Aug. 13, 1968 C. L. SNAYBERGER, SR., ET AL 3,396,878

FOLDING DEVICE FOR FLAT GOODS

Filed Oct. 25, 1966 2 Sheets-Sheet 1

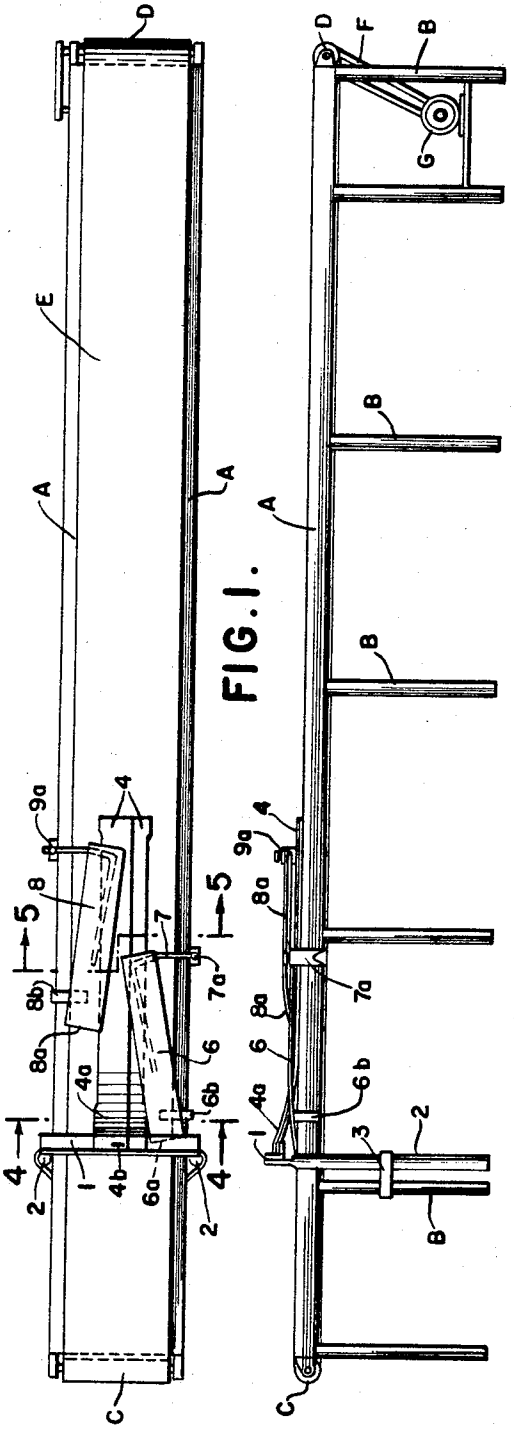

FIG. 1.

FIG. 2.

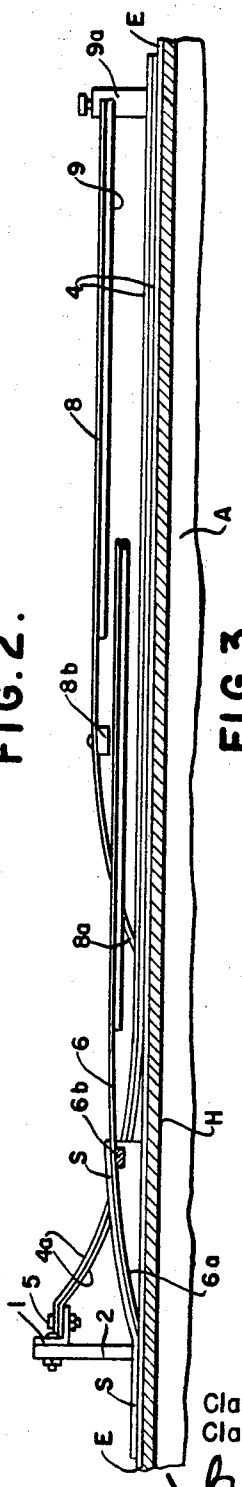

FIG. 3.

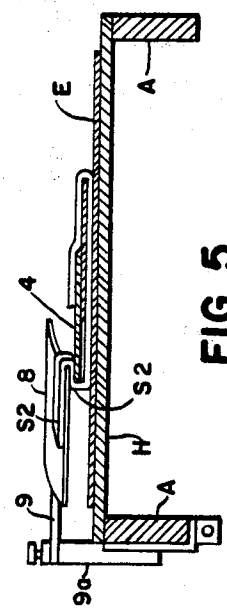

FIG. 5.

