

[54] CONVEYING APPARATUS

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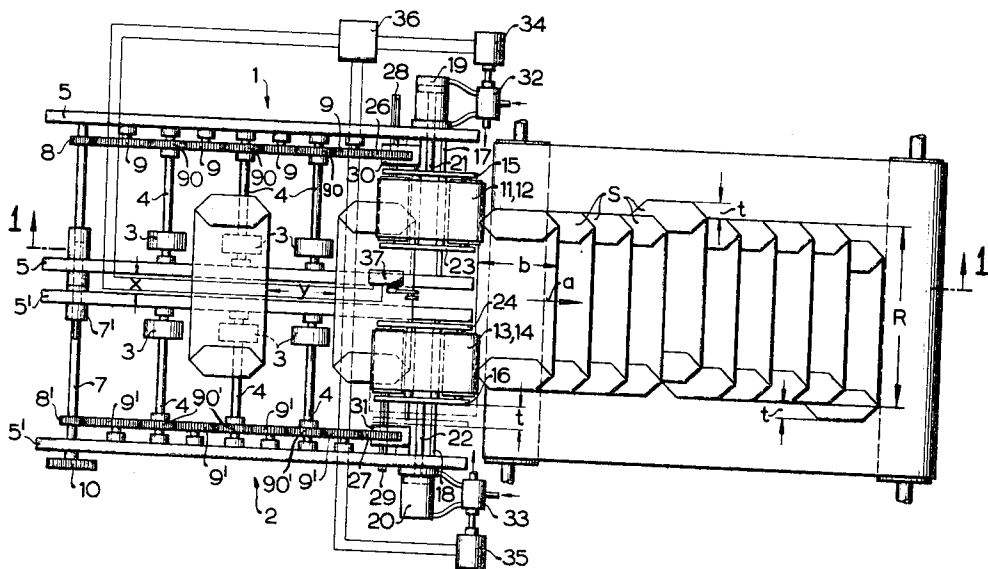
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[57] ABSTRACT

Method and apparatus for indexing a predetermined number of flat articles which form a group within a continuous series of such articles being conveyed by counting the articles, with means provided therefor, as they are conveyed until the predetermined number in the group is reached and then displacing, with means provided therefor, one of the articles, either the first or the last in the group, a short distance transverse to the direction of conveyance so that it extends laterally beyond one side of the series of articles.

