

FIG. 1

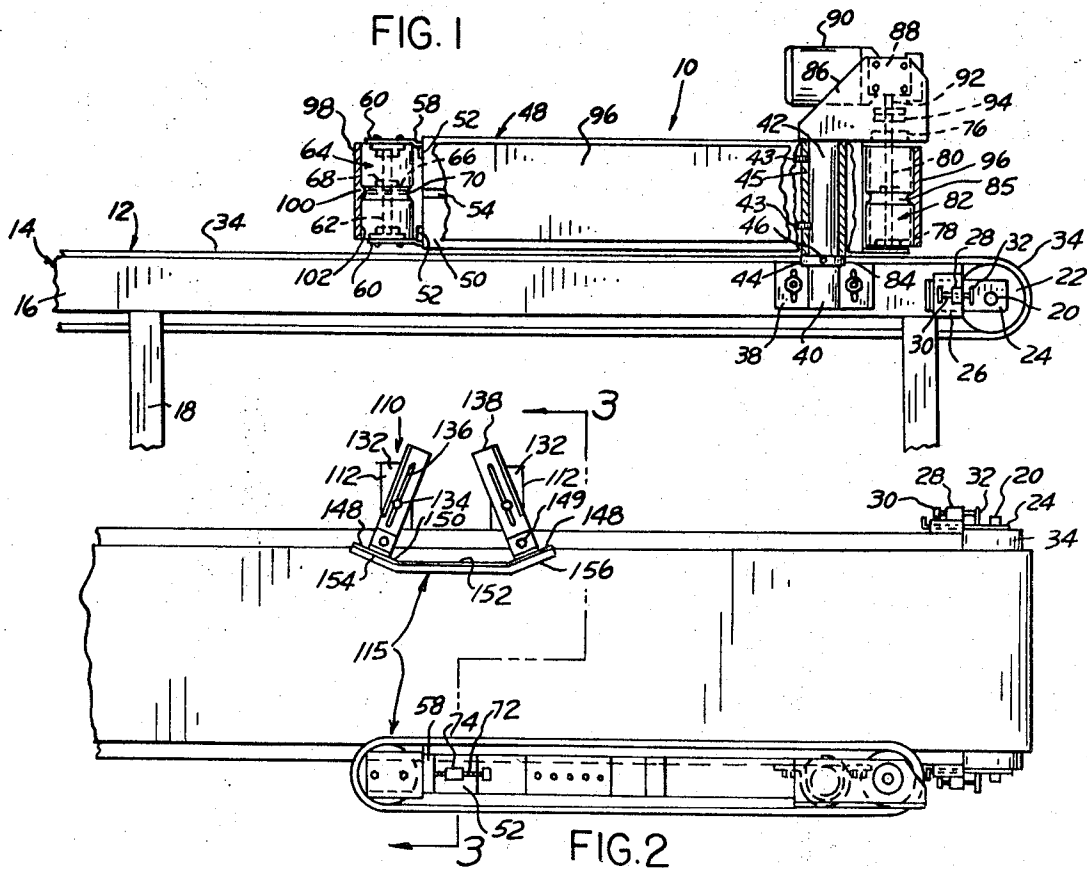


FIG. 2

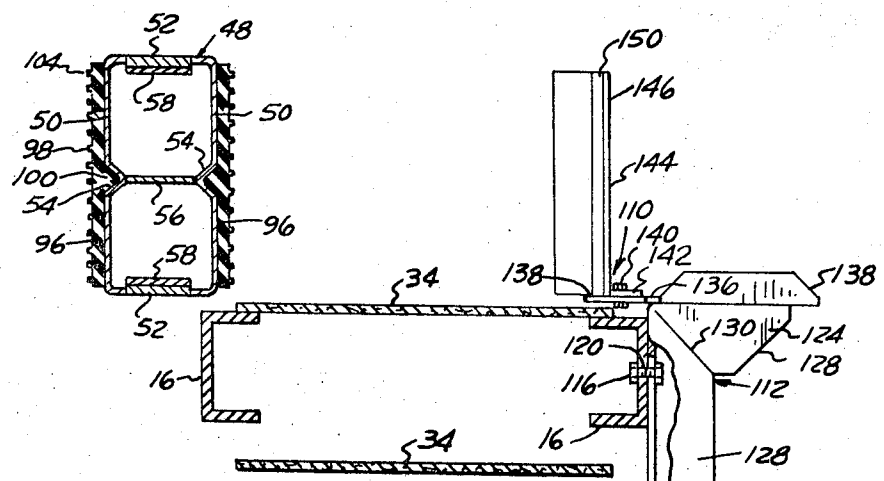


FIG. 3

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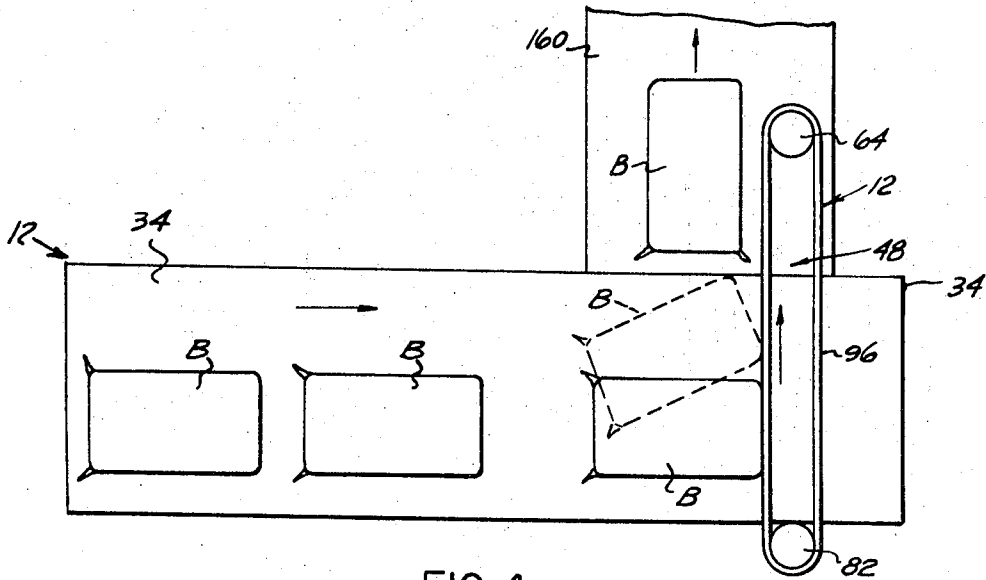


FIG. 4

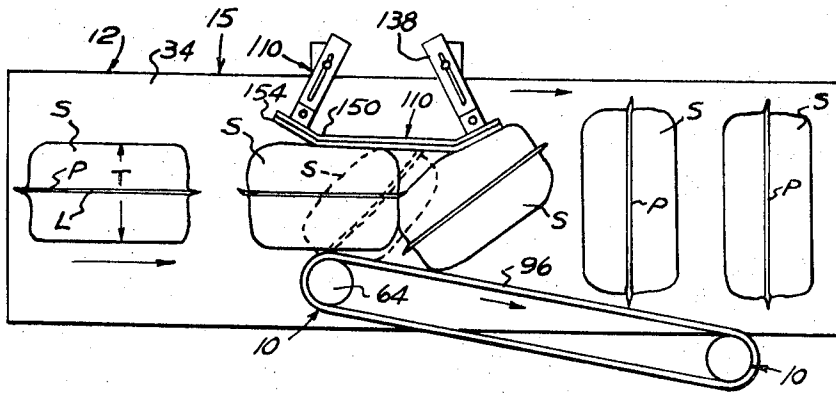


FIG. 5

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FILLED BAG SHIFTING DEVICE WITH BAG TURNER IN THE DRAWINGS

FIG. 1 is a side elevation, partly in vertical section, of a filled bag shifting device installed above a horizontal bag-transport conveyor;

FIG. 2 is a top plan view of FIG. 1, with a bag turner added, where it is desired also to turn standing bags around their vertical axes;

FIG. 3 is a cross section upon an enlarged scale, taken along the line 3-3 in FIG. 2;

FIG. 4 is a diagrammatic top plan view showing the operation of the filled bag shifting device in ejecting horizontal filled bags from the bag transport conveyor; and

FIG. 5 is a diagrammatic top plan view showing the operation of the bag shifting device with the bag turner added for turning upstanding filled bags around their vertical axes.

