United States Patent

[11] **3,610,401**

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[73] Assignee **Eastman Kodak Company Rochester, N.Y.**

[54] **SHINGLING ACCUMULATOR**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **198/35,** 198/34
[51] **Int. Cl.** **B65g 57/22**
[50] **Field of Search** ..... 198/29, 34, 35; 93/93 R, 93 DP; 53/159

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ABSTRACT: A method and an apparatus for accumulating in overlapping juxtaposition articles, such as card-cartoned products, having a body portion and a flange portion generally coplanar with one surface of said body portion. A series of such articles having a predetermined orientation is caused to descend at intervals to a support surface. Upon interception by said surface each article is advanced in turn together with any preceding articles a distance equal to at least the length of the body portion of an article, but less than the overall article length. The articles are held in their advanced position until the interception of the next succeeding article, whereby successive intercepted articles are juxtaposed such that the flange portion of one article and the body portion of an adjacent article are in overlapping relationship.

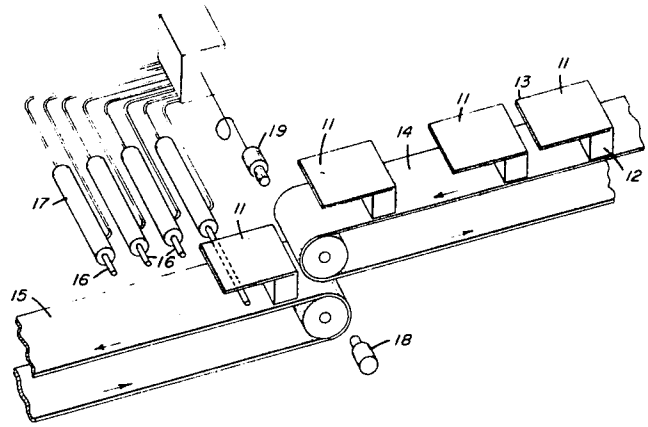


FIG. 1

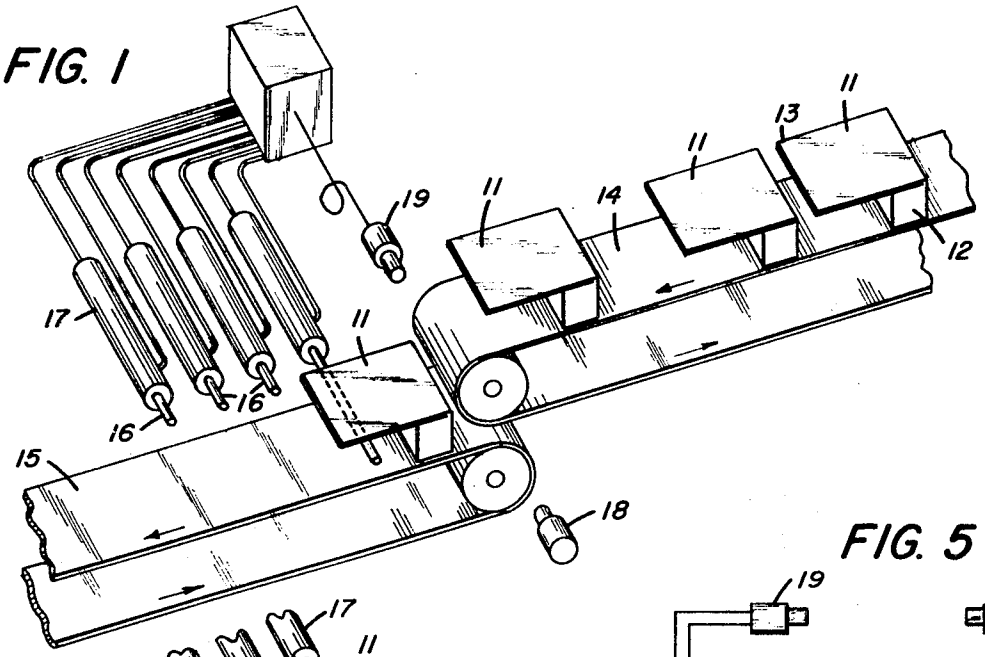


FIG. 2

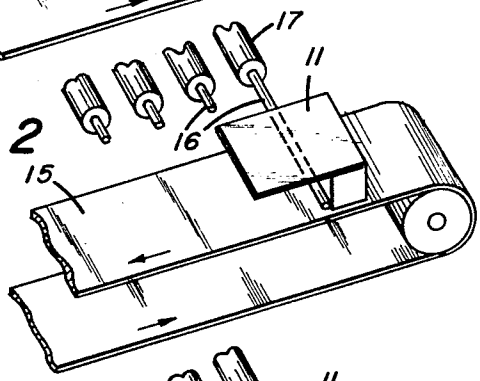


FIG. 3

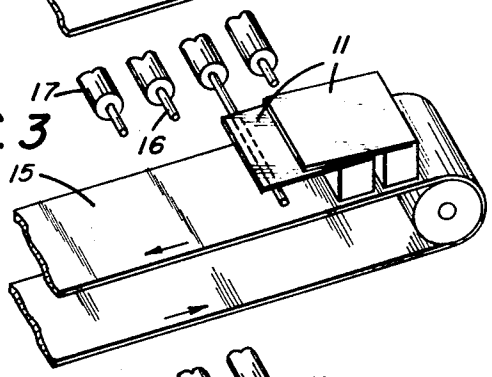


FIG. 4

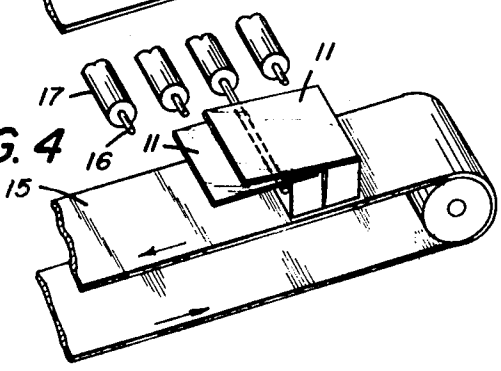
