United States Patent [19]

Beazley

[11] **3,785,638**

[45] **Jan. 15, 1974**

[54] **FABRIC PICKUP AND TRANSFER DEVICE**

[75] Inventor: **Aubrey G. Beazley**, El Paso, Tex.

[73] Assignee: **Farah Manufacturing Company, Inc.**, El Paso, Tex.

[22] Filed: **Aug. 31, 1971**

[21] Appl. No.: **176,606**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 5,809, Jan. 26, 1970, Pat. No. 3,611,957.

[52] **U.S. Cl.** **271/33**, 271/97, 271/118, 271/155

[51] **Int. Cl.** **B65h 3/20**

[58] **Field of Search** ..... 271/33, 27, 28, DIG. 2, 271/62 R, 39, 38, 40

[56] **References Cited**

UNITED STATES PATENTS

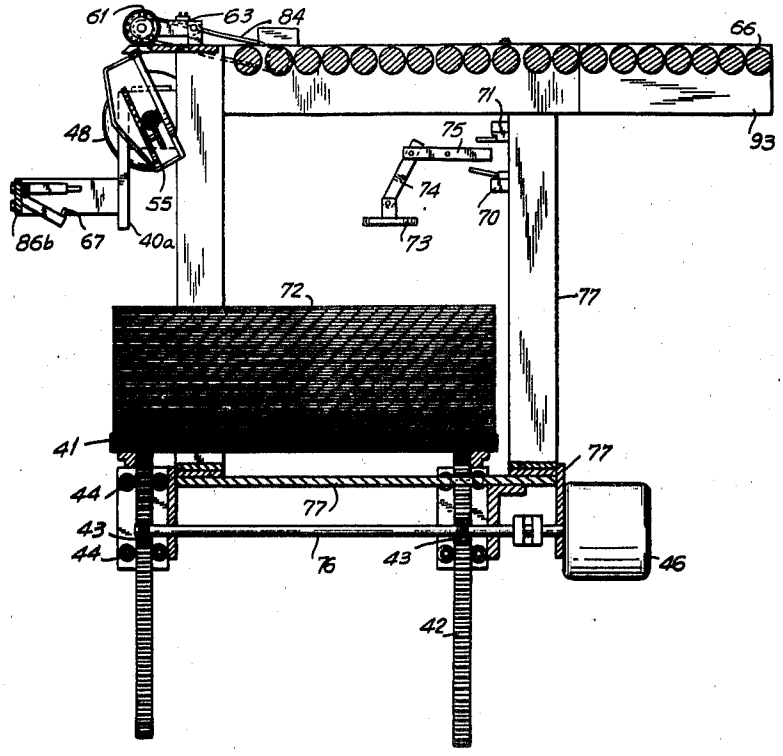
552,122	12/1895	Goodbar	271/33
1,888,194	11/1932	Broadmeyer	271/27
2,767,982	10/1956	Noon	271/27 X
3,079,145	2/1963	Grosnickle et al.	271/62 R
3,369,803	2/1968	Walton et al.	271/39 X
3,572,686	3/1971	Day	271/27
3,580,564	5/1971	Boynton et al.	271/33

Primary Examiner—Evon C. Blunk
Assistant Examiner—Bruce H. Stoner, Jr.
Attorney—Henry W. Koster et al.

[57] **ABSTRACT**

A pick-up and transfer device is provided which holds fabric workpieces in a stacked relationship, separates and picks up the workpieces individually by means of an adhesive tape, if needed in an inverted face-up or face-down relationship, transfers the workpieces from a lower position to an upper position, and advances the individual workpieces to subsequent garment forming devices.

