

United States Patent

Holler

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[54] **PACKING OF RELATIVELY FLAT ARTICLES**

[72] Inventor: **Hans Holler**, Bergisch Gladbach, Germany
 [73] Assignee: **Gebruder Holler GmbH**, Bergisch Gladbach, Germany
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Primary Examiner—Robert W. Michell
Assistant Examiner—L. R. Oremland
Attorney—Michael S. Striker

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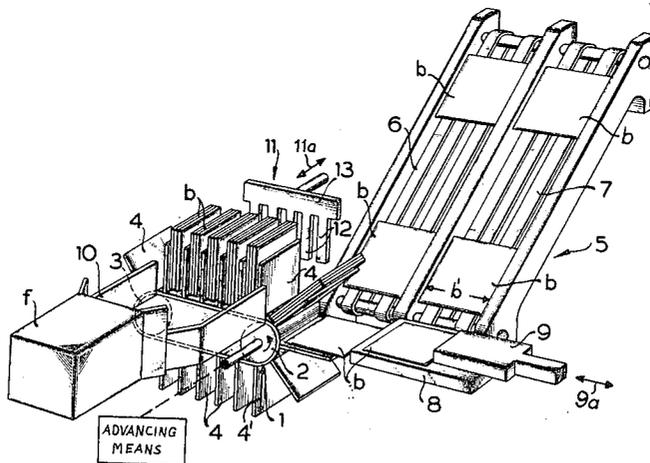
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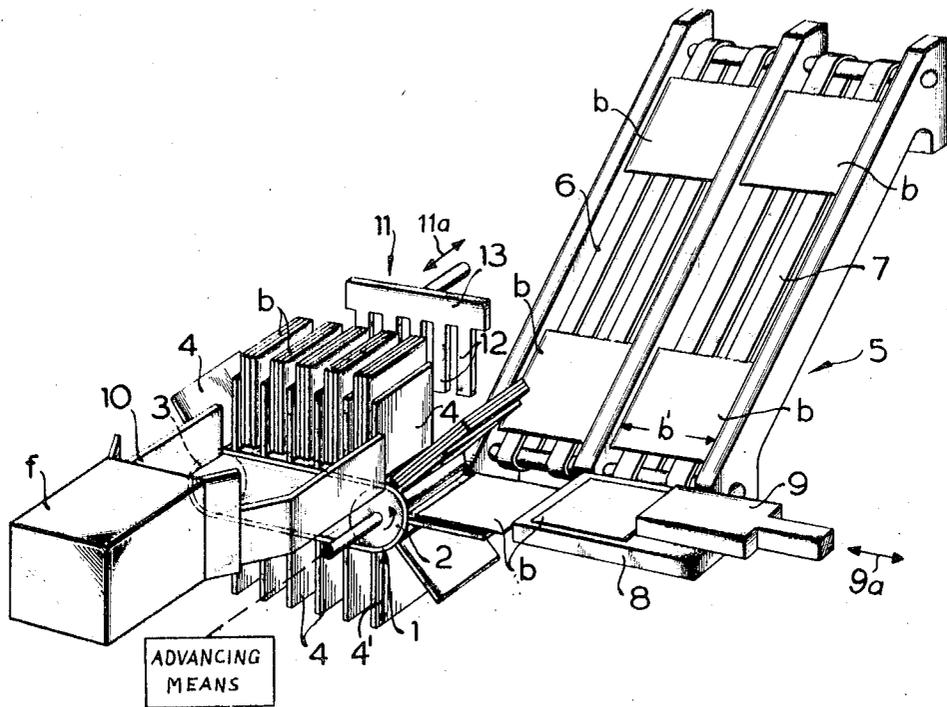
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[57] **ABSTRACT**

An apparatus for stacking and packing relatively flat articles. The articles are advanced to an operating station where they are gathered into stacks in superposed relationship. Thereupon each stack is turned so as to stand on edge and is, while being guided at its opposite major surfaces, inserted edgewise into a receptacle.

8 Claims, 1 Drawing Figure





INVENTOR
Hans HÖLLER
By

Charles S. Steiner

his ATTORNEY

PACKING OF RELATIVELY FLAT ARTICLES

BACKGROUND OF THE INVENTION

The present invention relates generally to the packing of relatively flat articles, and more particularly to an apparatus for effecting such packing.