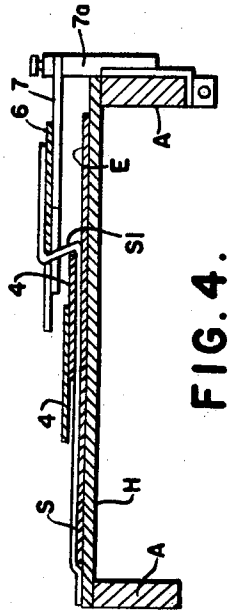

FIG. 4.

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FOLDING DEVICE FOR FLAT GOODS

Filed Oct. 25, 1966 2 Sheets-Sheet 2

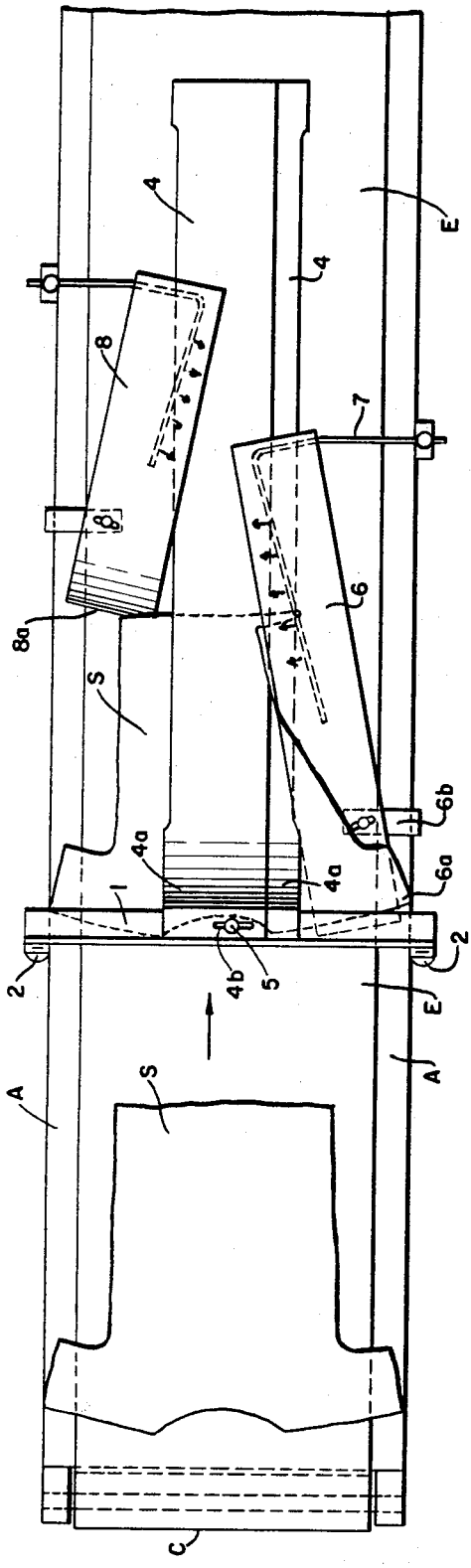

FIG. 6.