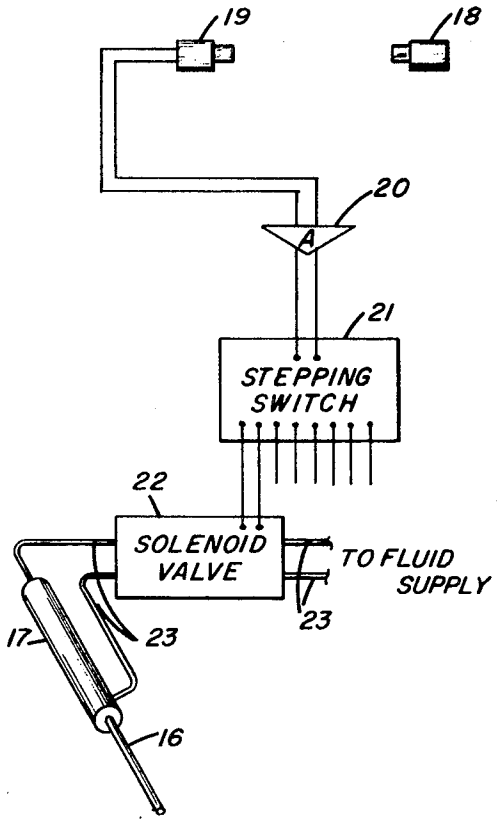


FIG. 5



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SHINGLING ACCUMULATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to the accumulating of a group of articles, such as card-cartoned products, of the type having a body or carton portion and a flange portion generally coplanar with one surface of said body portion. In particular, the invention relates to an apparatus and method designed to accumulate such articles in a shingled or overlapping arrangement.

2. The Prior Art

The prior art discloses numerous devices adapted to accumulate in various arrangements articles of specified types. Certain known devices designed to regroup articles which are presented at intervals. Within this class of devices are those which are designed to regroup the articles in an abutting relationship, and also devices which are designed to impart a predetermined uniform spacing between successive articles.

Where, however, it is desired to accumulate articles in an arrangement which will allow the articles to be subsequently packaged as a unit in the minimum amount of space possible, none of the above-mentioned known devices have been found suitable for accumulating articles of the particular type herein described. The articles referred to are those, such as card-cartoned products, which have a carton or body portion and a card or flange portion generally coplanar with one surface of the body portion.