6 Claims, 11 Drawing Figures



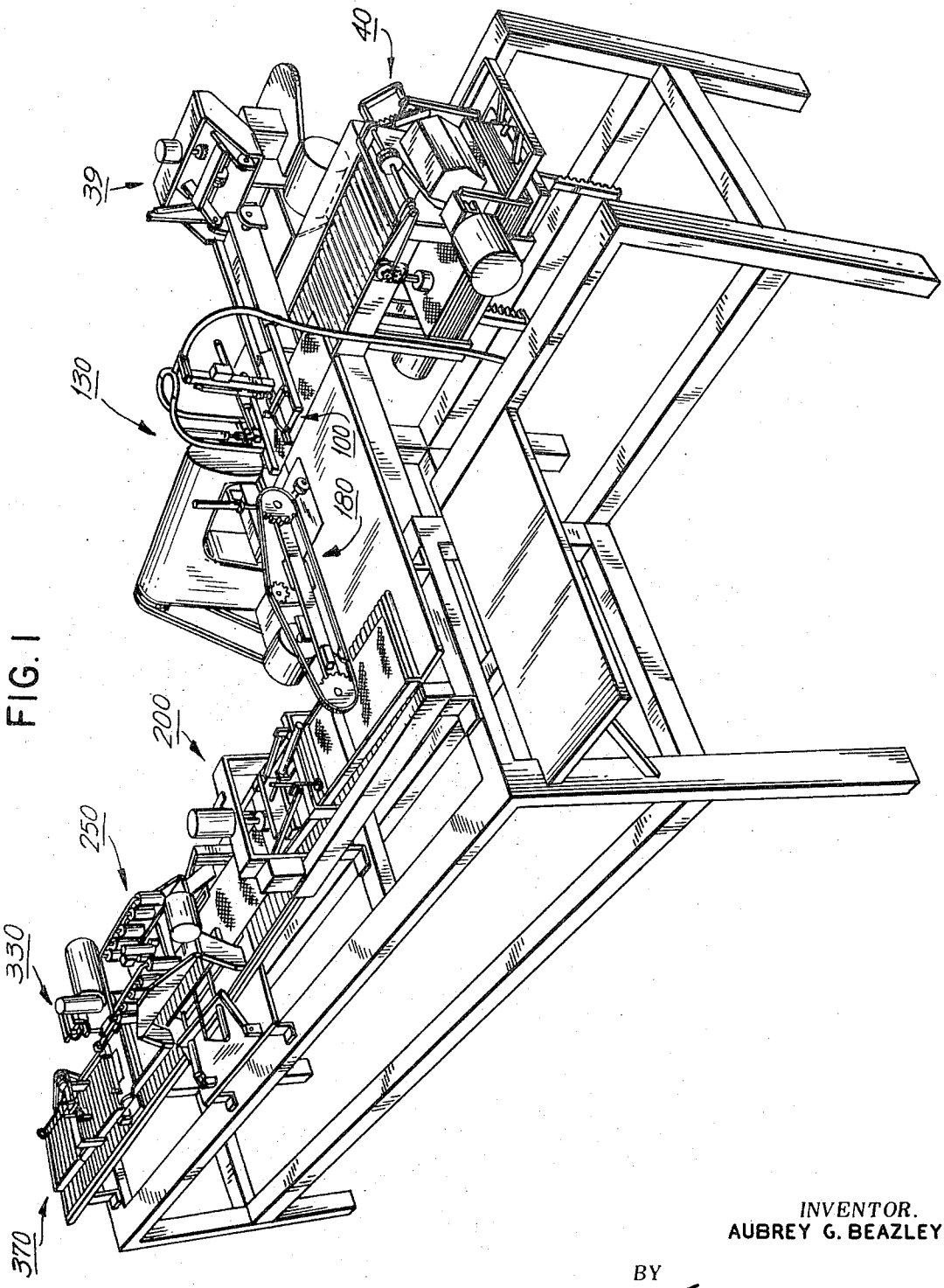
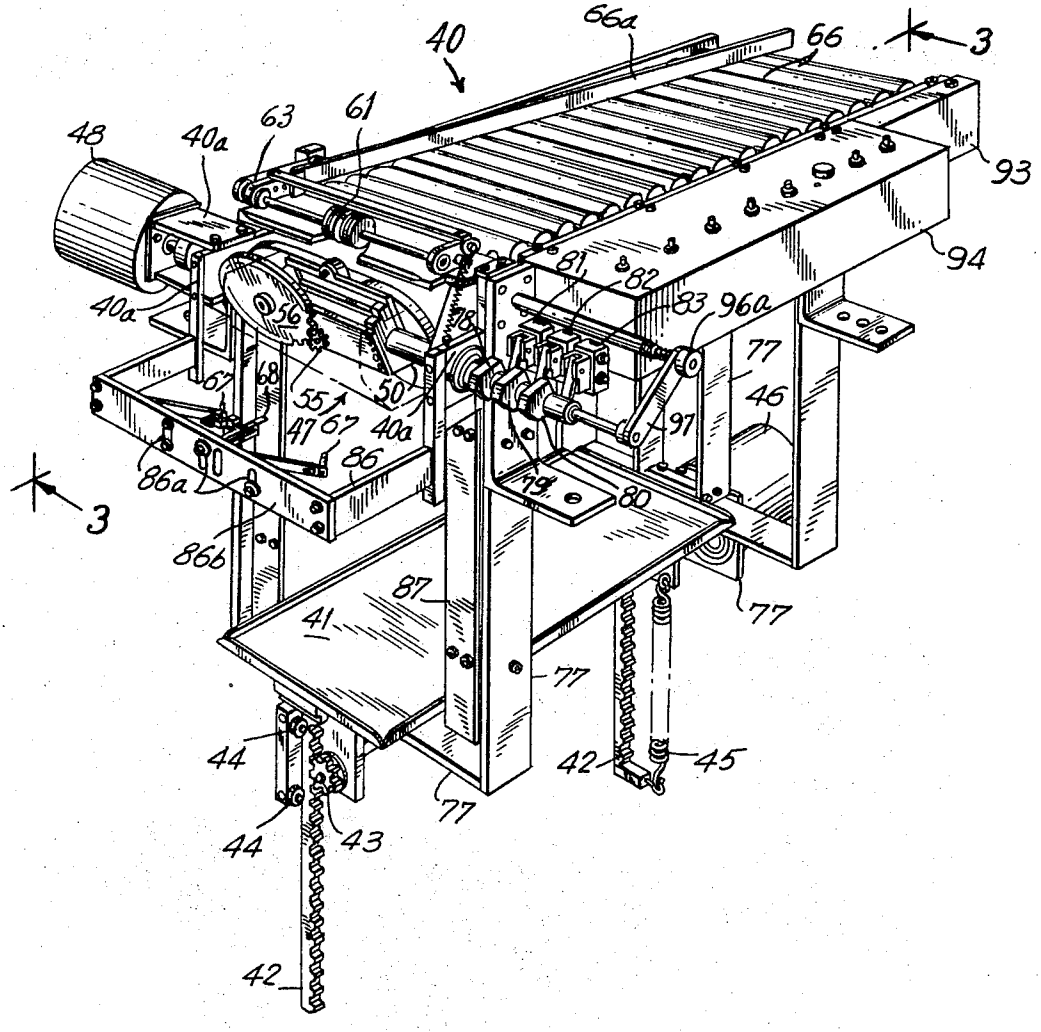


