

[54] **DISTRIBUTOR FOR RECTANGULAR FLAT ITEMS**

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[51] Int. Cl..... **B07c 5/02**

[58] Field of Search..... **209/74 R; 214/11; 271/64; 270/12, 45, 58**

[56]

References Cited

UNITED STATES PATENTS

3,395,913 8/1968 Vecchio et al..... 271/64
2,677,473 5/1954 Piggott et al..... 214/11

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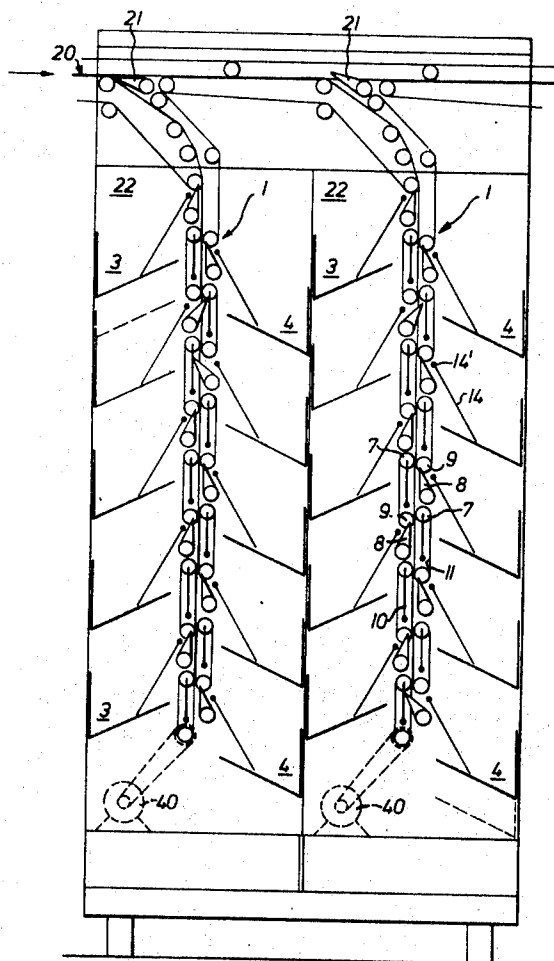
Attorney—George H. Spencer et al.

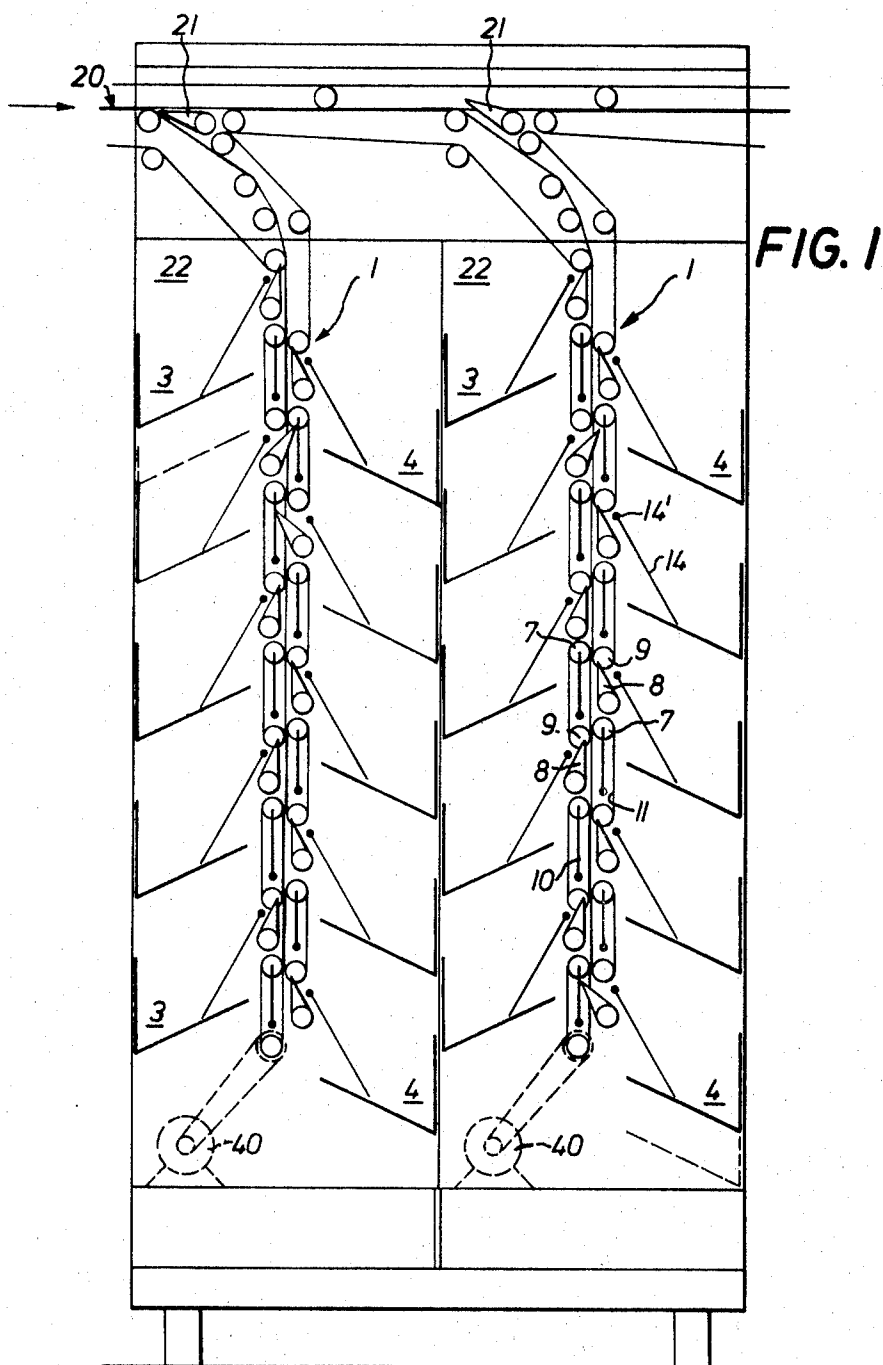
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ABSTRACT