It should be understood that to accumulate articles of this type in a relationship wherein the flange portion of one article merely abuts a portion of an adjacent article would generate wasted space generally proportionate to the total area of the card portions of the articles so accumulated. Owing to their unique configuration, maximum economy of space can be achieved only by accumulating the articles in an arrangement wherein the body portion of one article and the flange portion of an adjacent article are in an overlapping relationship.

Summary of the Invention

It is accordingly an object of this invention to provide a method and apparatus for accumulating in overlapping juxtaposition articles of the type having a body portion and a flange portion generally coplanar with one surface of said body portion.

It is a further object of this invention to provide a method and apparatus for accumulating and releasing in overlapping juxtaposition a group of such articles of predetermined number.

These and other objects are attained in accordance with the invention by providing a support surface to which articles of the type described and having a predetermined orientation are caused to descend at intervals. Each article, upon interception by said support surface, is advanced in turn, together with any preceding intercepted article or articles, a distance equal to at least the length of the body portion of an article but less than the overall article length. By means of a selectively actuated one of a series of spaced article stops the articles are retained in this advanced position until the interception of the next succeeding article to be accumulated. Through the interception and advancement of successively descending oriented articles, an accumulated group of such articles is formed wherein successive articles are juxtaposed such that the flange portion of one article and the body portion of the other article are in overlapping relationship.

Description of the Drawing

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing wherein similar reference numerals indicate corresponding parts in all figures.

FIG. 1 is a partial perspective representation of the apparatus herein described depicting the leading article in a group to be accumulated at its moment of interception by the support surface.

FIGS. 2, 3 and 4 are partial perspective representations of the support surface and its associated article stops and depict subsequent consecutive stops in the accumulating of a group of articles.

FIG. 5 is a schematic diagram illustrating typical sensing and control means for actuating an article stop.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, the apparatus described herein is designed to accumulate a group of articles 11, such as card-cartoned products, of the type comprised of a body or carton portion 12 having a unit length as measured between the leading and trailing extremities of said portion, and a flange portion 13 generally coplanar with and extending in one direction from a surface of the body portion.

The apparatus is comprised of a delivery means 14 adapted to transport thereon and discharge therefrom articles 11 of the type described, and which may be in the form of an endless driven conveyor belt. Subjacent delivery means 14 is a support surface 15 also adapted to transport such articles, and which similarly may be in the form of a conveyor belt. The upstream segment of support surface 15 is positioned in the path of descent of articles discharged from the downstream terminus of delivery means 14.

Positioned adjacent support surface 15 is a series of article stops 16, one fewer in number than the number of articles to be accumulated per group. Adjacent article stops in the series are spaced one from another at intervals equal to at least one unit (carton) length but less than the overall article length as measured between the leading and trailing extremities of an article to be accumulated. The individual stops 16 in said series are of the type which are actuable from a normally retracted configuration, wherein they allow free movement of articles on said support surface 15, into an extended configuration wherein an actuated stop is adapted to block the passage of said articles. The stops may be of any type suitable to engage the leading article of a group being advanced on support surface 15 and are shown as being simple rods connected to pistons driven by double-acting pneumatic or hydraulic cylinders 17. The particular apparatus herein described is designed to accumulate a group of articles having uniform size and shape, however the relative spacing between adjacent article stops may be adjusted to accommodate a variety of uniformly sized and shaped articles of the general type herein described. Similarly, while the embodiment shown herein is designed to accumulate a group of five articles, the number of article stops may be increased or decreased to provide groups correspondingly greater or fewer in number.

Disposed along the path of descent of articles discharged from the downstream terminus of delivery means 14 is a sensing means comprising an energy transmitter 18 and an energy receptor 19 so oriented that the energy beam passing therebetween is broken by the passage therethrough of a descending article. The form of energy beam directed by transmitter 18 toward receptor 19 may be of any suitable type such as, for example, light energy, in which case transmitter 18 will be a light source and receptor 19 will be a photoelectric cell.

