

Description

This invention relates generally to the handling of flexible planar objects, and more particularly to the shingling of such objects when presented in stack form.

US-A-4727784 describes an apparatus for piling a succession of blanks cut from a continuous web of relatively thin and flexible material such as paper, paperboard, plastic film or metal foil. Each blank is cut off then accelerated to produce a gap between itself and the next succeeding blank. The accelerated blank is then deflected out of its accelerated path and towards an underlying receiving surface of a conveyor. To deposit the blanks in a shingled relationship on the conveyor, with their leading edges spaces apart, each blank deflected out of its accelerated path is rapidly decelerated by its leading edge striking an idle roller and drops onto the underlying receiving surface of the conveyor which moves at a slow speed. The idle roller bears on the pile of shingled blanks on the conveyor with a force that can be adjusted and varied by a ram coupled to a pivoted arm having the roller mounted on one end. The extent of the spacing between the leading edges of adjacent blanks in the shingled pile on the conveyor can be adjusted and controlled by varying and changing the speed of the conveyor relative to the speed of the accelerating mechanism. Increasing the relative speed of the conveyor increases the spacing between the leading edges of the adjacent blanks and decreasing the relative speed decreases this spacing. A similar apparatus is described in US-A-4214744 for shingling sheets at the discharge end of a corrugator.

Industrial manufacturing of a garment currently requires an inordinate amount of time to handle material that will eventually comprise a garment. In excess of 80% of the time spent on any one garment may go to material handling. Sewing, for example, represents a surprisingly small proportion of manufacturing time, relative to handling. One area of the process that is particularly time-consuming is separation of a stack of fabric workpieces to allow easy subsequent handling of individual workpieces.

A workpiece stack can be created by repeatedly folding a piece of fabric onto itself and then cutting a single pattern clear through all layers of the multiple-folded cloth. This produces a stack comprised of flexible planar objects of uniform size, oriented such that all edges of each object are juxtaposed with the corresponding edges of each immediately adjacent object. This arrangement produces a stack with ends defined by the two outermost planar objects, and sides defined by the juxtaposed edges of the several juxtaposed ob-

jects, which sides are all approximately perpendicular to the two parallel planes containing the end members of the stack.

By automating the process by which such stacks are separated, increased efficiency in handling fabric workpieces can be obtained. However, numerous difficulties are encountered in attempting to automate the separation of fabric workpieces. Unlike the rigid planar objects to which much of the prior art is addressed, stacks of fabric workpieces easily lose a workable shape if their movement is not strictly controlled. Thus, fabric workpieces cannot be expected to "fall into place" of their own accord, a characteristic upon which art such as U.S. Pat. Nos. 4,008,890 (PULDA) and 4,049,259 (VENTZ) depends.

Much of the prior art also relies on minimal cohesion between juxtaposed planar surfaces. Where the planar objects are characterized by more substantial coefficients of friction, however, individual sheets are more likely to clump together, resisting current methods of separation. Although some of the art has addressed the "clumping" contingency, it does so only on an "as needed" basis.

It is an object of the present invention to prepare stacks of compressible fabric workpieces for subsequent automated separation by shingling the stack. Once the stack is shingled, an edge of each individual workpiece is exposed for easier handling. A further objective is to carry out this function in a manner which at all times controls the stack such that neither the stack nor the fabric workpieces composing said stack lose a workable shape. Additionally, the present invention is designed to prevent clumping entirely so that special time-consuming measures to separate clumps are avoided.

According to one aspect of the present invention there is provided an apparatus for spreading a shingled stack of compressible fabric workpieces having an open face exposing each underlying fabric workpiece, the apparatus comprising at least one driven roller, conveyor means for driving the shingled stack under the roller with the stack so oriented that the first part of the stack to make contact with the roller is its open face, and means for so applying positive pressure to the roller as to urge the roller towards the conveyor means while allowing the roller to ride upwardly on the said open face and decrease the amount of overlap between successive workpieces in the stack.