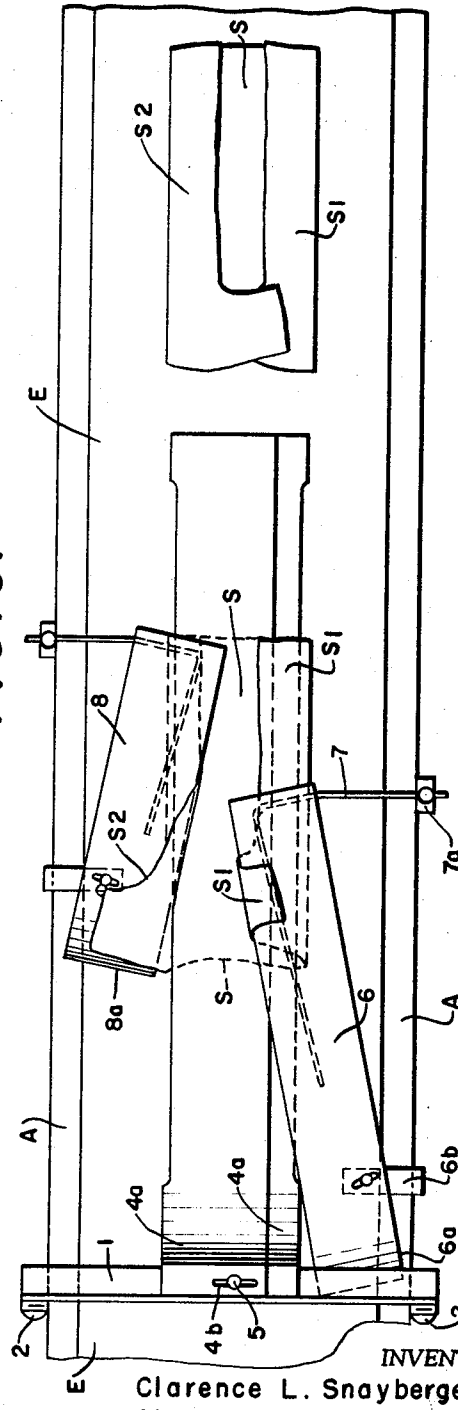

FIG. 7.

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FOLDING DEVICE FOR FLAT GOODS

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4 Claims. (Cl. 223—37)

Our invention is a novel folding device for flat goods, such as polo shirts, T-shirts, blankets, sheets, towels, and any other flat goods, and the object of the invention is to provide a folding device adapted to be mounted upon and asscociated with an endless conveyor belt, the same being adapted to automatically fold over the two sides of said polo shirts, or other flat goods, on the upper run of the conveyor belt as they are fed through and under the device.

The present invention is an improvement upon the folding device shown in our U.S. Letters Patent No. 3,131,838, issued May 5, 1964, which disclosed a folding device of the above type including a pair of superimposed and laterally offset stainless steel or other folding boards adapted to be adjustably secured to the conveyor frame and to rest in fixed location upon the upper run of the conveyor belt, which boards were laterally adjustable as to combined or overall width so as to conform with the width of the fold which was to be formed at the opposite sides of the shirt, or other flat goods, which goods could obviously be of different sizes; also disclosed two chrome plated folding bars cooperating with and disposed above the folding boards, one bar being disposed in advance of the other bar and mounted in brackets secured to the conveyor frame, the bars being so shaped that they form the folds in the shirt by turning in the sides of the shirt as it is moved by the conveyor belt under the folding boards, the bars being disposed one behind the other so as to fold in one side only of the shirt at a time whereby the folding operation at one side of the shirt will not interfere with the folding operation at the other side of the shirt.

The principal object of our present invention is to substitute for the two folding bars of our aforesaid patent, above mentioned, two rectangular substantially flat folding pans cooperating with and disposed above the folding boards, one pan being disposed in advance of the other and each pan being adjustably secured in brackets mounted on the conveyor frame, and said pans being disposed at an angle to the axis of the conveyor belt with their leading inner corners offset laterally beyond the adjacent sides of the folding boards to form the folds in the shirt as it is moved by the conveyor belt under the folding boards.

Another object of our invention is to provide a folding device of the above type so arranged that the operator may place an unfolded shirt or the like on the leading end of the upper run of the conveyor belt, and as the belt progresses the shirt will be carried under the folding boards, one side of the shirt being first engaged by the first folding pan to fold the said side over and upon the adjacent edge of the folding boards, further progress of the conveyor belt causing the other side of the shirt to be folded up and over the adjacent side of the folding boards, whereby upon further progress of the conveyor belt the shirt will emerge from under the folding boards, the final fold being performed manually by the operator who then lifts the bottom hem of the folded shirt upwardly and folds it back towards the collar of the shirt, the shirt being then ready for packaging.

A further object of our invention is to provide a folding device of the above type in which one, two, three or more shirts or the like may be placed one upon the other, and the plurality of superimposed shirts simultaneously folded for packaging according to the number of shirts desired by a customer.

A still further object of the invention is to provide a folding device which will fold infant's gowns, shirts, kimonos, or any other similar type of garment, the folds being formed automatically in accordance with the number of superimposed garments fed onto the conveyor belt.

We will explain the invention with reference to the accompanying drawings which illustrate one practical embodiment thereof to enable others familiar with the art to adopt and use the same, and will summarize in the claims the novel features of construction, and novel combination of parts, for which protection is desired.

In said drawings:

FIG. 1 is a top plan view of an endless conveyor showing our novel folding boards positioned thereon; also the folding pans mounted at opposite sides of the conveyor frame within the length of the folding board.

FIG. 2 is a side elevation of the parts shown in FIG. 1.

FIG. 3 is an enlarged longitudinal section through the upper portion of the conveyor frame in way of the folding boards showing the conveyor belt, the folding boards and the folding pans.