The packing of relatively flat articles, such as flat bags and the like, presents some problems if they are to be inserted stack-wise into a receptacle. The difficulty is that the articles, which are assembled in a stack and in this condition introduced into a receptacle, have a tendency to shift relative to one another particularly if they are not rigid.

An attempt to overcome this problem includes an apparatus wherein upwardly and laterally open receptacles are carried on an endless conveyor chain and pass beyond a loading station where each receptacle has introduced through its upper open side a stack of superposed flat articles. Subsequently, a laterally reciprocable member pushes the thus-formed stack laterally out of the respective receptacle and into a waiting container or package. However, this approach to the problem is satisfactory only if the articles being stacked and subsequently packed are rigid or at least substantially rigid. If the articles involved are for instance flat bags containing a liquid or flowable substance and air, this prior-art approach will not operate properly. When articles of these characteristics are involved, they will remain in superimposed stacked relationship only if they are closely guided at all edges. As soon as the stack is deprived of such guidance at even one edge, a circumstance which for instance inevitably occurs when the stack is inserted into a packing container, the superimposed bags slide relative to one another because of the air entrapped in them. The result in terms of improper packaging requires no elaboration.

SUMMARY OF THE INVENTION

It is, accordingly, a general object of the present invention to overcome the disadvantages of the prior art.

More particularly it is an object of the present invention to provide a novel apparatus for packing relatively flat articles, such as bags or the like, which is not possessed of these disadvantages.

In pursuance of the above objects, and others which will become apparent hereafter, one feature of my invention resides, briefly stated, in an apparatus for stacking and packing relatively flat articles, which comprises means for advancing the articles to be packed in a predetermined path to an operating station, means for stacking a plurality of the articles at the operating station in superposed relationship so as to form a stack of said articles, means for confining the resulting stack at the outer sides of the respectively upper and lower articles and for turning the stack to upright position so that the articles rest on edge, and means for thereupon inserting the stack edgewise into a receptacle.

By having the articles rest on their edges all articles of a stack can be properly guided without having the possibility of sliding or shifting relative to one another. The disadvantages of the prior art are thereby avoided. If the receptacle is to contain a very large number of the articles in question, then a plurality of individual stacks may be formed and introduced into the receptacle, thereby assuring that no one stack need be so large as to make proper control and guidance of its constituent articles impossible.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a perspective view of an apparatus in accordance with the present invention, with certain components omitted which are not essential for an understanding of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As illustrated, the apparatus according to the present invention comprises an endless conveyor which here is shown to be a conveyor belt 1. The belt 1 is trained about two transversely spaced axially parallel reversing rollers 2 and 3; one or both of the rollers 2 and 3 are driven in rotation as indicated by the arrow associated with the roller 2. Thus, the conveyor 1 is advanced in the direction of rotation of the rollers 2 and 3. The advancing means utilized for driving one or both of the rollers 2 and 3 is diagrammatically illustrated and may be of any suitable type well known to those skilled in the art.

The conveyor belt 1 is provided with a plurality of guide plates 4 which are spaced from one another at regular intervals longitudinally of the direction of advancement of the belt 1. Any two consecutive ones of the guide plates 4 thus define with one another a partially enclosed space which for purposes of this explanation I prefer to call a cell. It is evident from the drawing that these cells are open at the lateral sides as well as the side remote from the conveyor belt 1.

The belt 1 has at least one straight run (in the illustrated embodiment it has two) and it will be evident that when the guide plates 4 which are rigidly connected with the belt 1 are located in this straight run—that is when they are facing upwardly in the upper run of the illustrated belt 1—they extend in parallel planes with one another. However, as the plates 4 pass in a curved path around the reversing roller located at the upstream end of the straight run, that is here the reversing roller 2, they include an angle between one another as shown by the guide plates 4 illustrated in the region of the reversing roller 2. Thus, the cell defined between two consecutive ones of the guide plates 4 as the same pass around the reversing roller 2 diverges outwardly in direction away from the conveyor belt 1, as shown. This facilitates entry of articles to be stacked into the respective cell.