An item distriburo having a horizontally disposed main conveying path with a plurality of vertically disposed distributing paths branching downwardly from the main path through switches and distributing items to stacking compartments associated with the distributing paths. The stacking compartments are disposed on both sides of each distributing path so that there are two rows of stacking compartments between two adjacent distributing paths.

9 Claims, 6 Drawing Figures





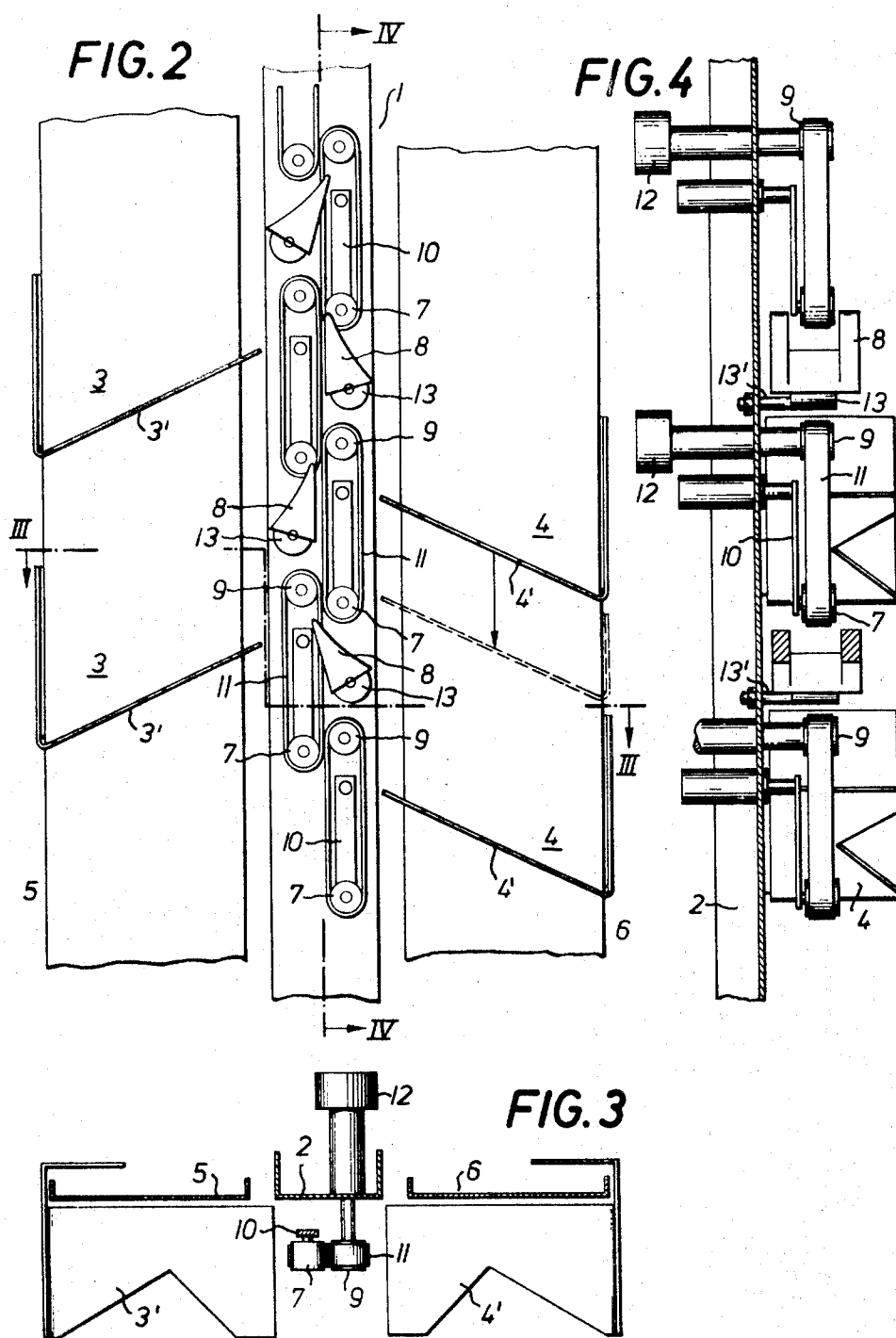


FIG. 5

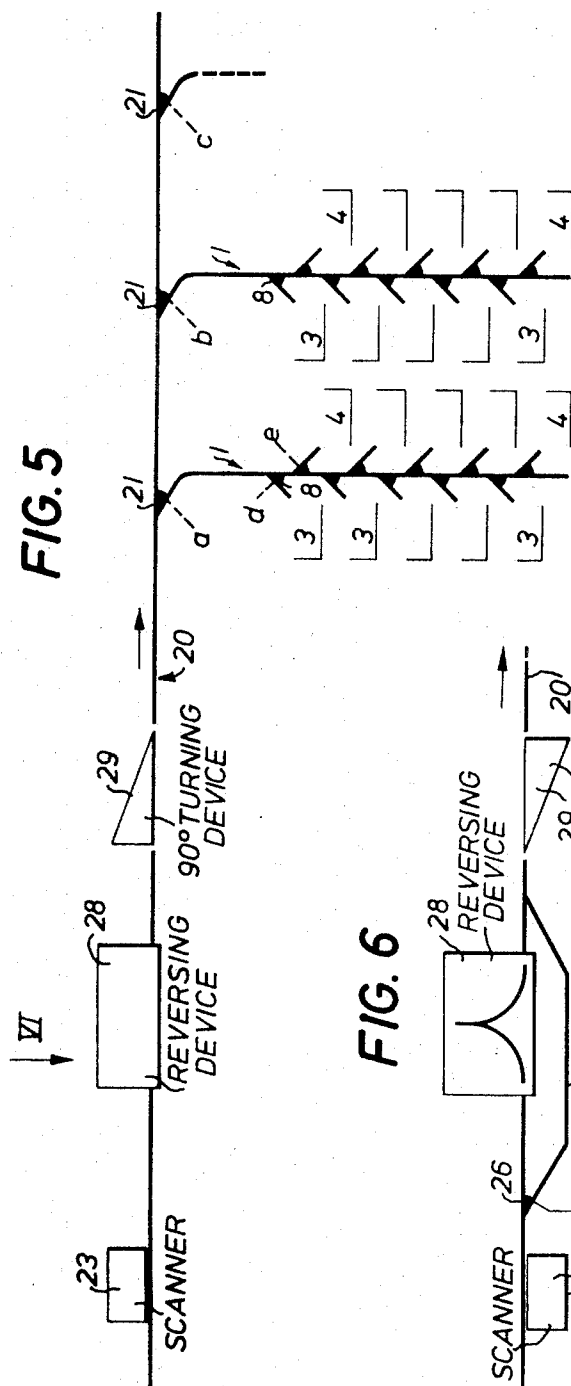
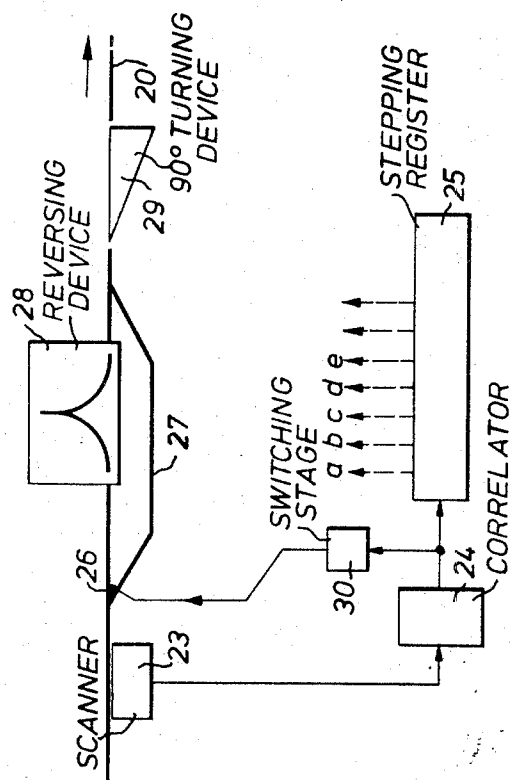