FIG. 1

INVENTOR.
AUBREY G. BEAZLEY

BY
Curtis, Morris & Safford
ATTORNEYS

FIG. 2



INVENTOR.
AUBREY G. BEAZLEY

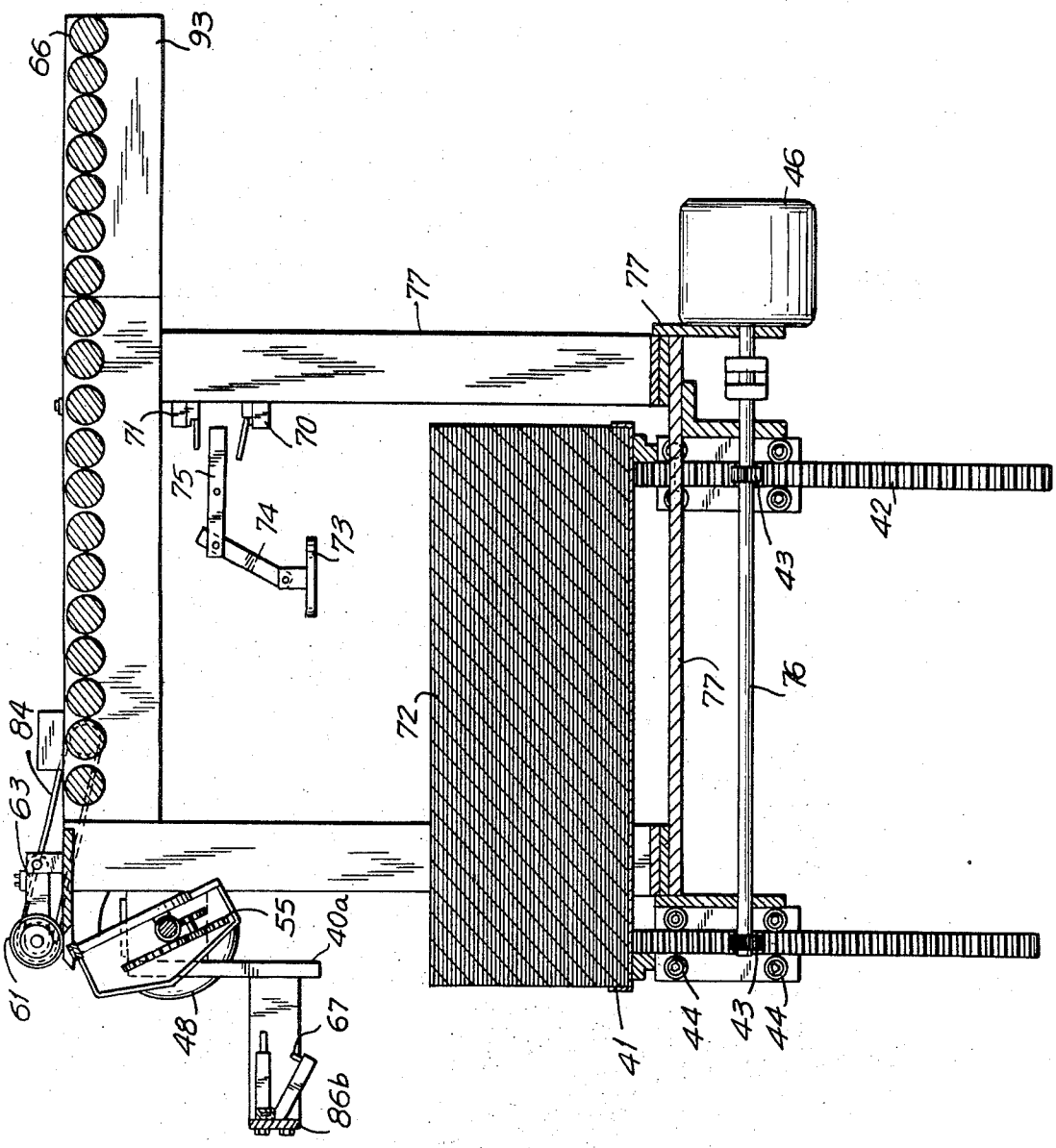


FIG. 3