FIG. 4 is an enlarged transverse section on the line 4—4, FIG. 1.

FIG. 5 is an enlarged transverse section on the line 5—5, FIG. 1.

FIG. 6 is an enlarged plan view of a portion of the conveyor showing a polo shirt placed upon the leading portion of the conveyor belt prior to its passage under the folding board and folding pans, respectively.

FIG. 7 is a view similar to FIG. 6 but showing the shirt disposed under the folding boards and the folding operation at one side substantially completed, and the folding operation at the opposite side in its initial state; also showing beyond the folding boards a folded shirt after having emerged from the folding device while on the conveyor belt.

As shown, the endless conveyor is of conventional type, having side frames A supported upon legs B and having at one end a roller C and at the opposite end a roller D, a conveyor belt E running around the drums C–D, and the drum D being driven by a belt F by means of a motor G. The particular construction of the endless conveyor forms no part of our invention, assuming that the conveyor is of substantial length to accommodate our folding device. Preferably the frames A carry a flat top board H underlying the upper run of the belt E to avoid sagging of the belt.

At a convenient distance from the leading end of the conveyor belt E and disposed above the belt E is a transversely disposed angle bar **1**, the ends of which extend beyond the sides of the frame A of the conveyor, as shown in FIGS. 1, 6 and 7, the ends being supported by uprights **2** which are fixedly secured by straps **3** or the like to the adjacent legs B of the conveyor frame, as shown in FIG. 2.

Preferably the angle-iron **1** has its vertical flange facing the leading edge C of the conveyor belt E, and is disposed approximately somewhat above the conveyor belt, and is adapted to adjustably hold the leading end of the pair of folding boards **4**, which normally bear upon the upper surface of the belt E disposed axially thereof, the leading end of the boards **4** being upwardly curved as at *4a*, FIGS. 6 and 7, each board being provided with a slot *4b* at its leading end which rests upon the horizontal leg

of angle-iron **1** engaging the vertical leg of the angle-bar **1** so that the boards may be shifted laterally for adjustment to conform with the desired width of the fold in the shirt, and the boards when so adjusted being held against relative movement by tightening the screw **5** which is threaded into the horizontal leg of the angle-iron **1**. Thus by loosening the screw **5** both of the folding boards **4** may be adjusted laterally of the belt E so as to conform with the width of the fold in the polo or other shirt which is to be folded.

Preferably the boards **4** are formed of stainless steel and are relatively long so as to accommodate the folding bars which are disposed one in advance of the other and which bars cooperate with the folding boards to form the folds in the polo shirt S, and the major portion of the folding boards directly contacting the upper run of the conveyor belt E.

Associated with the folding plates **4** are a pair of folding pans adapted to fold over the sides of the shirt passing under the folding boards **4** in succession, i.e., one side being folded at a time so that the folding operations of the respective pans will not interfere with each other. As shown, the first folding pan **6** is of rectangular substantially flat shape extending from a point under the angle-iron **1** rearwardly to a point substantially opposite the middle of the length of the folding boards **4** as shown in FIG. 1. Pan **6** is adjustably maintained in a substantially horizontal position above the folding boards **4**, but disposed at a slight angle to the axis of the conveyor belt E and its leading edge **6***a* is curved slightly downwardly to engage the conveyor belt E, the inner corner of the leading edge being slightly offset laterally from the adjacent side of the folding board **4**, and the inner edge of the pan **6** rearwardly of the said inner corner overlying the folding boards as shown in FIGS. 1, 6 and 7, so that as the shirt S on the belt E passes under the leading edge **4***a* of the folding boards **4** the tip **6***a* of the folding pan **6** which is in contact with the belt E will initially enter between the belt E and the underside of the shirt S, as shown in FIGS. 3 and 6, and as the pan **6** is stationary, as the shirt is moved by the conveyor under the folding boards **4**, and tip **6***a* of pan **6** will engage the leading end of the shirt S and turn same upwardly throughout the length of the shirt, forming a fold over the adjacent edge of the folding board **4**, as shown at S′ in FIG. 7, thus folding one side of the shirt S. The leading end of the pan **6** is supported by a bracket **6***b* on the frame A in such manner as to be adjustable transversely of the axis of the conveyor belt E to accommodate various widths of the folding bars **4** and shirts S, while the rear end of the pan **6** is supported by a substantially L-shaped rod **7** underlying the pan **6** and secured thereto, the rear end of rod **7** extending laterally of pan **6** and engaging a bracket **7***a* on frame A in such manner as to be adjustable transversely of the axis of conveyor belt E.

