DEVICE FOR TURNING FABRIC PANELS

ABSTRACT: A device for turning fabric panels to present a predetermined surface thereof upwardly is disclosed with a conveyor for transferring successive fabric panels to an operating station. Associated therewith is mechanism automatically responsive to the presence of a fabric panel with the wrong side up for operating the device for turning the fabric panels.
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BACKGROUND OF THE INVENTION

Many automatic machines exist which are capable of operating in seriatim on fabric panels in various stages of manufacture of garments and other textile articles. It is known to direct into such automatic machines fabric panels from a stack of such panels. A problem which arises in this respect is that the fabric panels may frequently be arranged in the stack with finished and underside alternately uppermost or in a random arrangement with respect to the surface which is uppermost. Such nonuniform arrangement of fabric panels in a stack frequently results in fabric becoming the wrong-side-up from the way they are originally cut, i.e., a bolt of material is spread on a table in many superposed folds and by cutting perpendicularly through the folded assembly many panels are cut simultaneously but with a portion of the panels being wrong-side-up. To rearrange the fabric panels manually in the stack would be prohibitively costly and would defeat the purpose of automatic mechanisms for operating unattended upon fabric panels in seriatim.

Techniques are known in regard to items other than fabric workpieces for turning wrong-side-up hems so that all are delivered right-side-up. The U.S. Pat. No. 2,929,490 of Mar. 22, 1960 to M. W. Steward discloses a mail handling apparatus which turns letters to deliver each with the stamp in preselected orientation. The U.S. Pat. No. 3,298,498 of Jan. 17, 1967 discloses a fabric inverter on which the decision as to which pieces are to be inverted is programmed into the controls. This patented construction cannot accept random arrangements of fabric pieces on the conveyor, that is, the fabric pieces must be delivered to the inverter in the predetermined sequence which is programmed into the controls, such as alternatively faceup and facedown.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a device for turning randomly oriented fabric panels into an oriented arrangement with a predetermined surface upwardly as the fabric panels are being transported to an operating station.

This invention comprehends the provision of automatic controls for sensing which surface of successive fabric panels is uppermost on a conveyor, and mechanism responsive to such automatic controls for selectivity rendering the fabric-turning device operative only when required.

It is also an object of this invention to provide the aforesaid fabric-turning device in a form which is compact and may be utilized conveniently in association with preexisting equipment for performing manufacturing operations on successively presented fabric panels.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 represents a top plan view of a fabric panel conveyor having the fabric-turning device of this invention applied thereto.

FIG. 2 represents an elevational view of a portion of the conveyor of FIG. 1 with the fabric panel conveyor of this invention illustrated thereon in an at rest position.

FIG. 3 represents an elevational view of a portion of the fabric-turning device of FIG. 2 illustrating the lowered position of the fabric clamp in readiness to turn a fabric panel.

FIG. 4 is a view similar to FIG. 3 but illustrating the leading edge of a fabric panel gripped in the fabric clamp.

FIG. 5 is a view similar to FIG. 3 but illustrating the fabric clamp raised with the leading edge of a fabric panel gripped therewith.

FIG. 6 is a view similar to FIG. 3 but illustrating the fabric clamp opened after completion of turning of a fabric panel.

FIG. 7 is a schematic electrical and pneumatic diagram illustrating a control arrangement for the fabric-turning device of this invention.

Referring to FIG. 1 of the drawings, a work fabric conveyor means is illustrated including a plurality of spaced conveyor belts 11 each directed about driver pulleys 12 on a drive shaft 13 and each sustained on idler pulleys 14 on an idler shaft 15. The drive shaft may be rotated from a power shaft 16 as by a belt 17 to move the upper run of the conveyor belts 11 in the direction of the arrow in FIG. 1. It will be understood that the conveyor means disclosed is representative of any conveyor means which may be associated, for instance, with machinery for operating upon fabric workpieces as by sewing, folding, cutting or the like.

Indicated generally by the dashed line 20 in FIG. 1 is a loading area on the conveyor means at which fabric workpieces 21 may be deposited in seriatim. The fabric workpieces may be delivered to the loading area 20 from another device from a stack of such fabric workpieces. This invention comprehends the delivery of fabric workpieces in a random faceup or facedown orientation in the loading area 20.

Indicated generally by the dashed line 22 in FIG. 1 is a delivery area on the conveyor, within which area any desired operation may be performed or initiated on the workpieces, as for instance, a sewing operation, an operation combining the workpiece 21 with another workpiece, or a delivery of the workpiece to a stack by any of conventional mechanical means.

The fabric-turning device of this invention comprises a unitary assembly supported adjacent to the conveyor means between the loading and delivery areas 20 and 22. Preferably, the fabric-turning device is carried on a base 30 from which rise bearing brackets 31 for a rock shaft 32 which extends transversely across the conveyor means above the upper run of the conveyor belts 11. Fastened upon the rock shaft 32 is a rock frame 33 including spaced arms 34 which span at least one of the conveyor belts 11 and are located each arm above a space between adjacent ones of the conveyor belts. The specific form of the rock frame 33 including, for instance, the number of spaced rock arms 34 and the number of conveyor belts 11 which the spaced rock arms span will depend upon the size and shape of the fabric workpiece to be turned. The rock frame illustrated in FIG. 1 has been found to operate successfully upon garment pocket pieces having the shape of the workpiece 21 in FIG. 1.