Referring now to FIG. 5, the transmitter 18 is connected to and energized by a suitable power source (not shown). Receptor 19 is connected to an amplifier 20 adapted to receive the signal output of receptor 19 generated by the passage of a descending article and to produce an output current in response thereto of sufficient magnitude to energize a stepping switch 21.

Stepping switch 21 is connected to a series of solenoid valves 22 each of which is in turn interconnected by means of pressure lines 23 to a fluid pressure supply and to a respective cylinder 17 associated with one of said article stops 16. Stepping switch 21 is adapted to individually actuate article stops 16 in a predetermined recurring sequence through the sequential energization of their respective solenoid valves 22; said sequence commencing with the actuation of the up-

streammost article stop and progressing in turn to consecutively adjacent downstream stops in response to respective receptor signals generated by successive descending articles. An article stop **16**, actuated by the energization of its solenoid valve **22**, is caused to assume and maintain an extended configuration until the next succeeding article stop in said sequence is actuated. Simultaneously with the actuation of said next succeeding article stop the solenoid valve of the previously actuated stop is deenergized by said stepping switch **21**, thereby causing said stop to return to its normally retracted configuration.

The sequential actuation and retraction of the article stops **16** continues until the downstreammost article stop has been actuated. The contracts on stepping switch **21** are so arranged that, upon receipt of the next receptor signal, said stepping switch will cause the retraction of the downstreammost article stop without causing the extension of any other stop. Thus, all article stops will then be in a retracted configuration wherein they are maintained until the initiation of a new sequence of actuations commencing with the activation of the upstreammost stop. It will be apparent to one skilled in the art that the apparatus may be provided with a reset device adapted to override the normal operation of the control means and place the apparatus in condition at anytime to commence a new sequence of actuations should it be necessary, for example, to clear a defective accumulation from the apparatus.

Operation

In operation, the articles to be accumulated are caused to descent at intervals and in a predetermined orientation. As shown in FIG. **1**, this may be accomplished by advancing oriented articles at spaced intervals along delivery means **14**, whereby their movement in due course causes each article to be discharged in turn from the downstream terminus thereof. FIGS. **1** through **4** depict orientation of the articles such that the flange portion **13** of each article **11** forms a downstream extension of the upper surface of its associated body portion **12**; however, it will be apparent to those skilled in the art that other orientations may be employed in accordance with the invention such as, for example, one in which the flange portion forms an upstream extension of the bottom surface of its associated body portion.

Each descending article is intercepted in turn by support surface **15** disposed subjacent delivery means **14** and positioned in the path of descent of the discharged articles. Upon interception by support surface **15**, each article is advanced in turn, along said surface, together with any previously intercepted article or articles in a group to be accumulated, a distance sufficient to place the trailing portion thereof in register to intercept and be overlapped by the leading portion of the next succeeding descending article.

Through the interception and advancement of successive descending articles an accumulated group of articles is formed on said support surface wherein adjacent articles are juxtaposed such that the flange portion of one article and the body portion of the other article are in overlapping relationship.

The operation of the invention herein disclosed may be illustrated by reference to FIGS. **1** through **4** wherein there are depicted consecutive steps in the accumulating of a group of articles. Referring initially to FIG. **1**, the leading article in a group to be accumulated is shown at its moment of interception by support surface **15**. There is further shown, in its extended configuration, the upstreammost article stop actuated, through the control means shown in FIG. **5** and hereinbefore described, in response to the passage of said leading article through the energy beam directed between transmitter **18** and receptor **19**.

FIG. **2** depicts said leading article after advancement of the leading surface of its body portion into contact with the actuated stop, thereby placing and maintaining the trailing portion of the article in register to intercept and be overlapped by the leading portion of the next succeeding descending article. The distance of advancement required to place the article in such position is regulated by the positioning of the article stop and is equal to at least the unit length of the body or carton portion of the article, but less than the overall article length.

In FIG. **3** there is shown the second article of the group to be accumulated at its moment of interception. It will be noted that, due to the relative positioning of the leading article, the required shingling or overlapping has been accomplished. It will further be noted that the passage of the second article through the energy beam has caused the responsive retraction of the previously actuated article stop simultaneously with the actuation of the adjacent downstream stop.