According to another aspect of the invention there is provided a method of spreading a shingled stack of compressible fabric workpieces having an open face exposing each underlying fabric workpiece, comprising so moving the stack on a single conveyor below a roller that the first part of the stack to make contact with the roller is its open

face, and so drivingly rotating the roller and pressing down the roller on the open face as to decrease the amount of overlap between successive workpieces in the stack, the direction of rotation of the roller being complementary to the direction of movement imparted by the conveyor.

A preferred embodiment of the present invention subjects a stack of compressible fabric workpieces to a two-part process. The first step in the process forms an initial shingle and the second step further decreases the amount of overlap between adjacent workpieces. As a result, each workpiece is exposed as each underlying workpiece is displaced relative to its immediate neighbor during the shingling process.

To achieve this goal, the stack is first placed on the platform of the rough shingler assembly. Here, a clamp, or similar means, is applied to the stack, preferably nearer to one end, such that the workpieces are immobilized relative to one another within a region near the clamp. The rough shingler then bends the stack. To accommodate the fold while conforming to the shape of surrounding workpieces, each workpiece shifts laterally relative to adjacent workpieces at the end of the stack past the bend and opposite the clamp. However, the clamp prevents any such shift or displacement within the region of the stack to which it is applied. To maintain the displacement, the other end of the stack is clamped. The first clamp is released and the stack is then unbent. The initial displacement has been carried through the entire stack.

This process may be repeated indefinitely, so long as the top workpiece in the stack continues to overlap the bottom workpiece and both clamps firmly hold both top and bottom workpieces. The longer the workpieces relative to the distance between the clamps and the thickness of the stack the more the stack can be shingled.

To complete the shingling process, the rough shingled stack is next treated by a spreader assembly. The spreader assembly includes at least one roller subassembly positioned above a conveyor belt on which the partially shingled stack is riding. The axle of the roller subassembly lies in a plane parallel to the conveyor and at an angle perpendicular to the direction of the conveyor belt. The stack is positioned upon the conveyor so that its open side faces the roller subassemblies and the direction of the conveyor. In the open side of a shingled stack each underlapping workpiece is exposed. In the closed side, each underlapping workpiece is hidden.

A preshingled stack is driven under a roller subassembly or series of subassemblies. As the conveyor carries the stack beneath a roller subassembly, the subassembly is lowered so that the rollers of the subassembly are brought into contact

with the open side of the stack. The rollers operate to recline and further shingle the stack. They do so by a combination of roller rotation in the same direction as the direction of the stack in combination with the application of pressure onto the shingled stack.

Brief Description of the Drawings

The preferred embodiment of the invention is described in detail below in conjunction with the illustrations in which:

Figure 1 is a perspective view of the rough shingler assembly in combination with the spreader assembly;

Figure 2A through 2F show the steps necessary to rough shingle a stack of fabric workpieces; and

Figure 3 shows a side view of the spreader assembly with the second roller subassembly engaged.

Detailed Description of a Preferred Embodiment

Figure 1 illustrates one arrangement of the preferred embodiment. This arrangement demonstrates a close spacial proximity that is appropriate for rough shingler assembly 100 and spreader assembly 200, in view of the close temporal proximity in which the two assemblies operate during the particular shingling process disclosed herein, as well as in the overall manufacturing process.

In this arrangement, a fabric workpiece stack is placed upon rough shingler platform 110. The rough shingler platform 110 comprises two adjoining subplates, primary subplate 112 and secondary subplate 114. The axis 116 of the platform 110 joins the two subplates 112 and 114. A primary clamp 118 is positioned to clamp a stack of objects against the primary subplate 112 and a secondary clamp 120 is positioned to clamp the same stack against the secondary subplate 114. The sides of the stack which will be offset in a shingled fashion are preferably parallel to the axis 116.