In accordance with the invention feed means 5 is provided adjacent the upstream end of the straight run of the conveyor 1. This feed means 5 is here illustrated in form of two conveyors 6 and 7 which feed the pliable articles to be stacked—here identified with reference character *b* because the articles are assumed for purposes of this explanation to be bags—transversely to the direction of advancement of the endless conveyor 1. Advantageously, the conveyors 6 and 7 will be associated with and receive the output of a nonillustrated apparatus which forms flat bags from suitable material, fills them and closes them. It is very common to make such bags from synthetic plastic materials, although other materials can of course also be used, and such bags may be filled with various different products, such as liquid wax or the like. Machines for making, filling and closing these bags are well known and need not be further discussed, particularly because they do not form a part of the present invention.

In any case, the conveyor 6 feeds bags *b* directly onto a horizontally or substantially horizontally extending guide plate 4 located at the upstream end of the straight run of conveyor 1, as illustrated, whereas the conveyor 7 feeds its articles *b* onto a platform 8 which has associated therewith a shifting member 9 reciprocable in the direction of the double-headed arrow 9a so that bags *b* deposited on the platform 8 are shifted by the shifting member 9 off the platform 8 and onto the horizontally or substantially horizontally extending guide plate 4 as shown. Thus, the combined output of the conveyors 6 and 7 is deposited on the particular guide plate 4 which is being loaded, that is all of the bags *b* supplied by the conveyors 6 and 7 are stacked onto the guide plate 4 which is being loaded. Such stacking continues until a predetermined number of the bags *b* has been stacked on the guide plate 4. The stacking is facilitated by the fact that the downstream or directly preceding guide plate 4 extends at an angle to the one being loaded, as illustrated, which evidently makes it easier to carry out the stacking process. When the desired number of bags *b* has been stacked on the guide plate 4 which is being loaded, for instance four of these bags *b*, the conveyor 1 is advanced in the direction of the arrow associated with the reversing roller 2 by

a distance sufficient to bring the next successive guide plate 4 into loading position. In other words, advancement of the conveyor 1 is not continuous, but instead stepwise.

Arranged at one lateral side of the upper straight run of the conveyor 1 is a guide arrangement 10 defining a passage which tapers in direction away from the conveyor 1, as illustrated. In the exemplary embodiment shown in the drawing the width of the passage defined by the guide arrangement 10 corresponds to the width of five successive ones of the cells defined between adjacent ones of the guide plates 4. More specifically, this is the width of the passage defined by the guide arrangement 10 proximal to the upper run of the conveyor 1. This width tapers in direction away from the upper run of the conveyor 1 and at the tapered open end of the passage a folding carton, or any other suitable receptacle *f* is arranged with its open side facing the opened tapered end, or even with its open side slipped over the open tapered end of the guide arrangement 10.

At the opposite lateral side of the straight run of the conveyor 1 there is arranged an ejecting or pushing member 11 which is reciprocable in the direction of the double-headed arrow 11a. It comprises an upper transverse bar 13 and a plurality of projections or teeth 12 extending downwardly from the bar 13. It is thus comb-like in appearance, as evident from the drawing. The length or height of the projections 12 corresponds to the height 4' of the guide plates 4, and the overall height of the member 11, that is the height of the projections 12 added to the height of the bar 13, corresponds to approximately or identically the width *b'* of the bags *b*. The height 4' of the guide plates 4, however, corresponds only to approximately two-thirds of the width *b'* of the bags *b*. The projections 12 are so arranged that when the member 11 reciprocates, each projection 12 will pass into one of the cells defined between two adjacent ones of the guide plates 4. The width of the projections 12 is advantageously so selected that it corresponds closely to the width of each cell, and of course it must not exceed this width of the cell. Thus, when the member 11 advances laterally in direction towards the guide arrangement 10, each of the projections 12 will eject a stack of bags from the associated cell into which it enters. Because there are five of the projections 12, and because these each register with one of the cells, five stacks will be simultaneously ejected into the channel defined by the guide arrangement 10 and from there into the carton or other container *f*.

It is evident that as the conveyor 1 advances stepwise, each loaded guide plate 4 carrying a stack of the bags *b* will move to upright position, as shown, whereby the bags *b* of the respective stack are similarly moved to upright position and rest on edge. The stack is then guided and retained by the associate guide plates 4 which contact the major outer surfaces of the outermost bags *b*, that is the first and the last bags *b* which are deposited when each guide plate is loaded to form a stack of bags *b* thereon.