FIG. 6



DISTRIBUTOR FOR RECTANGULAR FLAT ITEMS

BACKGROUND OF THE INVENTION

The present invention relates to a distributor for rectangular flat items, such as letters in particular, in which, from a horizontally disposed main conveying path, on which the items are transported lying down flat, a plurality of vertically disposed distributor conveying paths branch off downwardly via a switch arrangement. A plurality of stacking compartments are arranged, one under the other, along the perpendicular conveying paths in such a manner that the edges of the items which are disposed perpendicular to the conveying direction are always moved parallel to themselves.

A distributor with the above-mentioned features is disclosed in German Patent No. 1,277,606. This distributor is constructed in such a manner that one perpendicular row of stacking compartments is disposed between each two adjacent distributing paths. Thus the same number of distributing paths is required as there are rows of stacking compartments.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a distributor of the above-mentioned type in which a given number of stacking compartments can be provided through the use of as small a number of conveying elements, particularly conveying rollers, as possible.

This is accomplished by the present invention in that stacking compartments are disposed on both sides of each distributing path so that two perpendicular rows of stacking compartments are disposed between each two adjacent distributing paths.

In a further embodiment of the present invention a perpendicular distributing path and two perpendicular rows of stacking compartments which are operatively associated with the distributing paths by means of a switch are combined into a structural unit. In an advantageous manner, each unit is provided with its own motor to drive its conveying means.

A particularly advantageous arrangement of the distributing paths results when stacking compartments of one row are vertically offset with respect to those of the other row by one-half the vertical distance between the stacking compartments of one row. The distributing paths may then be constructed of a relatively small number of conveying elements in that on each side of the conveying path, and in association with the individual stacking compartments, there is a movable, i.e., resiliently mounted, roller, a switch tongue and a fixed roller which are arranged to follow one another. Because of the offset arrangement of the stacking compartments a movable roller on one side of the conveying path can then be disposed to cooperate with a fixed roller of the other side.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view showing a distributor with two vertically disposed distributing paths that branch off from a horizontally disposed main conveying path.

FIG. 2 is an elevational view to an enlarged scale of one of the vertically disposed distributing paths, with the associated stacking compartments, of another embodiment of a distributor.

FIG. 3 is a cross-sectional view taken along the line III—III of FIG. 2.

FIG. 4 is a cross-sectional view taken along the line IV—IV of FIG. 2.

FIG. 5 is a partly schematic, partly elevational view of a mail distributor which is provided with a main conveying path having a controllable position correction device.

FIG. 6 is a schematic plan view of part of the arrangement of FIG. 5 and taken in the direction of arrow VI of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates part of an item conveying system according to the invention including two vertically disposed distributing paths, generally indicated at 1, which branch off from a horizontally disposed main conveying path 20 formed in a known manner of rollers and conveyor belts and in which the items are transported in a horizontal orientation. Switches 21 are disposed between the horizontal path 20 and the vertically disposed conveying paths 1. Each path 1 is associated with stacking compartments 3 and 4, in a manner to be described in detail below. It can be seen that, in contradistinction to the above-mentioned known distributor, there are always two rows of vertically disposed stacking compartments 4 and 3 between each two adjacent distributing paths 1.