INVENTOR.
AUBREY G. BEAZLEY

FIG. 3a

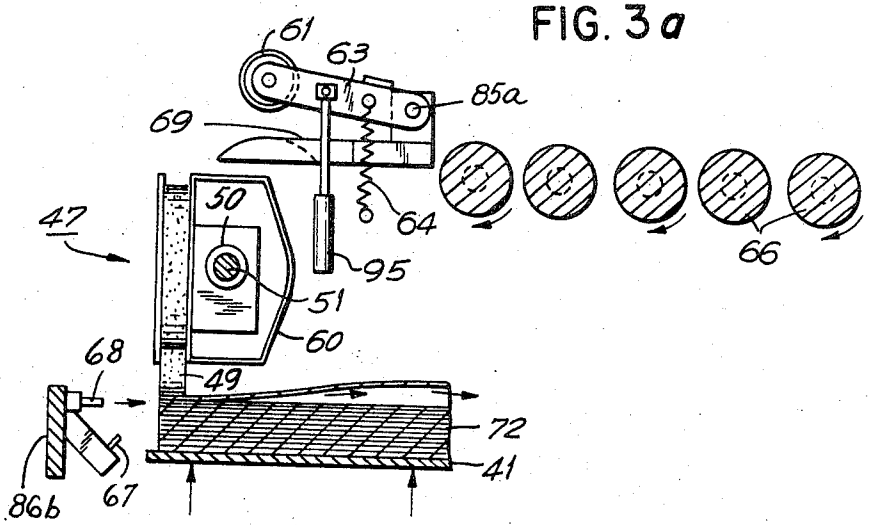


FIG. 3b

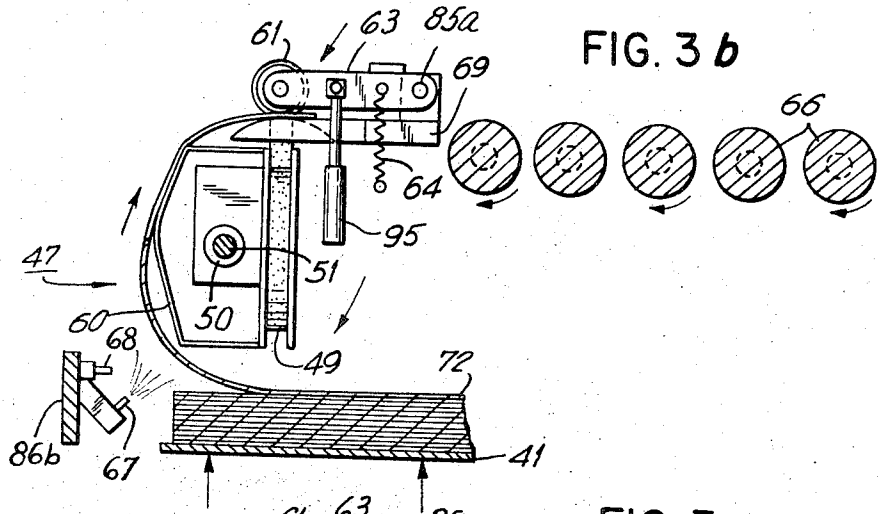
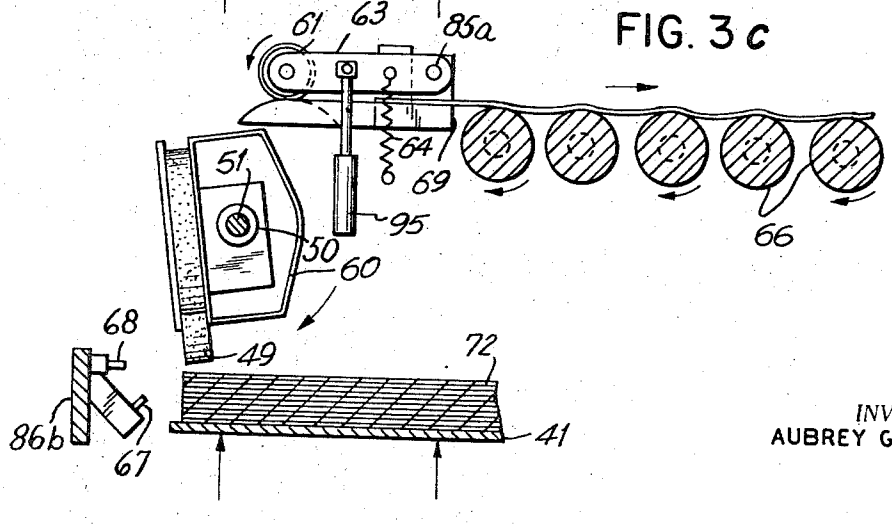