6 Claims, 2 Drawing Figures



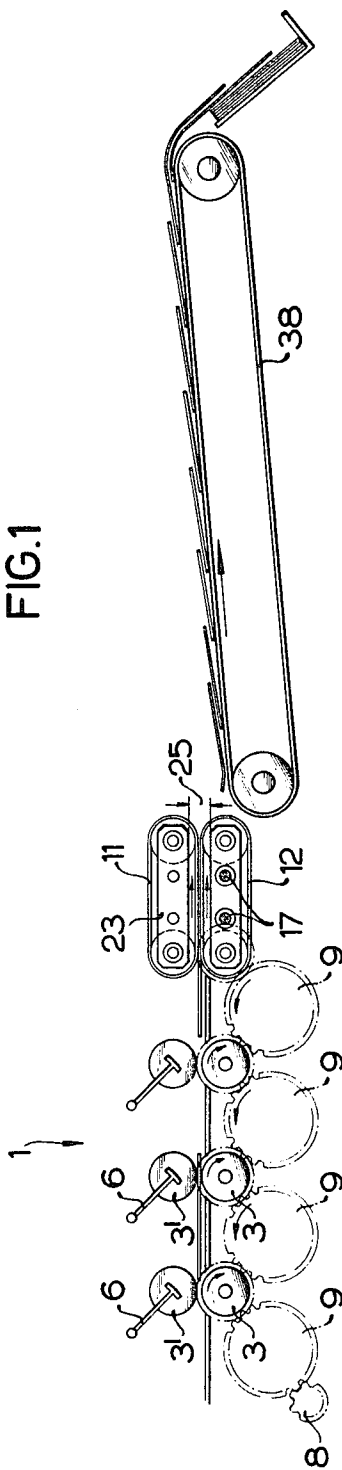
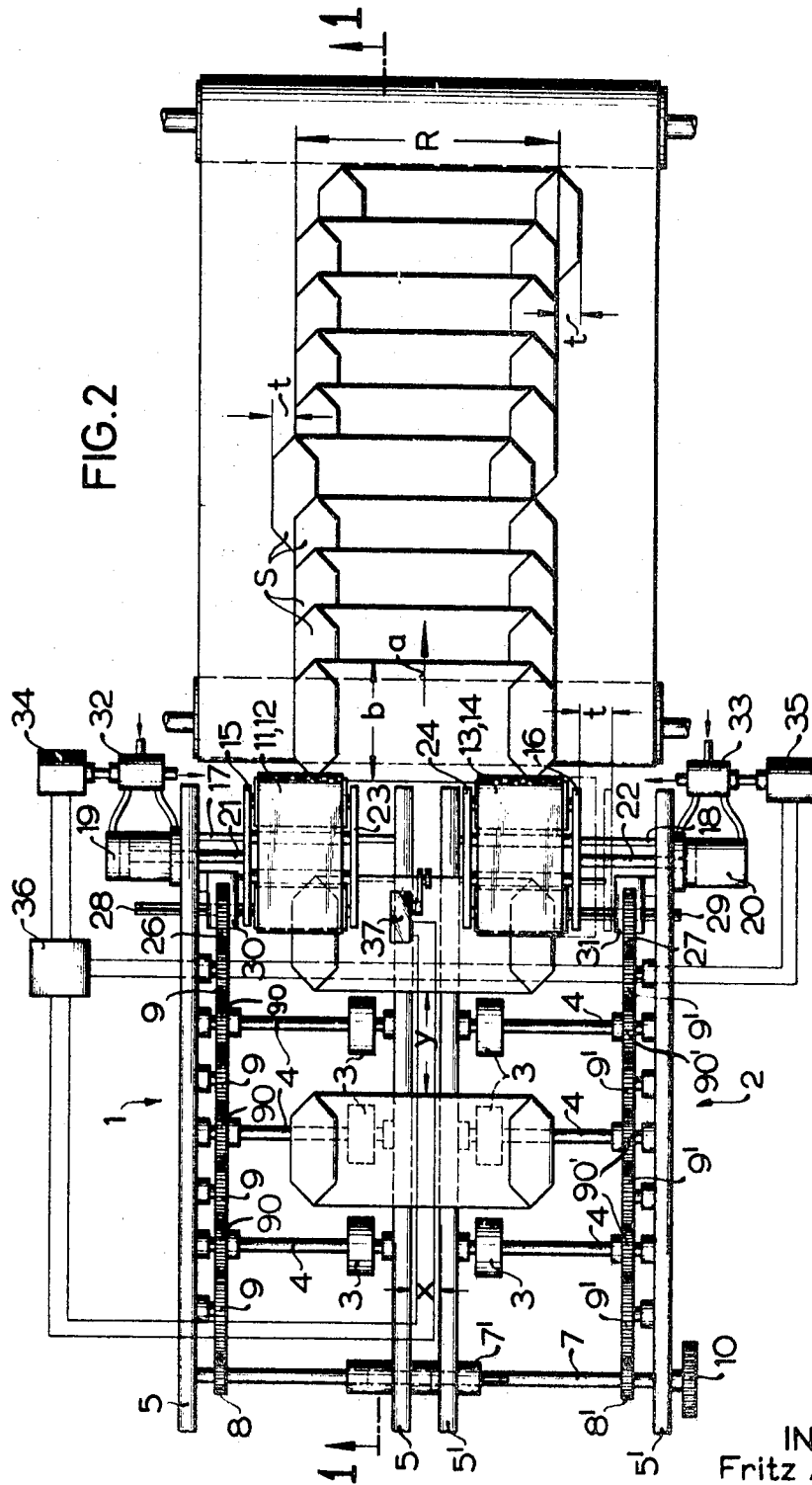


FIG. 1

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CONVEYING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a method and an apparatus for forming and indicating groups of a predetermined number of flat articles. The groups are formed within a continuously moving series of such articles which are individually discharged from one end of a machine as they are manufactured. More particularly, the present invention relates to a method and apparatus for forming and indicating groups of sacks or bags arranged in predetermined numbers within a continuous series of such articles which are individually discharged in a row at the end of a sack- or bag-making machine.

It is already known how to provide groups of sacks or bags in predetermined groupings, as they emerge in a continuous series from a machine which manufactures such articles, onto a conveyor. This can be accomplished, for example, in the manner disclosed in German Pat. No. 1,177,915. According to the German patent, the desired number of such articles which are to comprise the groups are counted off by a counting device controlled by a sensor. Upon reaching the desired number, a holding means is actuated. Such holding means momentarily holds the next article, which may be the first or the last article in the group, by means of a time delaying mechanism. This results in a greater space being left between such article and the rest of the continuous series. This space indicates the group of predetermined number.