Referring to the drawings in detail, FIG. 1 shows somewhat diagrammatically a filled bag shifting device, generally designated 10, as installed upon and above a horizontal bag conveyor, generally designated 12. The horizontal main bag conveyor 12 is of conventional design and hence is shown as consisting of a framework 14 having horizontally extending opposite side members 16 mounted on legs 18 and interconnected by the usual cross members (not shown). The opposite ends of the side members 16, which are inwardly facing channel members with their webs disposed vertically (FIG. 3), rotatably support the shafts 20 of belt conveyor drums 22 (only one of which is shown in FIG. 1). The shaft 20 of the conveyor drum 22 at one end of the conveyor 14 is adjustably mounted in bearing brackets 24 which are slidably mounted in fixed brackets 26 bolted or otherwise secured to the side members 16 and carrying internally threaded bosses 28 through which pass adjusting screws 30 engaging abutments 32 on the sliding brackets 24 for adjusting the tension and taking up the slack in a horizontal main endless conveyor belt 34 mounted on the drum 22.

Bolted as at 36 to one of the main conveyor frame side members 16 is a slotted vertically slidable bag shifting support bracket 38 (FIG. 1) having a tubular midportion 40 in which is mounted the lower end of a pivot shaft 42 upon which is adjustably mounted a stop collar 44 adjustably secured thereto by a set screw 46. Pivotaly mounted on the pivot shaft 42 to swing to and fro thereon is the tubular member 45 of an elongated structure 48 consisting of a pair of oppositely facing shallow vertical channel members 50 preferably rolled from heavy sheet steel and interconnected at top and bottom by cross members 52 (FIG. 3) and at their inwardly grooved midportions 54 by intermediate cross members 56.

Slidably mounted upon the upper and lower cross members 52 at the outer end of the elongated structure 48 are oppositely facing offset arms 58 to which are bolted or otherwise secured oppositely facing bearing blocks 60. Rotatably mounted in the bearing blocks 60 is the supporting shaft 62 of a rotary idler drum member 64 having a central cross disc 66 (FIG. 1) to which a collar 68 on the shaft 62 is secured. The conveyor drum 64 has a central groove 70. The arms 58 are adjusted in a conventional manner by screws 72 threaded through bosses 74 on the cross members 52 (FIG. 2).

Rotatably but nonadjustably mounted on the structure 48 at the opposite end thereof are bearing blocks 76 and 78 which rotatably support the drive shaft 80 of a rotary power-driven bag shifting belt drum member 82 connected to the shaft 80 in a similar manner to the connection of the shaft 62 to the idler drum 64. The drum 82, like the idler drum 64, is provided with a central groove 85. The lower bearing block 78 is mounted on the outer end of an arm or plate 84 which projects rearwardly from and is welded or otherwise secured to the lower end of the tubular member 45 of the conveyor boom 48. The tubular member 45 is welded or otherwise secured to and between the shallow channel side members 50 of the conveyor boom 48.

Bolted or otherwise secured to the top of the elongated structure 40 near the rearward end thereof is an angle bracket 86 to which is bolted the reduction gear box 88 of a speed-reducing electric motor unit 90, the output shaft 92 of which is coupled at 94 to the drive shaft 80. Trained around the rotary power-driven and idler drum members 82 and 64 respectively is an endless bag shifting belt 96 having a roughened surface 98 and having a V-belt portion 100 integral with the inner surface 102 thereof. The V-belt portion 100 engages the grooves 70 and 85 of the idler drum member 64 and power-driven drum member 82 respectively. In addition to enhancing the driving engagement of the belt 96, the V-belt portion 100 keeps the bag shifting belt 96 in line and prevents it from moving endwise along the drums 64 and 82. The outer surface 98 of the bag shifting belt 96 is roughened by being provided with small projecting nubs 104 (FIG. 3) which increase its frictional grip on the bags. The belts 34 and 96 are preferably made from elastic deformable material, such as the synthetic rubber sold and known generally throughout the trade as Neoprene and manufactured by the E. I. Du Pont de Nemours Co. of Wilmington, Delaware.

