première position, de telle sorte que l'article tombe en direction d'une seconde position;
 - c) recevoir les articles successifs provenant de ladite première position, les articles étant disposés horizontalement, jusqu'à une seconde position, dans le but d'entreposer lesdits articles en une pile à ladite seconde position, ladite seconde position se trouvant entre ladite première position et ledit plateau (4);

d) libérer l'ensemble de la pile d'articles à ladite seconde position pour qu'elle tombe, les articles étant disposés horizontalement, sous forme d'un ensemble, sur le plateau (4), lorsque le nombre des articles empilés à ladite seconde position atteint une certaine valeur; et

e) répéter les étapes a) à d) jusqu'à ce que l'on ait empilé un nombre prédéterminé de plusieurs ensembles desdits articles sur le plateau (4);

caractérisé en ce que les articles sont des articles en forme de ruban (F), destinés à être empilés dans un poste d'emballage ou d'emballage, les articles (F) étant acheminés en descendant une trémie (5) et étant alors insérés, au moyen de jets d'air provenant de premiers moyens de tuyère (23, 24), dans une première palette (2) à ladite première position;

en ce que les articles en forme de ruban, tandis qu'ils se trouvent dans ladite première palette (2), sont pulvérisés par le haut avec de l'air provenant d'un second moyen de tuyère (16) situé au-dessus de ladite première palette (2), afin de maintenir lesdits articles en forme de ruban au moins essentiellement plats;

en ce que les articles en forme de ruban (F) sont reçus et entreposés dans ladite pile à ladite seconde position, dans une seconde palette (3); et

en ce que la pile d'articles en forme de ruban dans ladite seconde palette (3) est pulvérisée par le haut avec de l'air provenant d'un troisième moyen de tuyère (32) situé au-dessus de ladite seconde palette (3), ladite seconde palette (3) étant munie d'ouvertures (29) permettant à l'air de s'échapper afin d'empêcher l'apparition de courants de turbulence.

2. Appareil destiné à empiler des articles flexibles (F), les articles étant reçus en étant disposés horizontalement, un par un, à intervalles réguliers, ledit appareil comprenant :
 - un bâti; un moyen destiné à acheminer les articles dans l'appareil; un premier dispositif horizontal de déchargement destiné à recevoir les articles (F) disposés horizontalement, le dispositif de déchargement étant supporté sur ledit bâti (1) à une première position disposée au-dessus d'un plateau (4), ledit premier dispositif de déchargement pouvant s'ouvrir en son fond; une première unité de fermeture et d'ouverture destinée à ouvrir ledit premier dispositif de déchargement afin de libérer chaque article individuel (F) suite à sa réception dans ledit premier dispositif de déchargement; un second dispositif horizontal de déchargement supporté sur ledit bâti (1) à une seconde position, desti-



né à recevoir les articles successifs (F) provenant dudit premier dispositif de déchargement, en étant disposés horizontalement, et entreposer lesdits articles (F) en une pile, ladite seconde position étant située entre ladite première position et ledit plateau (4), ledit second dispositif de déchargement pouvant s'ouvrir en son fond; une seconde unité de fermeture et d'ouverture destinée à ouvrir ledit second dispositif de déchargement dans le but de libérer l'ensemble de la pile d'articles pour qu'elle tombe, les articles étant disposés horizontalement, sous forme d'un ensemble, sur le plateau (4), lorsque le nombre des articles empilés dans le second dispositif de déchargement atteint une certaine valeur;

caractérisé en ce que l'appareil est un appareil destiné à empiler des articles en forme de ruban (F), à un poste d'empaquetage ou d'emballage;

en ce que le premier dispositif de déchargement est constitué d'une première palette horizontale (2);

en ce que le second dispositif de déchargement est constitué d'une seconde palette horizontale (3);

en ce que ledit moyen d'acheminement est constitué d'une trémie (5); et

en ce que l'appareil comprend, en outre : des premiers moyens de tuyère (23, 24) destinés à procurer des jets d'air afin d'insérer les articles (F) provenant de ladite trémie (5), dans ladite première palette (2);