This known way of indicating groups of articles has the disadvantage that it requires great skill in the manual removal of the articles so as not to disturb the groupings. This is particularly so when the articles being conveyed are arranged in a shingled fashion. When conveyed in shingled or overlapping fashion, the relative position of the serially arranged articles can easily be disturbed in the direction of movement of the conveyor. This occurs as groups are removed from the series and results in the loss of the previously provided spacings which mark the groups.

Moreover, the temporary holding of an article in the series presupposes that the articles can be displaced without difficulty on the conveyor and with respect to one another. However, this is the case only with paper articles and only when the paper used has a sufficiently stiff quality and smooth surface. Sacks or bags, for instance, of synthetic materials can not be displaced, particularly in an overlapping fashion, due to their great flexibility and due to their tendency to cling electrostatically to each other.

The known method and apparatus for providing groupings of articles in predetermined numbers is, therefore, limited by the disadvantages discussed above.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved method and apparatus for forming and indicating groups of flat articles, particularly sacks or bags, which are emerging from a machine for making such articles.

It is also an object of the present invention to provide a method and apparatus for indicating groups of articles in predetermined numbers in such a manner that the indication of the groups can not be disturbed unintentionally.

It is a further object of the present invention to provide a way of indicating groups of sacks or bags in predetermined numbers without being limited by the type of materials used for making such articles.

In brief, the present invention provides a method of indexing groups of flat articles in predetermined numbers within a continuous series of such articles being individually discharged from a machine, as they are manufactured.

According to the present invention, sacks or bags are discharged in a series as they are manufactured. As each predetermined number of sacks or bags which make up a group is formed, the next sack or bag, which may be the first

or the last of a group, is displaced a short distance transverse to the series (i.e., to either side thereof). In other words, the article which serves as an indicator extends laterally out of line, with respect to the series of sacks or bags, in the direction in which the sacks or bags are being conveyed.

This lateral marking or indexing continues to be effective even when the sacks or bags in a row are transferred, in a known manner, to a slower moving conveyor belt whereon the sacks or bags come to rest one on top of the other in overlapping manner. By the approach according to the invention, as predetermined groups of sacks or bags are removed from the overlapping series, the lateral marking is not disturbed, since it is beyond the reach of the hands of the operator moving the groups of sacks or bags.

The lateral marking also remains in effect when the sacks or bags are piled one on top of the other in storage stacks. This would be impossible in the known ways of marking groups of such articles.

Also, the present invention provides an apparatus suitable for accomplishing the method of the present invention. The apparatus includes a portion which individually conveys sacks or bags and which is alternately transversely movable with respect to the direction in which such articles are being conveyed. Such portion approximately corresponds in its dimensions with the dimensions of each sack or bag, particularly that dimension of the sack or bag which extends in the conveying direction. This portion is moved alternately, first in one direction, then the other direction, transverse to the direction in which the sacks or bags are conveyed. The portion performs a short transverse movement in one direction, without disturbing its normal conveying operation, as a sack or bag which is to be transversely displaced comes within its range. When this happens, the sack or bag is laterally pushed a short distance to one side or the other of the series. This is accomplished without interrupting the normal conveyance of the displaced article, which continues to be transported in the conveying direction while being laterally displaced. The sack or bag is not subjected to any forces which could cause it to be undesirably displaced. After completing its transverse movement, the conveying means portion remains in the displaced position until a predetermined number of sacks or bags has been conveyed. Then the conveying means portion executes another transverse movement, this time in the opposite direction to the first such movement. During such movement another indicator article is laterally displaced. Except for the indicator which is thus displaced, no other article is laterally moved. This is made possible by designing this conveying means portion with a width sufficient enough to accept arriving articles in either of its displaced positions without disturbing or displacing them.

A preferred embodiment of the transversely displaceable conveyor portion includes pairs of coaxing short endless conveyor belts which are disposed in a transversely displaceable frame. Moreover, the individual belts of each pair are disposed one on top of the other so that their respective reaches which are moving in the conveying direction, come into contact with each other in the conveying plane of the sacks or bags. In this embodiment, the individual sack or bag, which will serve as an indicator, is transversely displaced, while being positively moved forward in the conveying direction between the individual belts of the conveyor portion during its transverse displacement. Thus, the inadvertent displacement of the other sacks or bags is avoided.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic longitudinal view taken along the line 1—1 of FIG. 2 of the preferred embodiment of the apparatus according to the present invention.

FIG. 2 is a plan view of the apparatus according to FIG. 1.