Figures 2A through 2F show the sequence of steps taken by the rough shingler 100. Figure 2A shows that a workpiece stack 122 has been delivered to the platform 110. This may be done through any standard means such as by a conveyor. The stack 122 straddles the axis 116 and is positioned under both primary clamp 118 and secondary clamp 120. In Figure 2B, the primary clamp 118 is activated to firmly grasp the stack 122. The activation of the clamps may be controlled by mechanical, pneumatic, hydraulic or other means and is preferably automatically controlled. This action holds the workpieces in the stack immobile relative to one another in the region near to the

primary clamp 118.

In Figure 2C the secondary subplate 114 is rotated about the axis 116 bending the workpieces. The subplate 114 may be controlled by mechanical, pneumatic, hydraulic or other means. These control means are preferably automatically actuated in sequence with the clamps. Any suitable control means may be used. Each workpiece is bent around the axis 116. However, each workpiece that is successively farther from the platform 110 is bent through an arc having a larger radius of curvature. Accordingly, because each workpiece is the same length the ends of the stack positioned over the secondary subplate 114 are displaced from one another. The larger the angle that the secondary subplate rotates through, the larger the displacement of the ends of the stack 122.

The ends will be displaced whether the secondary subplate 114 is rotated upward or downward (as shown). It should be noted that if the subplate 114 is rotated upward the open end of the stack will be at the opposite end of the stack. Depending upon the characteristics of the workpiece attempting to rotate the subplate 114 up may tend to buckle the fabric and fail to shingle the stack 122.

Figure 2D shows that the secondary clamp 120 is activated to firmly grasp the stack 122. This action holds the workpieces in the stack immobile relative to one another in the region near to the secondary clamp 120. Next, Figure 2E shows that the primary clamp 118 is deactivated. The workpieces are no longer immobile relative to one another over the primary subplate 112. Lastly, in Figure 2F, secondary subplate 114 is returned to its starting position parallel to primary subplate 112. Because the workpieces are no longer bent through various radii of curvature the amount displacement between the ends of the stack 122 held by the secondary clamp 120 is transferred throughout the stack 122.

Additional displacement of the workpieces may be obtained by repeating that part of the process described above, so long as previous displacement has not removed any workpieces from the areas subject to detachable affixation by clamps 118 and 120 and so long as the top workpiece still overlies at least in part the bottom workpiece.

Where the workpieces are short in length, such as for blue jean patch pockets, the rough shingling operation may not be able to achieve sufficient shingling for suitable handling in subsequent operations. In such circumstances, the spreader assembly 200 is used to spread the shingled stack out even more. In the preferred embodiment of Figure 1, the rough shingled stack is transported from the rough shingler 100 to the spreader assembly 200. The stack may be transported by any known method such as a conveyor.

The spreader assembly 200 shown in Figure 3 comprises a conveyor 210 which transports the stack 122 therethrough. Additionally, roller assemblies 220 are utilized to spread out the fabric. The roller assemblies include a roller 222 driven by a belt 224 in the direction of the conveyor 210 and supported by a moveable arm 226. Positive pressure is exerted against the conveyor 210 by the roller 222 through an air cylinder 228. Springs, weight or other means may be used.

The open edge of the stack 122 is driven under the roller 222 by the conveyor 210. The stack 122 forces the roller 222 to rise up and ride along the stack 122. Because the workpieces are compressible, a small wave is developed due to the pressure of the roller 222 on the stack 122. This wave is pushed through the stack thereby increasing the amount of shingling (spreading out the stack 122). The sizes of the rollers 222 are preferably selected to have an appropriate angle of attack to the stack 122 based upon the amount of shingle expected. Thus, rollers of different sizes can be used throughout a single shingle spreader assembly as shown in Figure 3.

While a particularly preferred embodiment of this invention has been described above in detail, it is understood that this embodiment is illustrative only of the principles of this invention. Numerous equivalents, modifications and variations of the described structure will become readily apparent to those skilled in the art. Thus, the scope of this invention is limited solely by the claims appended hereto.

