APPARATUS FOR TORNING OVER PILES OF ITEMS

Inventor: Francesco Ponti, Cerbara-Citta’ Di Castello (Perugia) (IT)

Correspondence Address:
WILLIAM J. SAPONE
COLEMAN SUDOL SAPONE P.C.
714 COLORADO AVENUE
BRIDGE PORT, CT 06605

Assignee: C.M.C. S.p.A., Cerbara-Citta’di Castello (Perugia) (IT)

Appl. No.: 11/572,886
PCT Filed: Jul. 29, 2005
PCT No.: PCT/IB05/02508
§ 371(c)(1), (2), (4) Date: Jan. 29, 2007

Foreign Application Priority Data
Jul. 30, 2004 (IT) .......................... BO2004A000481

Publication Classification
Int. Cl.
B65H 15/02 (2006.01)

U.S. Cl. ........................................ 271/186

ABSTRACT

An apparatus for turning over piles of items, comprising a forming station (1), adapted for defining the above mentioned piles of items (20), each consisting of one or more items (10), and for pulling the piles towards a relevant outlet section according to a feeding direction (A); conveying means (2), adapted for receiving the above piles of items (20) from said outlet section and, in the order, conveying the piles according to a direction substantially equal to the above mentioned feeding direction (A), turning them over relative to a median axis perpendicular to the feeding direction and finally, conveying the piles according to a forwarding direction (B), substantially opposed to the feeding direction (A), into a receiving station (3), adapted for inserting the pile of items into corresponding envelopes (11).
APPARATUS FOR TURNING OVER PILES OF ITEMS

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an apparatus intended to set up piles of items in sheets and relevant enveloping, with special reference to stations intended for turning over such piles.

DESCRIPTION OF THE PRIOR ART

[0002] At present, such automatic enveloping systems of sheet items comprise conveying members, in the proximity of which there are provided one or more sheet feeders, converging into a station intended for receiving such piles into an envelope.

[0003] Such conveyors, continuously actuated at high speeds, consist of a fixed support base, generally featuring one or more longitudinal grooves inside which there are provided corresponding chains provided with a plurality of pushing pins, known as "lugs"; capable of moving the corresponding piles of items being formed.

[0004] To this end, pairs of consecutive lugs delimit seats for housing said piles.

[0005] Such conveyors are further provided with a pair of side abutments, associated to the fixed support base and generally adjustable, for the longitudinal guiding of each pile of items in sheet in the predetermined feeding direction.

[0006] A pile of items usually consists of a main sheet, or master, and of one or more enclosures, or secondary sheets, each released by a corresponding sheet feeder on the pile being formed, in phase relation with the forward motion of the lugs. The main sheet generally exhibits a barcode and optionally an address of the recipient to which, afterwards, the corresponding envelope will be delivered; an optical sensor, for example located in a suitable recess obtained in said fixed support base, will have the function of reading, coding and sending the electrical signal associated to such bar coding, to a controller intended for decoding and interpreting. Based on the information shown on the bar code, suitable enabling signals will enable or not the dispensing of secondary sheets by the relevant sheet feeders; therefore, a pile of items in sheet can exhibit a variable number of secondary sheets based on the bar code imprinted on the main sheet. As known, envelopes can exhibit a small opening of transparent material intended for showing the address of the recipient to which the same envelope will be delivered: to this end, the interposition of a further section intended for turning over the same piles of items in sheet between the pile forming station and the enveloping station can be functional.

[0007] However, the introduction of an additional apparatus in the enveloping system causes an increase of the overall dimensions, which are already considerable due to the longitudinal development of said conveying member.

[0008] Crossed belt devices are currently used, which grip and rotate the pile by one hundred eighty degrees relative to a median axis, but they exhibit the disadvantage of a considerable longitudinal extension.

[0009] Another known apparatus consists of a pair of plates that grips the pile and carries out a one hundred eight degree rotation relative to an end thereof, connected to the relevant support frame; disadvantages of such solution are found in the high cost, in the overall dimensions and in the presence of dead times that make the apparatus not very productive.

SUMMARY OF THE INVENTION

[0010] An object of the present invention is to provide an apparatus which should be capable of turning over piles of items in sheet and which should be compact and of limited dimensions, so as to solve the disadvantages mentioned above.

[0011] Another object of the present invention is to provide a functional and efficient apparatus capable of adjusting to the production requirements with certain versatility.