FIG. 3c



INVENTOR.
AUBREY G. BEAZLEY

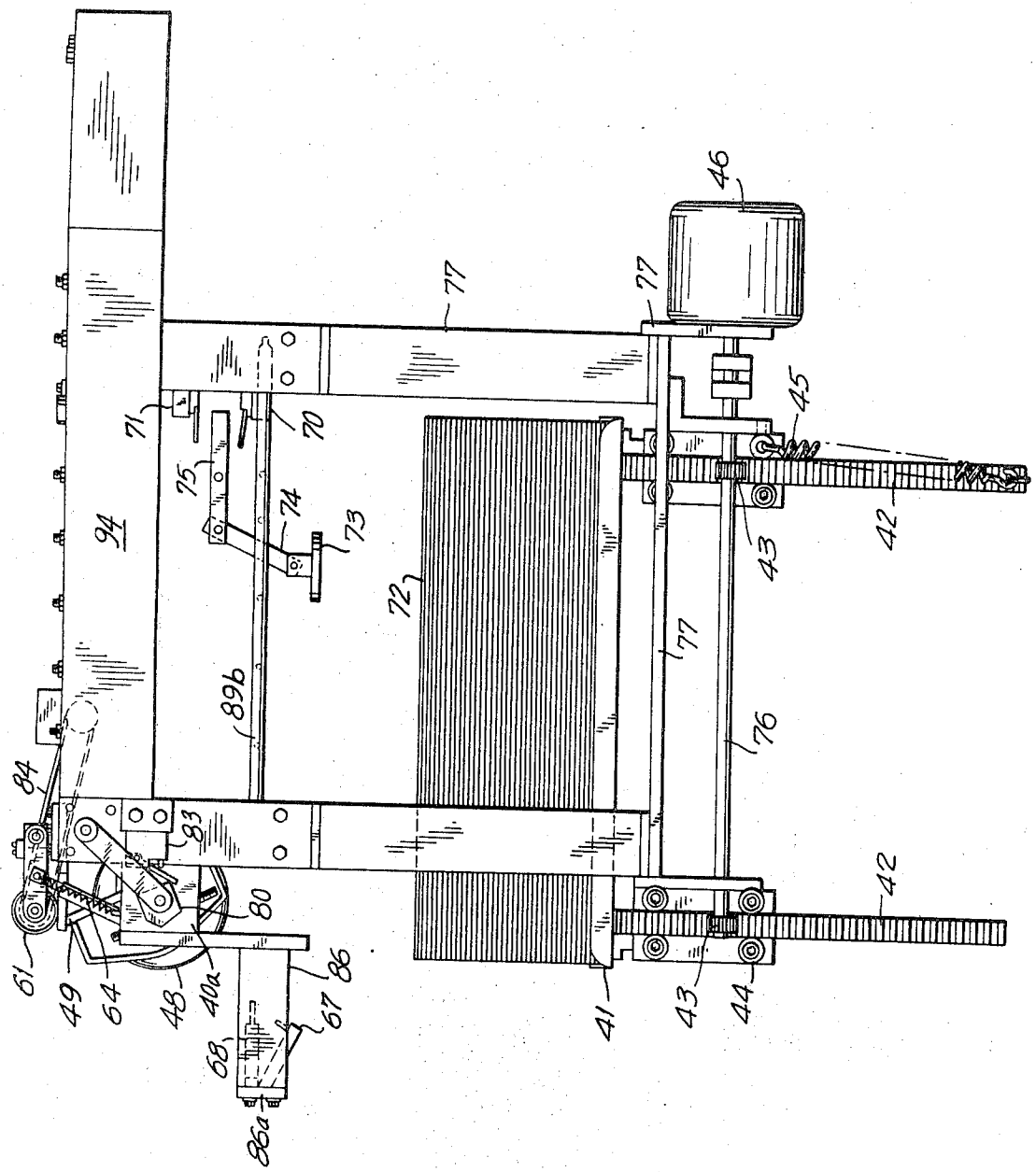
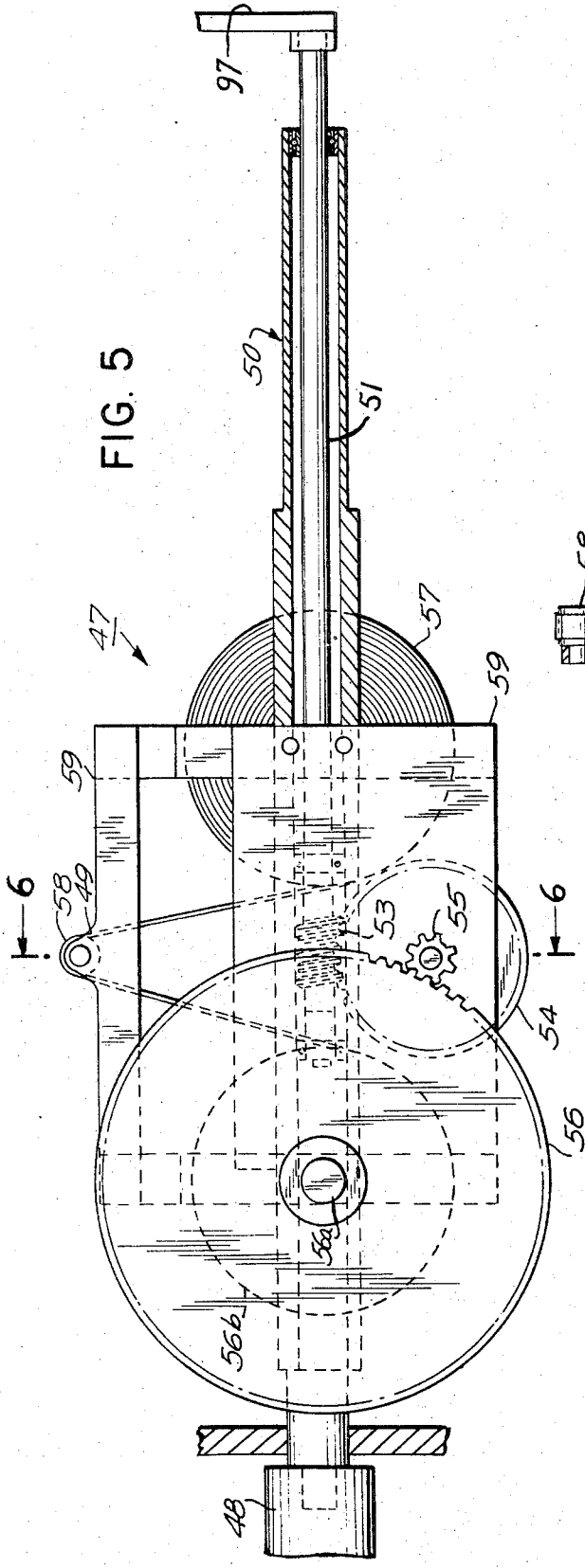