un deuxième moyen de tuyère (16) situé au-dessus de ladite première palette (2), destiné à pulvériser des jets d'air vers le bas sur les articles en forme de ruban (F), tandis qu'ils se trouvent dans ladite première palette (2); et

un troisième moyen de tuyère (32) situé au-dessus de ladite seconde palette (3), destiné à pulvériser des jets d'air vers le bas sur les articles en forme de ruban (F), tandis qu'ils se trouvent dans la seconde palette (3), ladite seconde palette (3) étant munie d'ouvertures (29) permettant à l'air de s'échapper afin d'empêcher l'apparition de courants de turbulence.

3. Appareil selon la revendication 2, dans lequel la dite première palette (2) englobe une paire de premières ailes (8), (8) reliées en pivotement audit bâti (1) pour effectuer un mouvement entre une position fermée dans laquelle lesdites ailes (8), (8) forment une paire, sont proches l'une de l'autre, pour définir conjointement un premier évidement longitudinal (9) dans lequel viennent se loger les articles en forme de ruban (F), et une position ouverte dans laquelle les bords internes opposés de

ladite paire des premières ailes (8), (8) sont éloignés l'un de l'autre afin d'ouvrir le fond dudit premier évidement longitudinal (9).

4. Appareil selon la revendication 2 ou 3, dans lequel ladite seconde palette (3) englobe une paire de secondes ailes (26), (26) reliées en pivotement audit bâti (1) pour effectuer un mouvement entre une position fermée dans laquelle lesdites secondes ailes (26), (26) formant une paire sont proches l'une de l'autre, pour définir conjointement un second évidement longitudinal (27) dans lequel viennent se loger les articles successifs en forme de ruban (F), et une position ouverte dans laquelle les bords internes opposés de ladite paire de secondes ailes (26), (26) sont éloignés l'un de l'autre afin d'ouvrir le fond dudit second évidement longitudinal (27).

5. Appareil selon la revendication 3, ou bien selon la revendication 4 dépendant de la revendication 3, dans lequel ladite unité de fermeture et d'ouverture (11) englobe un premier cylindre à air (12) supporté en position verticale sur ledit bâti (1), ainsi qu'un support d'ailes (13) fixé en position horizontale audit premier cylindre à air (12), ledit support d'ailes (13) étant muni d'une paire de fentes horizontales (14), (14) dans lesquelles viennent se loger une paire de broches (15), (15) en coulissement horizontal et faisant chacune saillie par rapport à une extrémité de la première aile respective (8), ladite paire de premières ailes (8), (8) pouvant effectuer un pivotement entre ladite position fermée et ladite position ouverte, à mesure que les broches (15), (15) formant une paire effectuent un mouvement mutuel de va-et-vient dans les fentes horizontales respectives (14), (14) lorsque ledit support d'ailes (13) se déplace verticalement en réponse à l'extension et au rétrécissement de ladite tige de piston dudit premier cylindre à air (12).

6. Appareil selon la revendication 4, ou bien selon la revendication 5 dépendant de la revendication 4, dans lequel ladite seconde palette (3) est munie de plusieurs ouvertures (29) pratiquées dans les parois latérales et les parois de fond (28), (28) dudit second évidement longitudinal (27), sur toute la longueur de ladite seconde palette (3).