[0012] Another object of the present invention is to provide an apparatus of simple and essential construction and relatively low cost.

[0013] Said objects are achieved, in accordance with the claims, by an apparatus for turning over piles of items, characterised in that it is provided with:

[0014] a forming station, adapted for defining said piles of items, each pile consisting of one or more items, and for pulling the piles towards a relevant outlet section according to a feeding direction;

[0015] conveying means, adapted for receiving said piles of items from said outlet section and, in the order, conveying the piles according to a direction substantially equal to said feeding direction, turning them over relative to a median axis perpendicular to the feeding direction and, finally, conveying the piles according to a forwarding direction, substantially opposed to the feeding direction, into a receiving station, adapted for inserting the piles of items into corresponding envelopes.

BRIEF DESCRIPTION OF THE INVENTION

[0016] The features of the invention will appear more clearly from the following description of preferred but non-exclusive embodiments made with reference to the annexed drawings, wherein:

[0017] FIG. 1 shows a front schematic view of the apparatus subject of the present invention;

[0018] FIG. 2 schematically shows the steps of forming, turning over and enveloping a pile of items in sheet handled by the apparatus under discussion;

[0019] FIG. 3 shows an enlarged detail of the apparatus subject of the present invention, in a different embodiment.

BEST MODES OF CARRYING OUT THE INVENTION

[0020] With reference to the annexed drawings, reference numeral 1 denotes a station for forming piles of items in sheet, the piles indicated with reference numeral 20, which consists of a conveying member 4, which moves a plurality of spaced pairs of lugs 14 according to the feeding direction A, a support base 15, an optical sensor 16 and a plurality of sheet feeders 17, 18a, 18b. The support base 15 exhibits two longitudinal grooves, not shown, along which said pairs of lugs 14 move, and two side abutments, not shown; the sheet feeder 17, on the other hand, releases main sheets 10, whereas the sheet feeders 18a, 18b release secondary sheets, respectively 10a, 10b.

[0021] Reference numeral 2 denotes conveying means, consisting of a pair of respectively first and second belt conveyors 2a, 2b; the first belt conveyor 2a exhibits a profile
consisting, in a sequence, of a first portion \( J_1 \), with slanting pattern facing downwards, of a second portion \( J_2 \), substantially semi-circular, and of a third horizontal portion \( J_3 \). Said conveyors \( 2a, 2b \) are mutually facing each other at the first portion \( J_1 \), at the second portion \( J_2 \) and at a section of the third portion \( J_3 \), to determine a continuous contact profile.

Reference numeral 3 denotes a station for receiving and enveloping said piles of items \( 20 \), consisting of a feeding device 13, adapted for releasing envelopes 11, a conveying member 6, actuating—according to the forwarding direction \( B \)—a plurality of spaced pairs of lugs 19, and a mobile abutment member 7, associated to the top branch of such conveying member 6. The top branch of the latter determines a horizontal plane \( Z \) on which also the same top branch of the first conveyor \( 2a \) lays, which is identified in said third portion \( J_3 \) and actuated in accordance with said forwarding direction \( B \).

Reference numeral 5 generally denotes an additional feeding line, consisting of a sheet feeder 12, a conveying member 9 and a horizontal support 8, a portion of the latter mutually facing one another.

The operation of the apparatus object of the present invention will now be described.

FIG. 1 shows the components of the apparatus under discussion according to the first embodiment, wherein the additional feeding line 5 is not present. With reference to said figure, the sheet feeder 17 releases a main sheet 10 on the support base 15, with the side having a bar code and an address facing downwards, so that the optical sensor 16, located downstream according to the feeding direction \( A \), acquires the associated information based on which secondary sheets will be released or not by the sheet feeders 18a, 18b, with said main sheet and secondary sheets, if present, defining said pile of items 20. It is noted that other embodiments may provide for a larger number of sheet feeders dispensing secondary sheets. Consecutive pairs of lugs 14, determining corresponding seats for the passing piles of items 20, are actuated in phase relation with the release of the main 10 and secondary sheets 10a, 10b, thus obtaining, thanks to their pulling action, a perfect overlapping of the sheets of each pile being formed. The pile of items 20 will exhibit a main sheet 10 which will be overapped by the secondary sheet released by the first sheet feeder following number 17, according to the feeding direction \( A \), which has been enabled. Thus, according to this embodiment, if the sheet feeder 18a is disabled and 18b is enabled, the pile of items 20 will consist of a main sheet 10 which will be overlapped by the secondary sheet 10b released by the sheet feeder 18b; on the other hand, if all sheet feeders are enabled, the pile of items 20 will respectively consist of the main sheet 10, of the secondary one 10a and of the secondary one 10b, one overlapped to the other.