FIG. 4

INVENTOR.
AUBREY G. BEAZLEY

FIG. 5



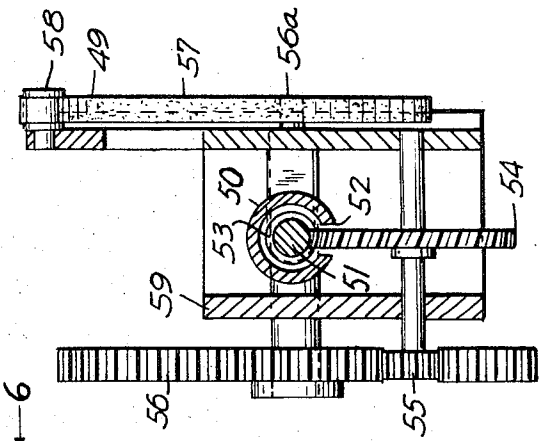
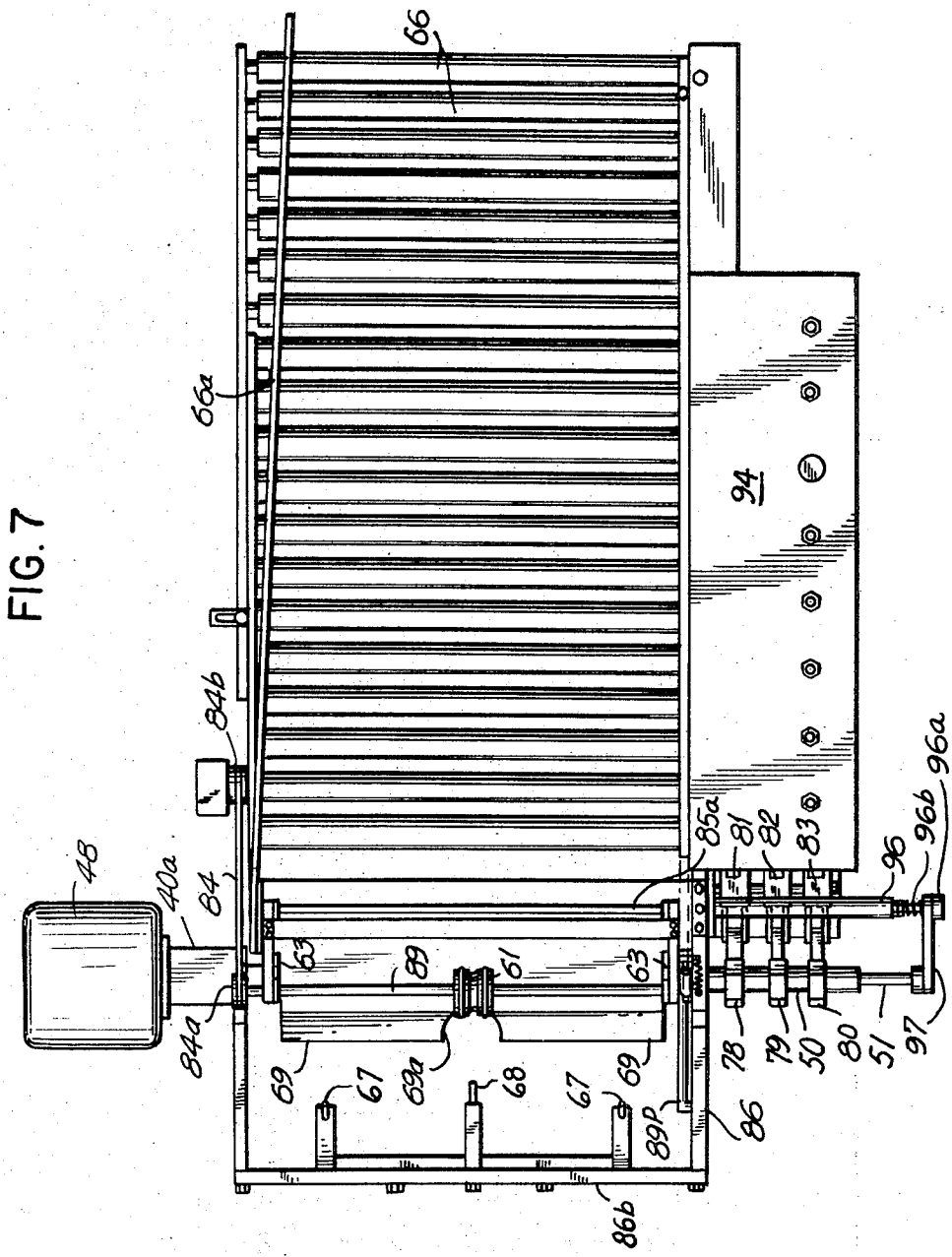