Patentansprüche

1. Verfahren zum Stapeln von flexiblen Gegenständen (F), umfassend die Schritte:
 - a) Aufnehmen der Gegenstände in horizon-



taler Anordnung nacheinander in regelmäßigen Abständen an einem ersten Ort, der über einer Schale (4) angeordnet ist;

b) Freigeben jedes einzelnen Gegenstandes (F) nach der Ankunft an dem ersten Ort, so daß der Gegenstand zu einem zweiten Ort fällt;

c) Aufnehmen der nachfolgenden Gegenstände von dem ersten Ort in horizontaler Anordnung an dem zweiten Ort, um diese Gegenstände an dem zweiten Ort in einem Stapel zu speichern, wobei sich der zweite Ort zwischen dem ersten Ort und der Schale (4) befindet;

d) Freigeben aller Stapel von Gegenständen an dem zweiten Ort, damit diese in horizontaler Anordnung als eine Gruppe auf die Schale (4) fallen, wenn die Anzahl der gestapelten Gegenstände an dem zweiten Ort einen bestimmten Wert erreicht; und

e) Wiederholen der Schritte a) bis d), bis eine bestimmte Vielzahl von Gruppen der Gegenstände auf der Schale (4) gestapelt sind;

dadurch gekennzeichnet, daß die Gegenstände bandartige Gegenstände (F) zum Stapeln in einer Umschnürungs- oder Verpackungsstation sind, wobei die Gegenstände (F) auf einer Rutsche (5) nach unten zugeführt und sodann mittels Luftstrahlen aus ersten Düsen (23,24) in eine erste Palette (2) an dem ersten Ort eingeführt werden;

daß die bandartigen Gegenstände, während sie sich in der ersten Palette (2) befinden, aus zweiten Düsen (16), die über der ersten Palette (2) angeordnet sind, von oben mit Luft angeblasen werden, um die bandartigen Gegenstände im wesentlichen eben zu halten,

daß die bandartigen Gegenstände (F) in einer zweiten Palette (3) an dem zweiten Ort aufgenommen und gespeichert werden;

und daß der Stapel der bandartigen Gegenstände in der zweiten Palette (3) aus dritten Düsen (32), die über der zweiten Palette (3) angeordnet sind, von oben mit Luft angeblasen werden, wobei die zweite Palette (3) Öffnungen (29) hat, durch die die Luft entweichen kann, um das Auftreten von turbulenten Strömungen zu verhindern.

2. Vorrichtung zum Stapeln flexibler Gegenstände (F), die nacheinander in gleichmäßigen Abständen in horizontaler Anordnung aufgenommen werden, umfassend:

einen Rahmen (1); eine Einrichtung zum Zuführen der Gegenstände in die Vorrichtung; eine erste horizontale Abgabeeinrichtung zur Aufnahme der Gegenstände (F) in horizontaler

Anordnung, wobei die Abgabeeinrichtung auf dem Rahmen (1) an einem ersten Ort abgestützt ist, der über einer Schale (4) angeordnet ist, wobei die erste Abgabeeinrichtung an einem Boden derselben geöffnet werden kann; eine erste Schließ- und Öffnungseinheit zum Öffnen der ersten Abgabeeinrichtung, um jeden einzelnen Gegenstand (F) nach der Aufnahme in der ersten Abgabeeinrichtung freizugeben; eine horizontale zweite Abgabeeinrichtung, die auf dem Rahmen (1) an einem zweiten Ort abgestützt ist, um die nachfolgenden Gegenstände (F) von der ersten Abgabeeinrichtung in horizontaler Anordnung aufzunehmen und um diese Gegenstände (F) in einem Stapel zu speichern, wobei sich der zweite Ort zwischen dem ersten Ort und der Schale (4) befindet, wobei die zweite Abgabeeinrichtung an einem Boden derselben geöffnet werden kann; eine zweite Schließ- und Öffnungseinheit zum Öffnen der zweiten Abgabeeinrichtung, um alle Stapel von Gegenständen freizugeben, damit diese in horizontaler Anordnung als Gruppe auf die Schale (4) fallen, wenn die Anzahl der gestapelten Gegenstände in der zweiten Abgabeeinrichtung einen bestimmten Wert erreicht,

dadurch gekennzeichnet, daß die Vorrichtung eine Vorrichtung zum Stapeln bandartiger Gegenstände (F) in einer Umschnürungs- oder Verpackungsstation ist,