Once formed, the pile of items 20 is pulled up to the outlet section of the forming station 1, corresponding to the end portion of the support base 15, according to the feeding direction \( A \). Afterwards, the facing branches of said first and second belt conveyors 2a, 2b grip and convey the pile of items 20, turning it over relative to the median axis perpendicular to the feeding direction; afterwards, the pile of items 20 with the main sheet 10 arranged at the top reaches the third portion \( J_3 \), at which the first belt conveyor 2a functionally co-operates with the conveying member 6, to allow the enveloping step that is carried out in the receiving station 3.

According to this embodiment, it is optionally possible to define a new pile of items 21 consisting of the additional sheets released by the sheet feeder 12 only: In this case, therefore, an additional sheet will correspond to the main sheet 10. It should be noted that the additional sheets released by the sheet feeder 12 consist, according to the production requirements, of main sheets 10 and/or secondary sheets.

The great versatility of the apparatus of the present invention, which can define piles of items of different composition based on the production requirements, is inferred from the above description. A direct advantage correlated to such peculiarities consists in the possibility of disabling the forming station 1, keeping only the feeding line 5 working: this would allow, for example, a reduction of the overall dimensions of the apparatus under discussion.

Another advantage of this invention consists in having devised an apparatus that exhibits reduced overall dimensions as compared to known solutions, but without affecting efficacy and functionality. Moreover, greater com-
pactness does not imply higher costs, since the apparatus is essential in its construction and easy to assemble.

[0034] It is understood that the above is described by way of a non-limiting example and therefore any practical variations fall within the scope of protection of the invention, as described above and claimed hereinunder.

1. An apparatus for turning over piles of items, characterised in that it is provided with:
   a forming station (1), adapted for defining said piles of items (20), each pile consisting of one or more items (10), and for pulling the piles towards a relevant outlet section according to a feeding direction (A);
   conveying means (2), adapted for receiving said piles of items (20) from said outlet section and, in the order, conveying the piles according to a direction substantially equal to said feeding direction (A), turning them over relative to a median axis perpendicular to the feeding direction and, finally, conveying the piles according to a forwarding direction (B), substantially opposed to the feeding direction (A), into a receiving station (3), adapted for inserting the piles of items into corresponding envelopes (11).

2. An apparatus according to claim 1, characterised in that said conveying means (2) comprise a pair of respectively first and second belt conveyors (2a,2b), mutually arranged for defining two facing branches intended for receiving the piles of items (20) from said outlet section, carrying them with a direction substantially equal to said feeding direction (A), as well as turning them over relative to the median axis perpendicular to the feeding direction.

3. An apparatus according to claim 2, characterised in that at said receiving station (3), it is provided with a conveyor (6) functionally co-operating with the top branch of said belt conveyor (2a), for allowing the continuous movement of said pile of items (20) in said forwarding direction (B), and intended for receiving said envelopes (11) in phase relation with the approach of said pile of items (20), a mobile abutment member (7), provided for defining said receiving station (3) and associated to the top branch of said conveyor (6), for allowing said enveloping step.

4. An apparatus according to claim 1, characterised in that it is provided with an additional feeding line (5) adapted for feeding on said pile of items (20), turned over and moved according to said forwarding direction (B), at least one item (10), in phase relation with the actuation of said conveying means (2), for defining a new pile of items (21) consisting of said pile of items (20) and of said item dispensed by said feeding line (5).

5. An apparatus according to claim 4, characterised in that said feeding line (5) comprises a conveying member (9) and a horizontal support (8), with the latter provided for moving said item (10), released by a sheet feeder (12), with said item (10) defining, along with said pile of items (20), said new pile of items (21).

6. An apparatus according to claim 2, characterised in that at said receiving station (3), it is provided with a conveyor (6) functionally co-operating with the top branch of said belt conveyor (2a), for allowing a continuous movement of said pile of items (20) in said forwarding direction (B), and intended for receiving said envelopes (11) in phase relation with the approach of said pile of items (21), a mobile abutment member (7), provided for defining said receiving station (3) and associated to the top branch of said conveyor (6), for allowing said enveloping step.

* * * * *