In the embodiment of FIGS. 2-4, the conveying and guide elements, to be described below, of a distributing path 1 of the distributor are disposed on a vertically arranged U-shaped member 2. The stacking compartments 3 and 4 are formed by individual stack bottoms 3' or 4', respectively, and continuous walls 5 and 6. Each stack bottom is mounted on guide means (not shown) to be perpendicularly movable in a known manner and can be lowered, as the height of its stack increases, against a setting force down to the position indicated by dashed lines. A stack bottom arrangement of this kind is shown in U.S. Pat. No. 2,124,858 for instance. As can be seen particularly in FIG. 2, the stacking compartments 3 of the left row are vertically offset with respect to the stacking compartments 4 of the right row by one-half the distance between the stacking compartments of each row. As will be seen from the following description, this results in a particularly favorable configuration for the distributing path.

In association with each of the individual stacking compartments 3 and 4, there is, torque each side of the conveying path, a movably mounted roller 7, a switching tongue 8 and a fixedly mounted roller 9. These components are so arranged that, due to the vertically offset positions of the stacking compartments 3 and 4, one movable roller 7 of the one row cooperates with a fixed roller 9 of the other row. Each movable roller 7 at one side of the path is mounted on a rocker arm 10 which lies opposite the switching tongue 8 at the other side of the path. Springs, which cannot be seen in the drawing, exert a tongue on the rocker arm 10 in a direction which causes its movable roller 7 to be yieldingly pressed against its associated fixed roller 9. Furthermore, the immediately adjacent movable and fixed rollers on each side of the conveying path are always connected together by a conveyor belt 11. The conveyor belts at both sides overlap in the area of the roll-

ers. The fixed rollers 9 are each driven via drive belts (not shown) and a roller 12.

As seen best in FIG. 4 the switch tongues 8 are bifurcated so that they surround the conveying elements 7 and 11, from both sides. Each tongue is actuated by a rotating magnet 13 on whose axis it is disposed. The rotating magnet is rigidly mounted to member 2 by a holder 13'. Each compartment switch thus substantially consists of a bifurcated switch tongue 8 and a rotating magnet 13. For reasons of simplicity, the reference numeral 8 for the switch tongue will be used hereinbelow in referring to the entire compartment switch.

According to a further feature of the present invention, a vertically disposed distributing path 1 with two rows of stacking compartments 3 and 4 which are associated with this path on both sides via switches 8 are combined into an independent structural unit 22. Each such structural unit has its own motor, 40 in FIG. 1, to drive its conveying means. By lining up the required number of structural units 22, as for example two as shown in FIG. 1, distributors with the desired number of stacking compartments can be assembled in a simple manner.

In the embodiment of FIG. 1, each stacking compartment 3 and 4, is provided with a guide bar 14 mounted at 14' in order to aid the formation of an orderly stack in the compartment.

In FIG. 1 a movable roller 7, a switch tongue and a fixed roller 9 are arranged in succession on each side of the conveying path of the distributing path 1. However, their order is from bottom to top while in FIGS. 2 and 4 the order of elements 7, 8 and 9 is from top to bottom.

The above described arrangement of the stacking compartments 3 and 4 results in the characteristic feature of the distributor, according to the present invention, that the items are stacked in a different orientation in the left-hand stacking compartments 3 than in the right-hand stacking compartments 4. When mail is furnished which lies in the main conveying path 20 with the address side up for example, they are stacked in the right-hand stacking compartments 4 in the same orientation, in the left-hand stacking compartments 3 with the address side down. The arrangement thus acts as a reversing device for the left-hand stacking compartments in that the items are pivoted about an axis in the plane of the item but perpendicular to the conveying direction.

If it should be desired, in exceptional cases, to stack the items in the left-hand stacking compartments 3 in the same orientation as in the right-hand stacking compartments 4, this can be effected by the insertion of controllable position correction devices in the main conveying path 20. Such an arrangement is illustrated schematically in FIGS. 5 and 6 which show a mail distributing machine.