DESCRIPTION OF THE PREFERRED METHOD AND APPARATUS

Referring to FIGS. 1 and 2, a conveying means is shown for discharging sacks S produced in a sack-making machine. The conveying means includes two separate symmetrically arranged, parallel conveyor assemblies 1 and 2 which are separated by a distance x from each other. The distance x can be adjusted in a known manner to correspond to the various sack sizes. Each of the conveyors 1 and 2 includes a frame 5, 5', respectively, and axles 4 are disposed thereon. Transport roller pairs 3, 3' are disposed on the axles 4. Each roller 3 is a driven supporting roller and each roller 3' provides a counterpressure to roller 3. The rollers 3 are driven by the shaft 7 by way of pinion gears 8, 8', intermediate gears 9, 9' and gears 90, 90' connected to axles 4. The shaft 7 is driven by the bag- or sack-making machine by way of the toothed wheel 10. The shaft 7 is so constructed that it can be telescopically extended. This is accomplished by providing a sleeve 7' within which the shaft 7 is slidably disposed so that its reach can be lengthened or shortened when the distance x between the individual conveyors is required to be changed. The counterpressure rollers 3' are arranged to be pivoted by means of levers 6 disposed on each of the frames 5 and 5'. The rollers 3' rest against the supporting rollers 3 under the influence of their own weight or the force of a spring.

The conveying means also includes a portion in the form of a coacting pair of short conveyor belts 11, 12 and 13, 14 which are provided at the outlet ends of each separate conveyor 1 and 2, respectively. The long dimension of the conveyor belts 11, 12 and 13, 14, respectively, corresponds approximately to the dimension b of the sacks S which extends in the direction a . Each pair of conveyor belts is mounted with its belt rollers in frames 15 and 16, respectively. Each of these frames can be displaced in a direction transverse to the conveying direction a on guide rods 17, 18. For this purpose, the pressure actuators 19 and 20 with their respective piston rods 21 and 22 engage the frames 15 and 16, respectively. The individual belts of each pair of belts 11, 12 and 13, 14 are disposed one on top of the other so that their respective reaches, which move in the conveying direction a , come into contact with one another in the conveying plane of the sacks. Two plates 23 of frame 15 are positioned opposite to two similar plates 24 of frame 16. A space 25 continuously extends between each pair of plates 23 and 24, respectively, as shown in FIG. 1. The space 25 serves as a channel, extending in the direction of the plane in which the sacks are conveyed. The sacks are conveyed through channel 25 between the pairs of conveyor belts 11, 12 and 13, 14. The pairs of conveyor belts 11, 12 and 13, 14 are driven by the last intermediate gears 9, 9', which engage the gears 26, 27. The latter are displaceably mounted on the extended axles 28, 29 of a belt roller of the conveyor belt pairs 11, 12 and 13, 14 and are supported in position by forks 30, 31 which are fastened to the frames 5, 5', respectively. The torque transmission from the gears 26, 27 to the axles 28, 29 occurs by means of adjusting springs disposed at the above-mentioned axles which are displaceably engaged in corresponding grooves provided in the gears.

The pressure actuators 19, 20 are provided with known control means 32, 33, respectively, which are operated by lifting magnets 34, 35, respectively. The lifting magnets 34, 35 are activated by a counting mechanism 36 to which counting pulses are transmitted by a sack sensor 37. The sensor 37 is disposed in the vicinity of the conveyor belt pairs 11, 12 and 13, 14. Sensor 37 is upwardly displaced every time a sack passes thereunder. This action causes a counting pulse to be sent to the counting mechanism 36. The counting mechanism 36 is so adjusted that, when it has received a predetermined arbitrarily adjustable number of pulses, it activates the lifting magnets 34, 35. Lifting magnets 34, 35 are activated to cause movement of piston rods 21 and 22, first in one direction and, subsequent to the counting mechanism 36 receiving the same number of pulses again, in the opposite direction. Thus the

direction of movement of piston rods 21 and 22 of pressure actuators 19 and 20 is reversed each time the predetermined number of sacks has moved past the sensor 37. This results in the pairs of conveyor belts 11, 12 and 13, 14 being moved laterally by the pressure actuators 19, 20 from their most recent position into another position. By locating the sensor 37 in the vicinity of the pairs of conveyor belts 11, 12 and 13, 14, it is assured that a sack is disposed within the range of the pairs of conveyors belts, during the above-discussed lateral movement of the latter. The sack is thus able to participate in the lateral movement.