Claims

1. An apparatus for spreading a shingled stack of compressible fabric workpieces having an open face exposing each underlying fabric workpiece, the apparatus comprising at least one driven roller (222), conveyor means (210) for driving the shingled stack (122) under the roller (222) with the stack (122) so oriented that the first part of the stack to make contact with the roller (222) is its open face, and means (228) for so applying positive pressure to the roller (222) as to urge the roller (222) towards the conveyor means (210) while allowing the roller (222) to ride upwardly on the said open face and decrease the amount of overlap between successive workpieces in the stack (122).
2. An apparatus according to claim 1, characterised in that the conveyor means is a single conveyor (210).

primary clamp 118.

In Figure 2C the secondary subplate 114 is rotated about the axis 116 bending the workpieces. The subplate 114 may be controlled by mechanical, pneumatic, hydraulic or other means. These control means are preferably automatically actuated in sequence with the clamps. Any suitable control means may be used. Each workpiece is bent around the axis 116. However, each workpiece that is successively farther from the platform 110 is bent through an arc having a larger radius of curvature. Accordingly, because each workpiece is the same length the ends of the stack positioned over the secondary subplate 114 are displaced from one another. The larger the angle that the secondary subplate rotates through, the larger the displacement of the ends of the stack 122.

The ends will be displaced whether the secondary subplate 114 is rotated upward or downward (as shown). It should be noted that if the subplate 114 is rotated upward the open end of the stack will be at the opposite end of the stack. Depending upon the characteristics of the workpiece attempting to rotate the subplate 114 up may tend to buckle the fabric and fail to shingle the stack 122.

Figure 2D shows that the secondary clamp 120 is activated to firmly grasp the stack 122. This action holds the workpieces in the stack immobile relative to one another in the region near to the secondary clamp 120. Next, Figure 2E shows that the primary clamp 118 is deactivated. The workpieces are no longer immobile relative to one another over the primary subplate 112. Lastly, in Figure 2F, secondary subplate 114 is returned to its starting position parallel to primary subplate 112. Because the workpieces are no longer bent through various radii of curvature the amount displacement between the ends of the stack 122 held by the secondary clamp 120 is transferred throughout the stack 122.

Additional displacement of the workpieces may be obtained by repeating that part of the process described above, so long as previous displacement has not removed any workpieces from the areas subject to detachable affixation by clamps 118 and 120 and so long as the top workpiece still overlies at least in part the bottom workpiece.

Where the workpieces are short in length, such as for blue jean patch pockets, the rough shingling operation may not be able to achieve sufficient shingling for suitable handling in subsequent operations. In such circumstances, the spreader assembly 200 is used to spread the shingled stack out even more. In the preferred embodiment of Figure 1, the rough shingled stack is transported from the rough shingler 100 to the spreader assembly 200. The stack may be transported by any known method such as a conveyor.

The spreader assembly 200 shown in Figure 3 comprises a conveyor 210 which transports the stack 122 therethrough. Additionally, roller assemblies 220 are utilized to spread out the fabric. The roller assemblies include a roller 222 driven by a belt 224 in the direction of the conveyor 210 and supported by a moveable arm 226. Positive pressure is exerted against the conveyor 210 by the roller 222 through an air cylinder 228. Springs, weight or other means may be used.

The open edge of the stack 122 is driven under the roller 222 by the conveyor 210. The stack 122 forces the roller 222 to rise up and ride along the stack 122. Because the workpieces are compressible, a small wave is developed due to the pressure of the roller 222 on the stack 122. This wave is pushed through the stack thereby increasing the amount of shingling (spreading out the stack 122). The sizes of the rollers 222 are preferably selected to have an appropriate angle of attack to the stack 122 based upon the amount of shingle expected. Thus, rollers of different sizes can be used throughout a single shingle spreader assembly as shown in Figure 3.

While a particularly preferred embodiment of this invention has been described above in detail, it is understood that this embodiment is illustrative only of the principles of this invention. Numerous equivalents, modifications and variations of the described structure will become readily apparent to those skilled in the art. Thus, the scope of this invention is limited solely by the claims appended hereto.