Raised bosses 35 on the rock frame 33 sustain a pin 36 supporting an air cylinder 37 having a supply line 38. The piston rod 39 of the air cylinder 37 is of the type adapted to be retracted by a spring (not shown) and to be extended and upon application of air under pressure to the air cylinder 37. The piston rod 39 is secured by a clevis 40 to one arm of a bellcrank 41 pivoted on a fulcrum pin 42 set in bosses 43 one on each of the rock arms 34. A fabric clamping plate 44 is secured to one other arm of the bellcrank, spans the rock arms 34 and thus cooperates with the rock arms to grip work fabric thereon.

Also fast on the rock shaft 32 is an operating rock arm 50 which is pivoted as at 51 to the piston rod 52 of an air cylinder 53 of which the air supply line is indicated at 54 in FIG. 1. The air cylinder 53 is operated between bosses 55 on the base 30 and may preferably be of the type in which the piston rod 52 is spring biased into the extended position as shown in FIG. 2 and urged into retracted position as shown in FIGS. 3 and 4 when air under pressure is directed to the air cylinder.

A workpiece detector unit indicated generally at 60 is carried on a bracket 61 secured as by screw 62 on the base 30. The detector unit is located in an advanced position in the drawing considered in the direction of movement of the conveyor belts 11. The detector unit comprises a light source 63 arranged to direct a beam of light onto one of the conveyor belts 11 over which the fabric workpieces 21 will pass. A photocell 64 is also included in the detector unit and is arranged to receive light from the light source reflected from the belt 11. Preferably that conveyor belt 11 upon which the light source...
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Directs light is formed of or surfaced with material having light-reflecting characteristics similar to that of one face which may be designated as the right face of the fabric workpieces to be operated upon and different light-reflecting characteristics from that of the opposite wrong face of the workpiece material. In this manner fabric workpieces placed on the loading area will not be detected by the photocell as such workpieces pass thereunder, whereas fabric workpieces proceeding wrong-face-up will cause the detector unit to signal a change in the light-reflecting characteristics.

FIG. 7 illustrates schematically an electronic and pneumatic diagram indicating a preferred control arrangement by which the fabric-turning device of this instruction may be operated. The operation of this device is indicated in successive stages in FIGS. 2 to 6 which in conjunction with FIG. 7 will explain the operation.

As illustrated in FIG. 7, the photocell 6 of the detector unit is connected electrically to provide an input DC signal level to a differentiator 70 whenever presence of a wrong-side-up workpiece is sensed by the detector unit 60. In response to the onset of the signal level 69, the differentiator provides an output a pulse 71. In response to the pulse 71, a square-wave generator 72 delivers to an operating coil 73 of a solenoid 74, a square-wave signal 75 of predetermined duration. The solenoid 74 which may be arranged to energize the solenoid 74 may be arranged to pressurize the cylinder 37. Referring to FIGS. 4, 5, and 6, such operation of the solenoid 82 will cause the clamping plate 42 to be depressed for a predetermined time as shown in FIGS. 4, 5, and 6. Preferably the duration of the square-wave signal 83 will be preselected depending upon the length of the fabric workpiece and the speed of travel of the belts 11 so that the clamping plate 44 will grip the leading edge of the fabric workpiece until the trailing edge is completely inverted and drawn beneath the rolls 43. When the clamping plate 44 is raised, as shown in FIG. 6, the belts 11 will carry and deliver the workpiece to the raised rock arms 34 to the operating area 32.

1 claim:

1. Apparatus for operating upon successive fabric workpieces on a continuous conveyor means automatically to orient said fabric workpieces with a predetermined side uppermost, comprising a support frame positionable adjacent to said conveyor means, a gripper for the leading edge of said fabric workpieces carried on said conveyor frame and having an at rest open position elevated above the path of travel of said workpieces on said conveyor means, a detector device carried on said conveyor frame in advance of said gripping means and including a light source, a photocell responsive to light from said light source reflected from workpieces on said conveyor means, and means biasing the response of said photocell to distinguish one side from another of the fabric workpieces on said conveyor means, and gripper operating means influenced by said control means for in seriatiom depressing said gripper into the path of the leading edge of a fabric workpiece on said conveyor means, closing said gripper into engagement with said leading edge, elevating said gripper above said conveyor means, and opening said gripper after said conveyor means has transported the trailing edge of said workpiece beyond the gripper.

2. Apparatus as set forth in claim 1 in which said gripper comprises an arm oscillatable about an axis disposed transversely above said conveyor means and pivoted jaw means carried upon said arm adjacent to the free extremity thereof, and in which said gripper operating means comprise a first actuator responsive to said control means for oscillating said arm to position the free extremity thereof selectively above or below the path of workpieces on said conveyor means, and a second actuator responsive to said control means for opening and closing said pivoted jaw means.