Another conveyor belt 38 is arranged next to the conveying means 1, 2. Conveyor belt 38 operates in a known manner and moves at a substantially slower speed than the conveying means 1, 2. The sacks S are arranged in a series on a conveyor belt 38 in groups of predetermined numbers. The groups are indicated by individual sacks which are out of line with the rest of the series.

The sacks S are removed from the sack-making machine, as shown in FIG. 2, in a continuous series at distance intervals y from each other. The sacks S emerge from conveyors 1 and 2 onto conveyor belt 38. The sacks S are sensed by sensor 37 when they come within its range. As soon as the last sack of the predetermined number, for example, five, set in the counting mechanism 36 actuates the sensor 37, the counting mechanism 36 activates the lifting magnets 34, 35. Lifting magnets 34, 35 now move the control means 32, 33 in such a manner that the pairs of conveyor belts 11, 12 and 13, 14 are caused to move by means of the pressure actuators 19, 20 from the position shown in FIG. 2 over a distance t into the position which is indicated in phantom lines. The fifth sack, which at this moment is within the range of the pairs of conveyor belts 11, 12 and 13, 14, is laterally displaced therewith. It is thus laterally displaced toward one side of the series of sacks arranged within the ends of line R by a distance t and is conveyed onto conveyor belt 38, as displaced. The subsequent sacks, however, remain within the ends of line R. After passage of an additional predetermined number of sacks (five) beyond sensor 37, the counting mechanism 36 activates the control means 32, 33 which cause pressure actuators 19, 20 to move the conveyor belts 11, 12 and 13, 14 in the opposite direction. The pairs of conveyor belts 11, 12 and 13, 14 are moved from a distance t beyond one side of the series of sacks S to a distance t beyond the other side of the series of sacks S. Moreover, the conveyor belts 11, 12 and 13, 14 carry with them the fifth sack which, at the instant of the lateral movement, is within their range. Thus individual sacks, which serve as indicators, are laterally displaced, in alternate order, beyond each side of the row or series of sacks as the predetermined number of sacks for the group is reached. This marking is not disturbed by the overlapping arrangement of the sacks. By the approach described, each laterally displaced sack clearly indexes the group of sacks with which it is associated. This indexing continues to be effective even when arranged in overlapping fashion on the associated slowly moving conveyor belt 38.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations.

I claim:

1. Apparatus for indexing a predetermined number of flat articles which form a group within a continuous series of such articles being conveyed, comprising, in combination:

a. means for individually conveying along a predetermined conveying path a continuous series of flat articles which are in spaced relationship with one another, said individual conveying means having at least a first portion and a second portion, said second portion being dimensioned in the direction of the said conveying path to substantially correspond to the dimension of the articles in the same direction and being arranged along said conveying path and in the same horizontal plane as said first portion;

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- b. means arranged downstream of said second portion for receiving said articles therefrom and conveying them in an overlapping fashion; and
 - c. means mounted on said individual conveying means for alternately moving said second portion in opposite directions transverse to said conveying path for alternately displacing a selected one of said articles a predetermined lateral distance from said conveying path in one direction and displacing another selected article a predetermined lateral distance from said conveying path in the opposite direction from the first article, so as to indicate successive groups of a predetermined number of the articles.
2. Apparatus as defined in claim 1, wherein said second portion is mounted for movement in opposite directions between two opposed end positions along a path transverse to said conveying path and said moving means moves it from one said end position to the other only when displacing a selected article.
3. Apparatus as defined in claim 1 wherein said second portion includes two coacting pairs of relatively short endless conveyor belts; and said moving means includes a pair of transversely moveable frames, each of said pairs of conveyor belts being disposed in one of said frames for transverse move-

ment therewith.

4. Apparatus as defined in claim 3 wherein said first portion includes two assemblies, said assemblies being adjustable and arranged parallel with respect to each other in order that the distance between them can be varied; and one of said two pairs of endless belts being arranged at each of said assemblies for receiving said articles, respectively therefrom, said two pairs of conveyor belts being disposed in a common plane transverse to the direction in which said articles are conveyed.

5. Apparatus as defined in claim 4 wherein said moving means further includes two hydraulic actuators, one of said hydraulic actuators being connected to each of said movable frames, respectively, whereby said pairs of conveyor belts are transversely moved.

6. Apparatus as defined in claim 5 further comprising a counting means, said counting means including a sensor at said conveying means for signaling the presence of an article, said counting means being connected to said hydraulic actuators whereby, upon the predetermined number of articles being registered by the counting means, a signal is emitted to the hydraulic actuators to move said frames.

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