Evidently, if the construction is of the type illustrated in the drawing, the member 11 will be withdrawn to the illustrated position subsequently to ejecting five stacks of articles and introducing them into the container *f*, and will remain in this withdrawn or rest position until the conveyor 1 has been advanced five steps so that five loaded cells are again juxtaposed with the member 11.

After the container *f* is filled, it is removed and a new one is put in its place. It is advantageous if the guide arrangement 10 is part of or associated with a known cartoning machine which opens the containers *f*—for instance by folding them to proper position if they are of the folding type—, supplies them to the loading position shown in the drawing, and subsequently closes them when they are filled. Such machines are known to those skilled in the art and do not themselves form a part of my invention.

The present apparatus avoids the disadvantages known from the prior art. Obviously, the articles or bags *b* can be guided much more readily when they rest on edge, than when they are horizontally superimposed as is conventional. If the

bags are filled with a liquid or flowable material and contain a cushion of air, they are slightly compressed as the respective stack is moved to upright position, that is as the adjacent plates 4 defining between themselves the loaded cell move to their normal position in which they are in parallelism with one another so that the cell is of constant width rather than diverging outwardly as is the case during the loading or stacking process. This compression assures that the bags cannot shift relative to one another while they await ejection and introduction into the container *f*. This, incidentally, of course also prevents a shifting of the contents of each bag during this time, and thereby avoids another possibility for changing of the orientation of the bags of any one stack with respect to one another.

It should still be emphasized that means for effecting reciprocation of the members 9 and 11 may be of any suitable type, and are of course well known to those skilled in the art, just as the advancing means associated with the conveyor 1 may be of suitable type, there being many devices known to those skilled in the art which could effect the desired stepwise advancing.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in an apparatus for stacking and packing relatively flat articles, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

I claim:

1. Apparatus for stacking and packing substantially flat pliable articles having major sides and edges, comprising endless conveyor means arranged for travel in a predetermined direction, and having a run including at least one at least substantially straight horizontal portion and at least one curved portion at the upstream end of said straight portion; guide means comprising a plurality of parallel guide plates mounted on conveyor means projecting therefrom transversely of said predetermined direction, consecutive ones of said guide plates defining with one another respective open cells arranged in said predetermined direction and closed only at their side adjacent said conveyor means, said guide plates being arranged for diverging from one another in direction outwardly from said conveyor means when located in said curved portion at said upstream end so as to facilitate insertion of said articles into said cells; feed means proximal to said curved portion at said upstream end for assembling in the respective cell located at said upstream end a stack of pliable articles which are arranged in superimposed relationship with their major sides oriented horizontally; advancing means for advancing said conveyor means in said direction whereby the stack of articles in the respective cell is turned when the cell enters said substantially straight portion of said run so that the articles rest on edge and said major sides are oriented vertically, the guide plates of the cell assuming a parallel vertical orientation and firmly engaging said stack between them; and ejecting means opposite said straight portion for ejecting each stack of articles resting on edge from its cell.

2. Apparatus as defined in claim 1, said ejecting means being arranged laterally of said run and said straight portion, and being operative for ejecting the stack of articles from a plurality of consecutive ones of said cells simultaneously.

3. Apparatus as defined in claim 2, wherein said straight portion has a horizontal orientation in its entirety.

4. Apparatus as defined in claim 2, wherein said ejecting means comprises a shiftable member provided with a plurality of projections each registering with one of said cells, said member being shiftable toward and away from a starting position and each of said projections ejecting the stack of articles from one of said cells during movement of said member away from said starting position.

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5 An apparatus as defined in claim 4, wherein said shiftable member is of substantially comb-like configuration.

6. An apparatus as defined in claim 4, said plate members projecting from said conveyor means by a first distance, said articles having a width corresponding to a second distance greater than said first distance, and said shiftable member having a height measured in longitudinal direction of said projections which is at least substantially equal to said second distance.

7. An apparatus as defined in claim 1, said feed means feed-

ing said articles transversely to said predetermined direction.

8. An apparatus as defined in claim 7, said feed means including a platform adjacent said curved portion at said upstream end and arranged in registry with the respective cell at said upstream end, depositing means for depositing said articles on said platform, and pusher means for pushing said articles off said platform and into the respective cell at said upstream end.

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