daß die erste Abgabeeinrichtung eine erste horizontale Palette (2) umfaßt;

daß die zweite Abgabeeinrichtung eine zweite horizontale Palette (3) umfaßt;

daß die Zuführeinrichtung eine Rutsche (5) umfaßt;

und daß die Vorrichtung ferner umfaßt:

erste Düsen (23,24), die Luftströme erzeugen, um die Gegenstände (F) von der Rutsche (5) in die erste Palette (2) einzuführen;

zweite Düsen (16), die über der ersten Palette (2) angeordnet sind, um Luftströme nach unten auf die bandartigen Gegenstände (F) zu richten, während sich diese in der ersten Palette (2) befinden; und

dritte Düsen (32), die über der zweiten Palette (3) angeordnet sind, um Luftströme nach unten auf die bandartigen Gegenstände (F) zu richten, während sich diese in der zweiten Palette (3) befinden, wobei die zweite Palette (3) Öffnungen (29) aufweist, durch die die Luft entweichen kann, um das Auftreten von turbulenten Strömungen zu verhindern.

3. Vorrichtung nach Anspruch 2, wobei die erste Palette (2) zwei erste Flügel (8,8) aufweist, die mit dem Rahmen (1) schwenkbar verbunden



- sind zu einer Bewegung zwischen einer geschlossenen Stellung, in der die beiden Flügel (8,8) eng benachbart sind, um gemeinsam eine erste längliche Ausnehmung (9) zur Aufnahme der bandartigen Gegenstände (F) zu begrenzen, und einer offenen Stellung, in der die gegenüberliegenden Innenränder der beiden ersten Flügel (8,8) im Abstand voneinander angeordnet sind, um den Boden der ersten länglichen Ausnehmung (9) zu öffnen. 5
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4. Vorrichtung nach Anspruch 2 oder 3, wobei die zweite Palette (3) zwei zweite Flügel (26,26) umfaßt, die mit dem Rahmen (1) schwenkbar verbunden sind zu einer Bewegung zwischen einer geschlossenen Stellung, in der die beiden zweiten Flügel (26,26) eng benachbart sind, um gemeinsam eine zweite längliche Ausnehmung (27) zur Aufnahme der aufeinanderfolgenden bandartigen Gegenstände (F) zu begrenzen, und einer offenen Stellung, in der die gegenüberliegenden Innenränder der beiden zweiten Flügel (26,26) im Abstand voneinander angeordnet sind, um den Boden der zweiten länglichen Ausnehmung (27) zu öffnen. 15
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5. Vorrichtung nach Anspruch 3 oder nach Anspruch 4 in Verbindung mit Anspruch 3, wobei die Schließ- und Öffnungseinheit (11) einen auf dem Rahmen (1) vertikal abgestützten ersten Luftzylinder (12) und einen an dem ersten Luftzylinder (12) horizontal befestigten Flügelhalter (13) umfaßt, wobei der Flügelhalter (13) zweite horizontale Schlitz (14,14) aufweist, in denen zwei Stifte (15,15) horizontal verschiebbar gelagert sind, die jeweils von einem Ende des zugeordneten ersten Flügels (8) vorstehen, wobei die beiden ersten Flügel (8,8) zwischen der geschlossenen und der offenen Stellung verschwenkbar sind, wenn die beiden Stifte (15,15) in den betreffenden horizontalen Schlitz (14,14) zueinander hin und voneinander weg bewegt werden, wenn der Flügelhalter (13) entsprechend dem Ausfahren und dem Einziehen der Kolbenstange des ersten Luftzylinders (12) vertikal bewegt wird. 30
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6. Vorrichtung nach Anspruch 4 oder nach Anspruch 5 in Verbindung mit Anspruch 4, wobei die zweite Palette (3) eine Vielzahl von Öffnungen (29) in den Seitenwänden und in den Bodenwänden (28,28) der zweiten länglichen Ausnehmung (27) über die gesamte Länge der zweiten Palette (3) aufweist. 50
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