Claims

1. An apparatus for spreading a shingled stack of compressible fabric workpieces having an open face exposing each underlying fabric workpiece, the apparatus comprising at least one driven roller (222), conveyor means (210) for driving the shingled stack (122) under the roller (222) with the stack (122) so oriented that the first part of the stack to make contact with the roller (222) is its open face, and means (228) for so applying positive pressure to the roller (222) as to urge the roller (222) towards the conveyor means (210) while allowing the roller (222) to ride upwardly on the said open face and decrease the amount of overlap between successive workpieces in the stack (122).
2. An apparatus according to claim 1, characterised in that the conveyor means is a single conveyor (210).



3. An apparatus according to claim 2, characterised in that there is a plurality of driven rollers (222), the single conveyor (210) and the rollers (222) are so arranged that in operation the conveyor (210) drives the shingled stack (122) under each roller (222) in succession with the stack so oriented that the first part of the stack to make contact with each roller (222) is its open face, and means (228) are provided for so applying positive pressure to each roller (222) as to urge the roller (222) towards the conveyor (210) while allowing the roller (222) to ride upwardly on the said open face and decrease the amount of overlap between successive workpieces in the stack (122).
4. An apparatus according to claim 3, characterised in that the diameters of rollers (222) decrease in the direction of movement imparted by the conveyor (210).
5. An apparatus for shingling a stack of fabric compressible workpieces, the stack having a first end and a second end, the apparatus comprising a rough shingler (100) arranged for supplying a rough shingled stack (122) to an apparatus according to any preceding claim, the rough shingler (100) comprising:
 - first holding means (118) actuable to hold the first end of the stack (122) to render the workpieces immobile relative to one another at the first end;
 - bending means (112,114,116) actuable to bend the stack (122) with its first end held by the first holding means (118) to form a displacement in the workpieces relative to one another at the second end of the stack (122);
 - second holding means (120) actuable to hold the second end when the stack (122) is bent by the bending means (112,114,116) and thereby to render the workpieces immobile relative to one another at the second end with the said displacement maintained; and
 - means for actuating the first and second holding means (118,120) and the bending means (112,114,116) in such a manner that the first end of the stack (122) is released by the first holding means (118) and the stack (122) is unbent by the bending means (112,114,116) to cause the stack (122) to present an open face exposing each underlying fabric workpiece.
6. An apparatus according to claim 5, characterised in that the bending means comprises a fixed primary subplate (112) and a rotatable secondary subplate (114) joined together at an axis (116).
7. An apparatus according to claim 6, characterised in that the said actuating means includes means for automatically rotating the secondary subplate (114).
8. An apparatus according to claim 5 or 6 or 7, characterised in that the first and second holding means comprise clamps (118,120).
9. An apparatus according to claim 8, characterised in that the said actuating means includes means for automatically actuating the clamps (118,120).
10. A method of spreading a shingled stack of compressible fabric workpieces having an open face exposing each underlying fabric workpiece, comprising so moving the stack (122) on a single conveyor (210) below a roller (222) that the first part of the stack (122) to make contact with the roller (222) is its open face, and so drivingly rotating the roller and pressing down the roller on the open face as to decrease the amount of overlap between successive workpieces in the stack (122), the direction of rotation of the roller (222) being complementary to the direction of movement imparted by the conveyor (210).
11. A method according to claim 10, characterised by moving the stack (122) on the conveyor (210) below a subsequent roller (222) so that the open face of the stack (122) comes into contact with the subsequent roller (222), and so drivingly rotating the subsequent roller (222) and pressing down the subsequent roller (222) on the open face as to further decrease the amount of overlap between successive workpieces in the stack (122), the direction of rotation of the subsequent roller being complementary to the direction of movement imparted by the conveyor (210).
12. A method according to claim 11, characterised by providing the subsequent roller (222) with a smaller diameter than that of the first said roller (222) in accordance with the amount of overlap expected in the stack (122) arriving at the subsequent roller (222).