FIG. 6

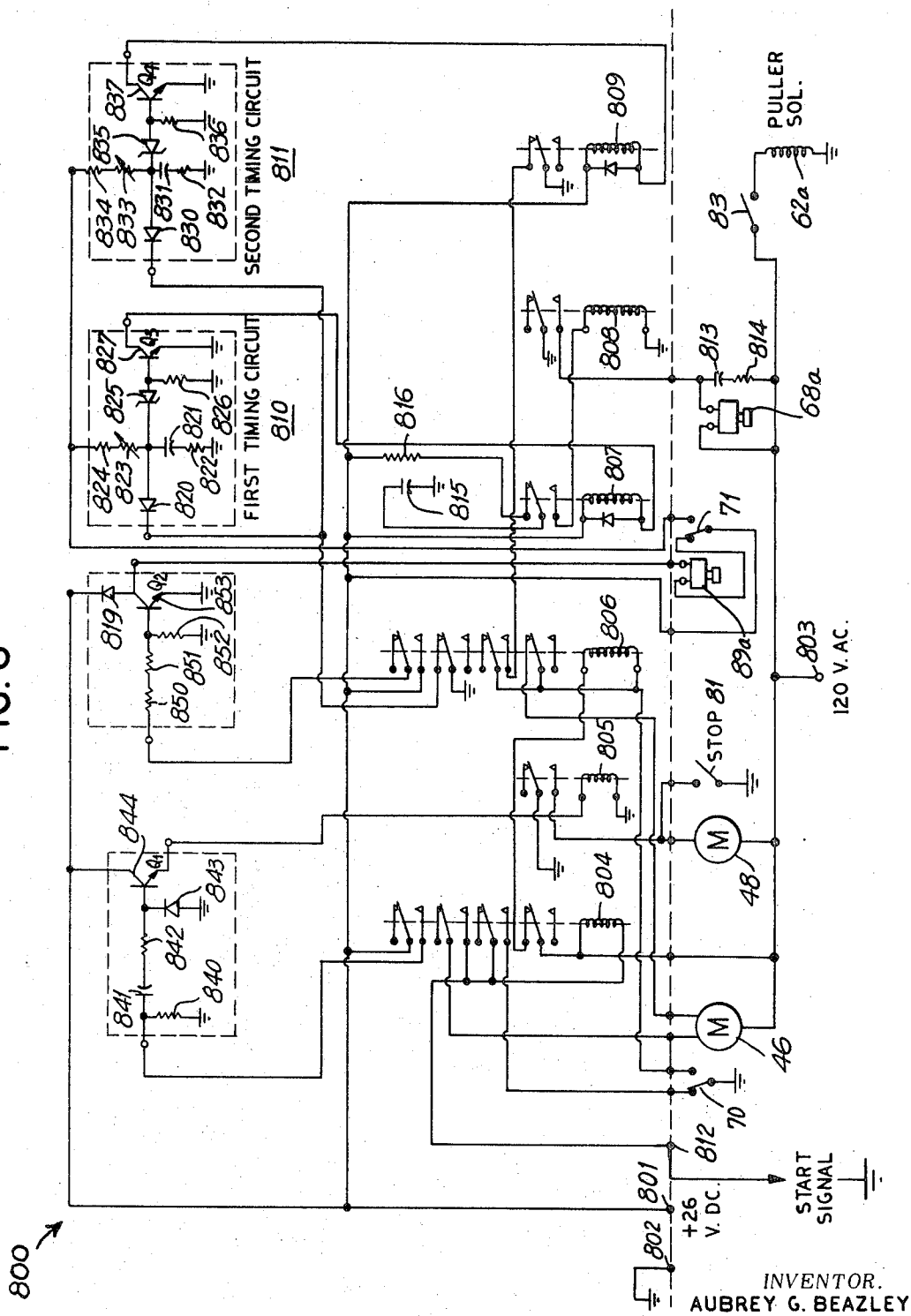
INVENTOR.
AUBREY G. BEAZLEY

FIG. 7



INVENTOR.
AUBREY G. BEAZLEY

FIG. 8



INVENTOR.
AUBREY G. BEAZLEY

FABRIC PICKUP AND TRANSFER DEVICE

This application is a continuation-in-part of copending application Ser. No. 5,809 filed on Jan. 26, 1970 and now U. S. Pat. No. 3,611,957 issued on Oct. 12, 1971.