To turn the bags being conveyed while they are moving along in upstanding or vertical positions, the bag turner 110 is added (FIGS. 2, 3 and 5) to form a bag shifter-turner, generally designated 115. In this instance, the bag shifting device 10 is disposed at a relatively small acute angle to the direction of travel of the belt 34 of the main conveyor 12 (FIG. 5). The bag turner 110 is mounted on the opposite side frame member 16 from that which carries the bracket 38 and for this purpose is provided with a pair of angle brackets 112, each of which has a vertical slot 114 therein adapted to receive a bolt 116 in the web 118 thereof. The bolts 116 are mounted in holes 120 in the side member 16 and serve the purpose, when loosened, of enabling the angle brackets 112 to be raised or lowered for adaptability to the heights of the particular bags to be turned. The angle brackets 112 are formed of angle bar stock, the flanges 122 and 124 of the vertical and horizontal arms 126 and 128 respectively being notched to provide a diagonal junction 130 (FIG. 3) between the two arms 126 and 128 when they are bent together at right angles to one another. The horizontal or upper arm 128 in its web 132 is drilled to receive a bolt 134 which extends through an elongated slot 136 in an arm 138 of angle bar stock which slidably engages the web 132 of one of the angle brackets 112. There are two of the arms 138 (FIG. 2) bolted to the two angle brackets 112 so as to both slide and swing relatively thereto.

The forward end of each arm 138 is drilled to receive a bolt 140 which passes through the alignedly drilled foot or tab 142 of an angle strut 144, the vertical portion 146 of which is welded or otherwise secured to the back surfaces of end portions 148 of a bag turning plate 150 (FIG. 2) to the central portion 152 of which the end portions 148 are inclined at obtuse angles. Bonded or otherwise secured to the front surface of the bag turning plate 150 is a facing 154 of elastic deformable material, such as synthetic rubber, for example, the same synthetic rubber as is used for the bag shifting belt 96. The front surface 156 of the facing 154 is preferably roughened or corrugated to enhance its gripping action on the bags being turned. The multiple diamond-shaped rib pattern (not shown) has been found satisfactory for this purpose.

In the operation of the invention, let it first be assumed that the apparatus is to be used solely for the ejection of bags lying horizontally upon the horizontally moving belt 34 of the main conveyor 12, as shown in FIGS. 1 and 4, so that the bags B are not required to be turned. Let it also be assumed that the bags are to be ejected from the main conveyor 12 to a ramp 160 extending downward from the main conveyor belt 34. To accomplish this purpose, the elongated structure 48 of the bag shifting device 10 is swung transversely to the direction of travel of the main conveyor belt 34 and that the bag shifting belt 96 is caused to travel in a clockwise direction around its drums 64 and 82. The motor 90 is then started in operation to cause the diverter conveyor belt 96 to travel in its orbital path,

as indicated by the right-hand arrow in FIG. 4. Let it also be assumed that the main conveyor belt 34 is traveling from left to right in the direction of the left-hand arrow of FIG. 4 and that filled bags B have been placed thereon and are traveling from left to right, as indicated in FIG. 4.

As the bottom of each bag B collides with the laterally moving belt 96 of the bag shifting device 10, it is engaged by the nubs 104 thereon and pulled laterally in the direction of travel thereof, passing through the dotted line position of FIG. 4 to the solid line position shown at the top of FIG. 4, and is ejected in a direction at right angles to its original direction of travel, as indicated by the middle or top arrow in FIG. 4. Instead of the ramp 160 as the terminal location for the bags B, it will be understood that a transverse conveyor (not shown) may receive the diverted bags for conveyance to a further location of disposal.

The bags B may be made of any suitable flexible material, such as paper, burlap or other fabric, or synthetic plastic. The present invention successfully handles and shifts all types of bags, regardless of the material of which they are made, and the slippery synthetic plastic bags which were previously impossible to shift mechanically on a large scale, other than manually, are easily diverted by the bag shifting device 10 of the present invention. At the same time, the bags B are not torn or otherwise damaged and the material contained in them is thus not spilled or harmed. All types of granular material are successfully handled in bags conveyed and shifted by the bag shifting device 10.