Patentansprüche

1. Vorrichtung zum Ausbreiten eines dachziegelartig überlappenden Stapels zusammendrückbarer Stoffstücke mit einer offenen Seite, an der jedes der aufeinanderliegenden Stoffstücke freiliegt, wobei die Vorrichtung mindestens eine angetriebene Walze (222), eine Förderein-



- richtung (210), die den dachziegelartig überlappenden Stapel (122) unter die Walze (222) befördert, wobei der Stapel (122) so ausgerichtet ist, daß der erste mit der Walze (222) in Kontakt kommende Teil des Stapels seine offene Seite ist, und eine Einrichtung (228) umfaßt, die derart einen positiven Druck auf die Walze (222) ausübt, daß diese zur Fördereinrichtung (210) hin gedrückt wird, wobei die Walze (222) gleichzeitig auf der offenen Seite aufwärts fährt und den Grad der Überlappung der aufeinanderfolgenden Teile in dem Stapel (122) reduziert.
2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Fördereinrichtung ein Einzelförderer (210) ist.
3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß mehrere angetriebene Walzen (222) vorhanden sind, der Einzelförderer (210) und die Walzen (222) derart angeordnet sind, daß im Betrieb der Förderer (210) den dachziegelartig überlappenden Stapel (122) nacheinander unter jede Walze (222) befördert, wobei der Stapel so ausgerichtet ist, daß der erste mit der jeweiligen Walze (222) in Kontakt kommende Teil des Stapels seine offene Seite ist, und daß eine Einrichtung (228) vorhanden ist, die derart einen positiven Druck auf jede Walze (222) ausübt, daß die Walze (222) zum Förderer (210) hin gedrückt wird, wobei die Walze (222) gleichzeitig auf der offenen Seite aufwärts fährt und den Grad der Überlappung der aufeinanderfolgenden Teile in dem Stapel (122) reduziert.
4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß der Durchmesser der Walzen (222) in Richtung der vom Förderer (210) erteilten Bewegung abnimmt.
5. Vorrichtung zum dachziegelartigen Überlappen von zusammendrückbaren Stoffstücken eines Stapels mit einem ersten und einem zweiten Ende, wobei die Vorrichtung eine Einrichtung (100) zum Herstellen einer grob dachziegelartigen Überlappung umfaßt, die einen sich grob dachziegelartig überlappenden Stapel (122) einer Vorrichtung nach einem der vorhergehenden Ansprüche zuführt, und die Einrichtung (100) zum Herstellen einer grob dachziegelartigen Überlappung folgendes umfaßt:
- eine erste Halteeinrichtung (118), die derart betätigbar ist, daß sie das erste Ende des Stapels (122) festhält, um die Stücke an diesem ersten Ende gegeneinander unbeweglich zu machen;
 - eine Biegeeinrichtung (112, 114, 116), die derart betätigbar ist, daß sie den Stapel (122) biegt, wobei das erste Ende von der ersten Halteeinrichtung (118) gehalten wird, um eine Verschiebung der Stücke gegeneinander am zweiten Ende des Stapels (122) hervorzurufen;
 - eine zweite Halteeinrichtung (120), die derart betätigbar ist, daß sie das zweite Ende des Stapels festhält, wenn der Stapel (122) von der Biegeeinrichtung (112, 114, 116) gebogen wird, wodurch die Stücke am zweiten Ende gegeneinander unbeweglich gehalten werden, wobei die Verschiebung aufrechterhalten wird und
 - eine Einrichtung zum Betätigen der ersten und der zweiten Halteeinrichtung (118, 120) und der Biegeeinrichtung (112, 114, 116) derart, daß das erste Ende des Stapels (122) von der ersten Halteeinrichtung (118) losgelassen wird und der Stapel (122) durch die Biegeeinrichtung (112, 114, 116) geraderichtet wird, so daß der Stapel (122) eine offene Seite zeigt, an der jedes der übereinanderliegenden Stoffstücke freiliegt.
6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Biegeeinrichtung eine feste erste Teilplatte (112) und eine drehbare zweite Teilplatte (114) umfaßt, die an einer Achse (116) zusammengefügt sind.
7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Betätigungseinrichtung Mittel zum automatischen Drehen der zweiten Teilplatte (114) umfaßt.
8. Vorrichtung nach Anspruch 5 oder 6 oder 7, dadurch gekennzeichnet, daß die erste und die zweite Halteeinrichtung Klemmen (118, 120) umfassen.
9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß die Betätigungseinrichtung Mittel zum automatischen Betätigen der Klemmen (118, 120) umfaßt.
10. Verfahren zum Ausbreiten eines dachziegelartig überlappenden Stapels zusammendrückbarer Stoffstücke mit einer offenen Seite, an der jedes der aufeinanderliegenden Stoffstücke freiliegt, wobei der Stapel (122) auf einem Einzelförderer (210) so unter eine Walze (222) befördert wird, daß der erste mit der Walze in Kontakt kommende Teil des Stapels (122) seine offene Seite ist, wobei die Walze derart drehangetrieben und nach unten auf die offene