The second folding pan **8** is similar in all respects to pan **6**, but is mounted on the opposite side of the conveyor frame A and extends from a point in advance of the rear end of pan **6** rearwardly to approximately the rear end of folding plates **4** as shown in FIGS. 1, 6 and 7. Pan **8** is adjustably maintained in a substantially horizontal position above the folding boards **4** and above the folding pan **6**, but disposed at a slight angle to the axis of conveyor belt E and its leading edge **8***a* as curved downwardly to engage the conveyor belt E, the inner corner of the leading edge being slightly offset laterally from the adjacent side of the folding board **4**, and the inner edge of the pan **8** rearwardly of said inner corner overlying the folding boards **4**, as shown in FIGS. 1, 6 and 7, so that as the shirt S shown in FIG. 8 is moved in the direction of the arrow the tip **8***a* will engage the leading end of the shirt S and fold the same upwardly as at S2, FIG. 7, and inwardly over the near side of the folding boards **4**, the shirt eventually emerging from over the folding

boards **4** into the folded position shown at the right hand side of FIG. 7. When reaching such position on the conveyor E the folding operation may be completed manually by the operator lifting the hem or leading portion of the folded shirt S to which has been imparted a substantially rectangular shape and folding same upwardly and over to meet the neck portion of the folded shirt, after which the folded shirt is ready for packaging.

The pan **8** is laterally adjustably supported on the frame by means of brackets **8***b* and **9***a* similar in all respects to brackets **6***b* and **7***a*.

We have found that our folding device will fold more than one shirt at a time when a number of shirts are placed in superimposed relation upon the leading end of the belt E, two, three, four or more shirts being simultaneously folded for packaging more than one shirt at a time. The operation of the device with respect to simultaneously folding a plurality of shirts is identically the same as previously described in connection with the folding of a single shirt.

In order to prevent clinging of the fabrics to the pans **6** and **8**, the supporting rods **7** and **9** for the pans may be formed of hollow tubing having their ends connected to a suitable source of compressed air or steam (not shown). The outer portions of the hollow tubes **7** and **9** may be provided with a series of outlet jet holes along the inner sides of the tubes, as shown more particularly by the arrows in FIG. 6, so that the air or steam jets emerging from the perforations will prevent clinging of the articles while being folded to the pans and will thus assist in the folding of the articles.

We do not limit our invention to the exact form shown in the drawings, for obviously changes may be made therein within the scope of the claims.

We claim:

1. In combination, a frame with an endless conveyor belt supported thereupon and having an upper run continuously driven in one direction to move articles of clothing placed on said run at the leading end thereof towards the other end, a folding device comprising a pair of superimposed folding plates normally resting upon said run and being of less overall width than that of the run and under which the articles pass during their movement on said run; the leading ends of said plates being upwardly curved to permit entry thereunder of said articles; means on said frame for centering and maintaining the plates in fixed relation on said run and for adjusting the overall width of the plates; a pair of folding pans cooperating with and disposed above the folding plates, one pan being disposed in advance of the other; and said pans being adjustably mounted respectively in brackets secured to opposite sides of the frame; each pan being of substantially rectangular shape and disposed at an angle to the axis of the belt and having a downwardly curved front end which rests on said run with its inner corner adjacent and spaced from the near side of the plates, said front end being adapted to pass under and raise the near side of the article along the folding plates, the inner edge portions of the pans overlying the plates and being adapted to fold the raised side of the article inwardly and flat upon the near side of the top of the folding plates as the article is advanced by the run under the folding plates; whereby one side of the article will be folded in advance of the other, both folds being performed when the article emerges from the folding plates.

2. In a combination as set forth in claim **1**, said means on the frame comprising a horizontal angle iron disposed at the leading end of the overlapping plates, the ends of said iron being supported in brackets fixed to the frame; and the upwardly curved leading ends of the plates resting upon and being secured to said iron.

3. In a combination as set forth in claim **2**, the leading ends of the plates having transverse slots therein; and said adjusting means comprising a screw passing through

said slots of the overlapping plates and into the said angle iron.

4. In a combination as set forth in claim 1, the pans being supported respectively on hollow tubes mounted in said brackets, said tubes being perforated below the pans and adapted to be connected with a source of vapor under pressure to provide jets to prevent clinging of articles while being folded to the pans and to assist in the folding of the articles.

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