A separator and transfer device for paper napkins, towels and the like wherein a specific quantity or number of relatively flat objects such as paper napkins, towels or similar material can be automatically separated and transferred.

3 Claims, 9 Drawing Figures
SEPARATOR AND TRANSFER DEVICE FOR PAPER NAPKINS, TOWELS AND THE LIKE

This invention relates to a separator and transfer device, and more particularly a separator and transfer device for automatically separating and transferring a specific quantity or number of relatively flat objects, such as paper napkins, towels or similar articles or material.

An object of the present invention is to provide a separator and transfer device, wherein articles or material, such as paper napkins, can be conveniently and readily handled as they are packed or flow from existing or new folding equipment.

Another object of the present invention is to provide a separator and transfer device that separates individual bundles of napkins to be packed and transfers the bundles to automatically wrapping or banding equipment, and wherein the separation and transfer takes place at a high rate of speed and in a generally horizontal plane.

Still another object is to provide a separator and transfer device that is relatively economical to manufacture and efficient in operation and which is rugged in structure and efficient to use.

Still other objects and advantages will become apparent in the subsequent description in the specification.

IN THE DRAWINGS:

FIG. 1 is a side elevational view of the separator and transfer device of the present invention and illustrating the delivery roll.

FIG. 2 is a top plan view thereof.

FIG. 3 is a front elevational view taken on the line 3—3 of FIG. 1.

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3.

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 3.

FIG. 6 is a view showing a portion of the apparatus of FIG. 4, but illustrating the tripping motion.

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 4.

FIG. 8 is a sectional view taken on the line 8—8 of FIG. 1.

FIG. 9 is a sectional view taken on the line 9—9 of FIG. 8.

Referring in detail to the drawings, the numeral 100 indicates a vacuum folding and transfer roll that carries a typically folded napkin 101 that has been previously folded by a suitable folding mechanism, and the napkin 101 is carried by means of vacuum introduced or admitted through the main vacuum port 102 and through a plurality of vacuum holes 103, FIG. 1. The folding roll 100 is made or constructed with a plurality of grooves 104 that may, for example, be two to eight in number per napkin. Conventional or typical packer fingers 105 are mounted for oscillation in time with the roll 100, and the packer fingers 105 strip the folded napkin 101, FIG. 5, from the roll 100 and push the napkin 101 into the chute space 106, FIG. 3. The packer fingers 105 are actuated by a suitable shaft 107 that forms part of the present invention. As the napkin 101 is pushed into the chute space 106, the napkin becomes trapped by the stops 108, FIG. 2, and the stops 108 keep the napkin from following the fingers 105 back to the roll 100. The napkins are packed into a continuous stream into the chute, and heretofore these napkins have been removed by hand at the “marker” napkin to a banding or wrapping machine.

In accordance with the present invention, there is provided a set or plurality of separating fingers 109, FIGS. 1, 2 and 3, or two sets of separating fingers 109 for each web may be provided, depending on the type and fold of napkins being handled, and the separating fingers 109 are mounted on a shaft 110. The shaft 110 has a continuous torque applied thereto by any suitable means, as for example by an air motor 111, and the motor 111 is connected to the shaft 110 by means of an endless chain 112 and sprocket arrangement 113. As shown in the drawings, the shaft 110 with the separation fingers 109 are selectively held in a cocked position with the packer fingers 105 in grooves 104 in the vacuum roll 100. It will be noted that the separating fingers 109 are arranged along side and occupy the same groove 104 as the packer fingers 105.

With further reference to the drawings, the shaft 110 with torque applied by the air motor 111 or other suitable device, is selectively held in the cocked position by a dog 115, FIG. 4, against a stop lever or bell crank 116. The stop lever 116 is controlled by rotation of a cam-carrying wheel or disc 117 by a segmented cam 118. The cam-carrying wheel 117 is driven through a sprocket 119, from the drive shaft of the main napkin folder (not shown), and this may be driven with a 5:1 reduction relative to the packer finger oscillation per minute, and this ratio can be changed as desired.

It will be noted that the segmented cam 118 is forced out to trip lever 116 by the actuation of a suitable solenoid 120 and the pivoting of arm 121 around a pivot point 122. This action causes the cam follower 123 to force the segmented cam 118 out so as to move the lever 116 around the pivot point 124 so as to permit the separator shaft to rotate 50° to the stop 125.

Further, the cam-carrying wheel or disc 117 is driven at a suitable ratio, such as a 5:1 ratio, to the packer finger 105. This serves to eliminate any possible error in the count of each napkin package. Also, this corrects for error in the setting of the counter (not shown) that supplies the electrical signal to the solenoid 120. In addition, the cam-carrying wheel can be timed through the chain reference drive to the sprocket 119, and through the slots 126 to trip the separating fingers at a time when the packer fingers are on the way out of the vacuum roll 100 so as to assure that the separating finger 109 is flipped up 90° at the desired time or interval. The packer finger 105 can continue to pack napkins 101 in behind the separating fingers 109 since when they flip up 90° they force the entire package of napkins in the tray ahead of the stop 108 enough to allow for 5 to 20 napkins to be packed in behind the fingers 109, as shown in the drawings. The numeral 75 indicates connection blocks for transfer fingers 137.

Further, when the trip cam 118 permits the separating fingers 109 to flip up 90°, the micro switch 127, FIG. 4, is also actuated by the lever 116 by an extension 90 attached to bell crank 116.

This action energizes a clutch brake 128 that is arranged between a motor 129 and reducer 130, and the motor 129 and reducer 130 may be of “C” face type. This action then drives the cross-shaft 131 through sprockets 132 and 133. The cross-shaft 131, by means of sprockets 134 on each end thereof, serves to drive
through a chain 135 to sprocket 136 on each side frame. In each side frame, as shown in the drawings, a coil spring 76 is provided which provides give or resiliency in order to prevent damage to the transfer fingers 137.