Seite gedrückt wird, daß der Grad der Überlappung zwischen aufeinanderfolgenden Stücken im Stapel (122) reduziert wird und die Drehrichtung der Walze (222) komplementär zu der vom Förderer (210) erteilten Bewegungsrichtung ist.

11. Verfahren nach Anspruch 10, dadurch gekennzeichnet, daß der Stapel (122) auf dem Förderer (210) derart unter eine nachfolgende Walze (222) bewegt wird, daß die offene Seite des Stapels (122) mit der nachfolgenden Walze (222) in Kontakt kommt und dadurch die nachfolgende Walze (222) drehangetrieben und nach unten auf die offene Seite gedrückt wird, um den Grad der Überlappung zwischen aufeinanderfolgenden Stücken im Stapel (122) weiter zu reduzieren, wobei die Drehrichtung der nachfolgenden Walze komplementär zu der vom Förderer (210) erteilten Bewegungsrichtung ist.

12. Verfahren nach Anspruch 11, dadurch gekennzeichnet, daß die nachfolgende Walze (222) einen kleineren Durchmesser als die erste Walze (222) hat, entsprechend dem zu erwartenden Grad der Überlappung bei dem an der nachfolgenden Walze (222) eintreffenden Stapel (122).

Revendications

1. Appareil pour étaler une pile de pièces chevauchantes de travail de tissu compressible ayant une face ouverte exposant chaque pièce de travail de tissu se trouvant au-dessous, l'appareil comprenant au moins un rouleau d'entraînement (222), des moyens d'acheminement (210), pour entraîner la pile (122) de pièces chevauchantes sous le rouleau (222) avec la pile (122) orientée de telle sorte que la première partie de la pile à faire contact avec le rouleau (222) est sa face ouverte, et des moyens (228) pour appliquer une pression positive au rouleau (222) de manière à repousser le rouleau (222) vers les moyens d'acheminement (210) tout en permettant au rouleau (222) de passer par dessus et vers le haut sur ladite face ouverte et diminuer la quantité de chevauchement entre des pièces de travail successives dans la pile (122).
2. Appareil selon la revendication 1, caractérisé en ce que les moyens d'acheminement sont un convoyeur unique (210).
3. Appareil selon la revendication 2, caractérisé en ce qu'il y a une pluralité de rouleaux d'en-

traînement (222), le convoyeur unique (210) et les rouleaux (222) étant agencés de telle sorte qu'en fonctionnement le convoyeur (210) entraîne la pile (122) de pièces chevauchantes au-dessous de chaque rouleau (222) à la suite avec la pile orientée de telle sorte que la première partie de la pile à faire contact avec chaque rouleau (222) est sa face ouverte et des moyens (228) sont prévus pour appliquer une pression positive à chaque rouleau (222) de manière à repousser le rouleau (222) vers le convoyeur (210) tout en permettant au rouleau (222) de passer par dessus et vers le haut sur ladite face ouverte et diminuer la quantité de chevauchement entre des pièces de travail successives dans la pile (122).