In the mail distributor shown in FIGS. 5 and 6 a known scanner 23 is disposed at the entrance to the main conveying path 20, where the items are moved on edge, to read the identifying imprint on the items. The scanned signal forms guide signals in a known correlator 24. These guide signals are shifted in steps through the stages of a stepping register 25 in synchronism with the advance of the items along their conveying path and effect the formation of setting signals for the actuation of the respective switch 21 and the respective compartment switch 8 whenever the item has reached the

particular switch. The shifting takes place in a known manner under the control of signals from light barriers, disposed along the conveying path, which are not shown in the drawing. In the drawings the operative connections between the stepping register 25 and the switches in the conveying paths are indicated schematically by a representative number of dashed lines, lines *a, b, c, d, e*, etc., of FIG. 6 being considered to be connected to the identically marked lines in FIG. 5.

Beyond the scanner 23 a switch 26 is disposed with which the items can be selectively guided through either a position correction device or a simple detour channel 27. In the drawing, a reversing device 28 known, for example from German Patent No. 1,146,449 is shown schematically. With this device the items are turned by 180° about an axis which is parallel to their plane and perpendicular to the conveying direction. A 90° turning device 29 of known type is disposed behind the confluence point of the two channels 27, 28 where the previously vertically disposed items are laid flat for further conveyance along the main horizontally disposed conveying path 20.

The setting signal for switch 26 is formed in a known switching stage 30 from the guide signals furnished by the correlator 24. This is done in such a manner that items which are intended for a left-hand stacking compartment 3 in view of their guide identification pass through reverser 28 so that the items finally come to lie in the same orientation in all stacking compartments insofar as their address side is concerned.

An item distributor which, like that shown in FIGS. 5 and 6, has a scanner, a correlator, a stepping register and switching stages is known from U.S. Pat. No. 3,141,540 for instance.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

We claim:

1. In a distributor for rectangular flat items, such as items of mail, the distributor having a plurality of vertically disposed distributing paths which branch off, in a downward direction, from a horizontally disposed main conveying path through switches, a plurality of stacking compartments associated with the vertically disposed distributing paths one below the other and each being operatively disposed with respect to its associated distributing path via a compartment switch in such a manner that the edges of the items which are perpendicular to the conveying direction are always moved parallel to themselves, the improvement wherein there are two vertically disposed rows of said stacking compartments associated with each said distributing path, each row being vertically disposed on a respective side of its associated distributing path, with two vertically disposed rows of stacking compartments being disposed between two adjacent distributing paths.

2. An arrangement as defined in claim 1, wherein each said distributing path, and said two vertically disposed rows of stacking compartments operatively associated thereto are formed as a structural unit which further comprises a compartment switch for each said compartment disposed between said path and its respective compartment.

3. An arrangement as defined in claim 2 wherein each said path includes conveying means and each said

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structural unit further comprises a motor operatively connected to said conveying means.

4. An arrangement as defined in claim 2 wherein said stacking compartments of one of said rows are vertically offset with respect to those of the other of said rows by half the distance between the stacking compartments of one row.

5. An arrangement as defined in claim 4, wherein each said path includes conveying means disposed on each side of said path to guide and convey the items, said conveying means comprising a plurality of pairs of rollers, one of which is movably mounted and the other of which is fixedly mounted, each of said stacking compartments having a respective pair of said rollers associated with it and with said rollers on opposite sides of said compartment switch, said switch including a switching tongue, and with said fixedly mounted rollers associated with said compartments in the one of said rows cooperating with said movably mounted rollers in the other of said rows.

6. An arrangement as defined in claim 5 wherein said conveying means further comprises conveying belts connecting said rollers of each of said pairs of rollers, and wherein said conveying belts associated with said compartments in one of said rows overlap said conveying belts associated with the other of said rows in the area of said cooperating fixedly and movably mounted

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rollers.

7. An arrangement as defined in claim 6 further comprising a rocker arm associated with each of said pairs of rollers and supporting said movable roller, each said rocker arm being disposed to lie opposite a respective switching tongue of the associated pair of rollers disposed on the opposite side of said distributing path.

8. An arrangement as defined in claim 1, wherein each of said stacking compartments has a bottom portion which receives the items and on which the items are stacked one on top of the other, and further comprising means connected to said stacking compartments, said means dropping said bottom portions of said stacking compartments in response to an increase in the number of items stacked therein.

9. An arrangement as defined in claim 8, further comprising controllable position correction means disposed in the main conveying path to permit the selective guiding of items bearing distributing marks at one side thereof, and control means connected to control said position correction in such a manner, in dependence on the distributing marks associated with the items, that the items come to lie in the same orientation in all stacking compartments with respect to their one side.

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