The fingers 137 are connected to block 75. The numeral 70 indicates a frame unit that includes a cross-piece 71 as well as spaced apart side pieces 72, and there is provided connecting blocks 73.

The sprocket 136 drives sprocket 80 on each side of the frame through its shaft 81, and this forms a drive for the chain flight 142. The main shaft 131 drives a sprocket 134 on the outside of the frame so that the chain 135 drives a sprocket 136. The sprocket 136 is operatively connected to another sprocket 80 on the inside of the frame, and the sprocket 80 becomes the drive for the entire flight 142. The chain flight 142 provides a drive for the upper flight 143 through a chain and sprocket mechanism 85. Thus, it will be seen that there is provided a drive for the two parallel chain arrangements that carry the transfer fingers 137 so that these fingers 137 will be driven straight into a vertical position into the space created between the napkins by the separator fingers 109, and the fingers 137 will continue on in a horizontal direction so as to transfer a specific number of napkins 101 away from the fold 100.

In addition, as the transfer fingers 137 transport or move the napkins horizontally down the tray or chute 106, the cam follower 118 engages a lever 139 and through its shaft 95 moves the stop dog 125 that permits the air motor 111 to drive the shaft 110 carrying the fingers 109 270° to a rest position in the grooves 101 that are formed in the vacuum roll 100. The transfer fingers 137 and parallel chain arrangements 142 and 143 run continuously until they return to their start or initial position.

With further reference to the chute or tray, there is provided posts 60, FIG. 3, and mounted on the inside of the posts 60 are slats 61 that form the chute. On the exterior of the chute is a flat bar 62, and on the top and bottom of the bar 62 small feeler elements or plastic pieces 63 are adapted to be provided as well as coil springs 64 so that as the napkins are shoved in place, the napkins are held in their proper location with a small amount of give or resiliency provided. The main frame of the machine includes spaced apart plates 50 as well as a top plate or member 51.

The pin 40 works in a slot 41 in the disc 117, and the pin 40 is retained in its inward position by a coil spring 42, and the coil spring 42 surrounds a hub 44 on the disc 117, the numeral 45 indicating an axle arrangement within the hub 44, FIG. 7. The numeral 93 indicates slots that provide clearance so as to permit the fingers 137 to move therethrough, FIG. 7.

The machine of the present invention will separate napkins or similar articles, such as hand towels, as they come off of a folding machine. The prior patents include U.S. Pat. Nos. 3,254,889 and 3,498,600, but the present invention possesses certain important differences or advantages over these prior patented machines, since these machines are quite complicated and expensive. In addition, with the prior U.S. Pat. Nos. 3,524,899 and 3,498,600, it is necessary to purchase a new folding machine to go in line with the same. With the separator of the present invention it is possible to attach the machine to most existing folders and is less complicated and less expensive than previous machines.

The following is given as the sequence of operation of the separator and transfer device of the present invention:

Initially the packer fingers 105 remove articles, such as the napkins 101, from the vacuum roll 100 and pack the napkins out on the tray. The count fingers 109 may be in the ready position, such as that shown in FIG. 1, and the shaft 110 is under constant torque by the air motor 111. The count finger 109 is held in ready position by the stop 115. The cam carrier plate 117 rotates once for every five napkins. The solenoid 120 is energized approximately three to four napkins ahead of a predetermined count which in this case must be a multiple of five. The solenoid 120 rotates the arm 121 which forces the segmented cam 118 out, and as it passes the arm 121 the roller 94 moves a lever 116, allowing the shaft 110 to rotate 90° to the stop 125. This places the count fingers 109 behind the last napkin packed from the vacuum drum on to the tray.

At the instant the count finger 109 is up the package transfer fingers 137 moves up from under the tray through the space created from the count finger and moves the napkins down the tray. Further, at the instant the transfer fingers 137 move up they trip the stop 125 through a lever 139 which allows the count fingers 109 to rotate 270° back to stop 115 and the ready position. The transfer fingers 137 move the napkins down the tray and return under the tray to a start position. The solenoid is de-energized after it causes lever 116 to move. The transfer fingers 137 are driven through an electric clutch brake arrangement including the motor 129 and gear reducer 130.

The separator fingers may be arranged along side and occupy the same grooves as the corresponding packer fingers or they may also occupy separately cut grooves. The parts can be made of any suitable material and in different shapes and sizes.

Although the invention has been herein shown and described in what is considered to be the most practical and preferred embodiment, it is recognized that departures from the disclosed invention may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

What is claimed is:

1. Apparatus for separating and transferring a plurality of non-rigid articles along a generally horizontally disposed path from a source of articles, said apparatus comprising a frame located adjacent to a said source, a tray mounted on said frame in a generally horizontal position, one end of said tray being located in a position to receive articles from said source, means for continuously moving articles from said source onto said one end of said tray, shaft means mounted on said frame, at least one separator finger fixed to said shaft, rotatable means fixed to said shaft for maintaining said separator finger in operative position until a predetermined quantity of articles have been placed on said tray, lever means swingably mounted on said frame and normally disposed in the path of rotation of said rotatable means, means for swinging said lever means out of the path of said rotatable means to permit rotation of said shaft, means for rotating said shaft so that said separator finger engages and moves the articles away from
said one end, at least one transfer member movably mounted on said frame, means for moving said transfer member in a first direction to a position behind and in engagement with said articles on said tray and moving said transfer member in a second direction to move said articles to the opposite end of said tray.

2. The structure as defined in claim 1 including means on said one end of said tray for retaining articles that are moved onto said tray.

3. The structure as defined in claim 1 including a plurality of generally parallel separator fingers fixed to said shaft.

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