If it is desired to turn filled upstanding bags S, the bag turner attachment 110 is mounted on the side member 16 of the frame 14 of the main conveyor 12 in the manner described above and the bag shifting conveyor 10 swung to make a small acute angle with the main conveyor belt 34, as shown in FIG. 5. The turning plate 150 of the bag turner 110 is then adjusted by moving its arms 138 inward or outward in the manner described above until the space between the central portion of its facing 154 and the bag shifting belt 96 immediately after it has rounded the idler drum 64 (FIG. 5) is slightly less than the transverse thickness T of the bags S, the contents of which are assumed to be at least slightly compressible or displaceable.

Ordinarily, the bags S will be traveling in an upright position after being filled by a conventional filling machine (not shown) and their tops P will have been closed by sewing, sealing or the like. The bags during filling are deposited on the main conveyor belt 34 with their longitudinal thicknesses L disposed in the direction of travel of the belt 34 and in this orientation they enter the space between the bag turner attachment 110 and the diverter conveyor 10 (FIG. 5). As the facing 154 of the bag turning plate 150 is stationary but roughened, it frictionally grips and halts the adjacent side of the bag S and acts as a fulcrum while the opposite side thereof is gripped by the roughened surface formed by the nubs 104 on the bag shifting belt 96 and is carried to the right.

This action rotates the bag S in a counterclockwise direction around its vertical axis as indicated by the dotted lines in FIG. 5. At the same time, the transverse thickness T of the bag S is temporarily deformed slightly to accommodate the bag S to the varying width of the space between the turner

attachment 110 and the bag shifting device 10. As a result of this action, and of the cooperation between the stationary bag turner 110, the moving conveyor 12 and the moving bag shifting belt 96 of the bag shifting device 10, the bags S are rotated one by one from their longitudinal positions at the left-hand end of FIG. 5 to the transverse positions at the right-hand end thereof.

This turning of the bags S from longitudinal to transverse positions imparts greater stability to them and prevents them from falling sidewise with consequent interruption in the operation of the main conveyor 12 and possible damage to the bags S and their contents. The bag shifter-turner 115 shown in FIG. 5 has the further advantage of enabling the bags S to be deposited in horizontal positions as shown in FIG. 4 upon the main conveyor belt 34 with the tops P either at the forward end or rearward end of the bags S.

If the tops P of the bags S are to face forward on the belt 34, a cross bar (not shown) is mounted above and near the belt 34 so that the bags S first engage it near their bottoms while their tops P continue to move forward, whereupon the bags fall forward onto the belt 34. If, on the other hand, the tops P of the bags S are to face rearward, the cross bar is mounted at a greater height above the belt 34 so as to engage the upper portion of each bag S and push it backward as the bag S travels first against and then beneath the cross bar and falls backward.

I claim:

1. A device adapted to operate cooperably with a moving conveyor for shifting relatively to the conveyor the positions of bags traveling therealong, said device comprising a support adapted to be positioned adjacent the conveyor, an elongated structure mounted on said support and adapted to extend over the conveyor in the path of travel of bags traveling thereon, said elongated structure being pivotally mounted on said support for swinging laterally relatively thereto in a substantially horizontal path, a pair of rotary members rotatably mounted on said elongated structure with their axes of rotation disposed vertically in horizontally spaced parallel relationship, an endless bag shifting belt trained around said rotary members and having a bag gripping surface thereon, a motor drivably connected to one of said rotary members, and a stationary bag turner mounted on the opposite side of the bag travel path on the conveyor in spaced relationship to said bag shifting belt and having a bag gripping portion thereon disposed in fulcrum relationship to the bags being moved by said belt, said bag turner including a stationary horizontally elongated member adapted to be disposed approximately parallel to the direction of travel of the conveyor.
2. A bag shifting device, according to claim 1, wherein a horizontally adjustable bracket structure is adapted to be mounted adjacent the conveyor, and wherein said horizontally elongated member is mounted on said bracket structure.
3. A bag shifting device, according to claim 1, wherein said bag turner also includes an end portion disposed at an obtuse angle to said horizontally elongated member.

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