FIG. **4** depicts the subsequent advancement of both articles the distance required to place the trailing portion of the second article in register to be overlapped by the next succeeding article; the articles being maintained in the advanced position through engagement of the leading article with the responsively actuated article stop.

In like manner, succeeding articles are intercepted and advanced, together with the preceding articles of the group, until, in due course, the downstreammost article stop is responsively actuated by a descending article. The descent of the next, and final, article of the group causes said stop to be responsively retracted, but does not cause the responsive actuation of any other stop. Thus, all article stops are then in a retracted configuration, thereby allowing the accumulated group of articles to be advanced from the support surface. The apparatus is then in condition to accumulate a new group of articles commencing with the actuation of the upstreammost article stop in response to the next succeeding article discharged from delivery means **14**.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

We claim:

1. The method of accumulating in overlapping juxtaposition a group of articles of uniform size of the type having a nominal article length and comprised of a flange portion generally coplanar with and extending in one direction from a surface of a body portion having a unit length less than said article length, said method comprising the steps of:

discharging into descent at intervals articles of the type described having a predetermined orientation;

intercepting each descending article in turn by a support surface;

advancing each article upon interception together with any previously intercepted article in a group to be accumulated a distance on said support of at least one unit length but less than one article length, and;

retaining said articles in their advanced position until the interception of the next succeeding article of said group, whereby successive intercepted articles are juxtaposed such that the flange portion of one of said articles and the body portion of the other article are in overlapping relationship.

2. The invention of claim **1** comprising the further step of releasing from said support surface an accumulated group of articles.

3. The invention of claim **2** wherein successive groups of articles are accumulated on and released from said support surface.

4. Apparatus for accumulating in overlapping juxtaposition a group of articles of uniform size of the type having a nominal article length and comprised of a flange portion generally coplanar with and extending in one direction from a surface of a body portion having a unit length less than said article length, said apparatus comprising:

delivery means for discharging into descent at intervals articles of the type described having a predetermined orientation;

conveyor means adapted to intercept each descending article in turn and to advance each article upon interception together with any previously intercepted article in a group to be accumulated a distance of at least one unit length but less than one article length, and;

stop means for retaining said articles in their advanced position until the interception of the next succeeding article of said group, whereby successive intercepted articles are juxtaposed such that the flange portion of one of said articles and the body portion of the other article are in overlapping relationship.

5. Apparatus for accumulating in overlapping juxtaposition a group of articles of uniform size of the type having a nominal article length and comprised of a flange portion generally coplanar with and extending in one direction from a surface of a body portion having a unit length less than said article length, said apparatus comprising:

delivery means adapted to effect the spaced descent of articles of the type described having a predetermined orientation;

conveyor means subjacent said delivery means and adapted to intercept and convey thereon said descending articles;

a series of article stops adjacent said conveyor means and spaced one from another at intervals of at least one unit length but less than one article length, said stops being individually actuable from a normally retracted configuration into an extended configuration wherein an actuated stop is adapted to engage the leading article in an accumulation of one or more articles on said conveyor means thereby positioning a portion of the trailing article of said accumulation in register to intercept and be overlapped by a portion of any immediately succeeding descending article;

sensing means activatable by the transfer of an article from said delivery means to said conveyor means; and

control means operable in response to successive activations of said sensing means to actuate said article stops in a predetermined sequence progressing from the upstreammost article stop to consecutively adjacent downstream stops, said control means being arranged to cause retraction of a previously actuated article stop simultaneously with the actuation of the next stop in said sequence.

6. The invention of claim 5 wherein an actuated stop is adapted to engage the leading surface of the body portion of the leading article in an accumulation.

7. The invention of claim 5 wherein said control means is adapted to retract the downstreammost article stop in response to the next succeeding activation following the actuation of said stop, thus placing all article stops in a retracted configuration wherein they are maintained until the commencement of a succeeding sequence of actuations.

8. The invention of claim 7 wherein said control means is arranged so that activation of said sensing means when all said stops are in their retracted configuration will cause actuation of said upstreammost stop to its extended configuration.