4. Appareil selon la revendication 3, caractérisé en ce que les diamètres des rouleaux (222) diminuent dans la direction de déplacement imprimée par le convoyeur (210).

5. Appareil pour faire se chevaucher les pièces d'une pile de pièces de travail compressible en tissu, la pile ayant une première extrémité et une seconde extrémité, l'appareil comprenant un chevauteur grossier (100) agencé pour fournir une pile (122) de pièces chevauchantes de façon grossière à un appareil selon l'une quelconque des revendications précédentes, le chevauteur grossier (100) comprenant :

des premiers moyens de maintien (118) actionnables pour maintenir la première extrémité de la pile (122) pour rendre les pièces de travail immobiles les unes par rapport aux autres à la première extrémité ;

des moyens de pliage (112,114,116) actionnables pour plier la pile (122) avec sa première extrémité maintenue par les premiers moyens de maintien (118) pour former un déplacement dans les pièces de travail les unes par rapport aux autres à la seconde extrémité de la pile (122) ;

des seconds moyens de maintien (120) actionnables pour maintenir la seconde extrémité lorsque la pile (122) est pliée par les moyens de pliage (112,114,116) et ainsi pour rendre les pièces de travail immobiles les unes par rapport aux autres à la seconde extrémité avec ledit déplacement maintenu ; et

des moyens pour actionner les premier et second moyens de maintien (118,120) et les moyens de pliage (112,114,116) de telle manière que la première extrémité de la pile (122) est relâchée par les premiers moyens de maintien (118) et la pile (122) est dépliée par les moyens de pliage (112,114,116) afin que la



pile (122) présente une face ouverte exposant chaque pièce de travail de tissu se trouvant au-dessous.

6. Appareil selon la revendication 5, caractérisé en ce que les moyens de pliage comprennent une sous-plaque (112) primaire fixe et une sous-plaque (114) secondaire rotative jointes ensemble suivant un axe (116).

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7. Appareil selon la revendication 6, caractérisé en ce que lesdits moyens d'actionnement comportent des moyens pour faire tourner automatiquement la sous-plaque secondaire (114).

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8. Appareil selon la revendication 5 ou 6 ou 7, caractérisé en ce que les premier et second moyens de maintien comportent des pinces (118,120).

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9. Appareil selon la revendication 8, caractérisé en ce que lesdits moyens d'actionnement comportent des moyens pour actionner automatiquement les pinces (118, 120).

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10. Procédé pour étaler une pile de pièces chevauchantes de travail de tissu compressible ayant une face ouverte exposant chaque pièce de travail de tissu se trouvant au-dessous, comprenant le déplacement de la pile (122) sur un convoyeur (210) unique au-dessous d'un rouleau (222) de telle sorte que la première partie de la pile (122) à faire contact avec le rouleau (222) est sa face ouverte et l'entraînement en rotation du rouleau et le pressage du rouleau vers le bas sur la face ouverte de manière à diminuer la quantité de chevauchement entre des pièces de travail successives dans la pile (122), le sens de rotation du rouleau (222) étant complémentaire au sens de mouvement imprimé par le convoyeur (210).

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11. Procédé selon la revendication 10, caractérisé par le déplacement de la pile (122) sur le convoyeur (210) au-dessous d'un rouleau postérieur (222) de telle sorte que la face ouverte de la pile (122) vienne en contact avec le rouleau postérieur (222) et l'entraînement en rotation le rouleau postérieur (222) et le pressage du rouleau postérieur (222) vers le bas sur la face ouverte de manière à diminuer à nouveau la quantité de chevauchement entre des pièces de travail successives dans la pile (122), le sens de rotation du rouleau postérieur (222) étant complémentaire au sens de mouvement imprimé par le convoyeur (210).

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12. Procédé selon la revendication 11, caractérisé par la disposition d'un rouleau postérieur (222) avec un diamètre plus petit que le premier rouleau (222) en fonction de la quantité de chevauchement souhaitée dans la pile (122) arrivant au rouleau postérieur (222).