This invention relates to an apparatus for picking up and transferring fabric workpieces, and more particularly, to an apparatus with an adhesive tape pick up which contacts a workpiece at a lower position by adhesion to the tape and rotates about a horizontal axis to transfer the workpiece from a lower position to an upper position.

In the production of garments, such as men's pants, almost endlessly repetitive sewing operations are required for a competitive manufacture of these garments. Thus, for example, in the manufacture of pants, the back pockets of pants are fashioned from a pocket blank which undergoes a number of manufacturing steps until it is incorporated into the finished pants article. During the manufacturing process, there is a need to transfer the pocket blanks from one position to another. For example, as illustrated in the above-identified patent there is the need to transfer each pocket blank individually from a lower pocket blank supply to an upper pocket blank feeding means so that each blank may be processed separately.

Several problems must be met in properly supplying fabric workpieces to a garment forming machine. For example, fabric workpieces often tend to stick together. The prior devices for separating and transferring fabric workpieces, however, share a common disadvantage of overcomplexity for the functions performed. The present invention, however, provides a simple and uncomplicated means for pick up, transfer and advancement of fabric workpieces.

In accordance with the present invention, a novel pick up and transfer device is provided which holds fabric workpieces in a stacked relationship, separates and picks up the workpieces individually, transfers the workpieces from a lower position to an upper position and advances the individual workpieces to subsequent garment forming devices. Thus, an adhesive tape is provided which extends over guide means on a rotatable unit of the device and this tape is advanced by means of properly provided gear train from one reel on the device to another so that a fresh portion of the tape is used for each pick up and transfer. A workpiece is brought into contact with the tape by means of a workpiece support table which raises all the stacked workpieces until the top workpiece contacts the tape. After contact is made, air jets are utilized to aid in separating the top workpiece from the adjacent workpiece in the stack as the stack is lowered. The tape, thus holding a single workpiece, is rotated about a horizontal axis to bring the workpiece to an upper position. During this transfer, air jets are used to aid in holding the workpiece against the transfer device. The combination of adhesive pickup properly formed support surface for the workpiece, and the use of air jets provides a reliable method of workpiece separation and insures that contact between the workpiece and transfer device continues until the workpiece is separated from the transfer device by a puller wheel at the upper position.

IN THE DRAWINGS

FIG. 1 shows an isometric view of a pocket blank forming machine utilizing the unique pick up and transfer device of the present invention;

FIG. 2 is an isometric view of the single ply pick up and transfer device of FIG. 1;

FIG. 3 shows a section 3—3 of the single ply pick up and transfer device of FIG. 2;

FIG. 3*a*, 3*b* and 3*c* show the transfer device in three positions in the transfer sequence of a single fabric ply;

FIG. 4 is a side view of the single ply pick up and transfer device with associated mechanism, air tubes and switch means as well as a stack of work plies;

FIG. 5 is a partial front view in section illustrating the pick up and transfer device mechanism associated with the advance and pick up of an adhesive tape used as the fabric pick up means;

FIG. 6 is a section view on lines 6—6 of FIG. 5 illustrating the gearing associated with the pick up means;

FIG. 7 is a top view of the pick up and transfer device of FIG. 2 with the means associated with adhesive tape pick up of the fabric ply removed; and,

FIG. 8 is an electrical control circuit for the single ply pick up and transfer device.

A complete pocket forming machine is shown in FIG. 1. The functions and operational sequence of this machine are fully described in the previously identified copending application. The functions essentially consist of simultaneously feeding a pocket blank from a transfer device **40** toward a sewing machine unit **130** and feeding a facing patch from a twist pick-up device **29** toward a mating device **100.** The mating device **100** places and facing patch on the pocket blank whereupon the patch and blank are sewn together by sewing unit **130.** Thereafter, the work blank with facing patch attached is removed from the sewing machine area by a rake device **180.** Next, the pocket blank is conveyed to a patch facing folder device **200** and thereafter sent through a pocket blank side edge folding and pressing device **250.** After the edge of the pocket blank has been folded, the pocket blank is conveyed to a pocket folder device **330** which folds the pocket blank over itself. At this point, the folded pocket blank is removed from the machine by a stacking device **370.** The portion of this pocket blank forming machine comprising the transfer device **40** will now be described in greater detail.

Device **40,** shown in FIGS. **2** through **7,** includes a workpiece support table **41** which holds a stack **72** of die cut or otherwise cut fabric workpieces. Support table **41** is supported by racks **42** which are driven vertically by pinions **43** mounted on shaft **76** driven by motor **46.** The racks **42** are guided and held from lateral movement by rack guides **44,** i.e., low friction roller bearings. When motor **46** is activated, it rotates shaft **76** thereby lifting table **41** upwardly. This upward movement is assisted by a spring **45** which is attached to the lower end of one rack **42.** The upward motion continues until the top workpiece on stack **72** contacts a tape **49.**

Tape **49** is held in a single ply pickup and transfer unit **47** which is rotated in a clockwise direction (as viewed in FIGS. 3*a*–3*c*3c) by a motor **48.** The housing **59** of transfer unit **47** is rigidly attached to a sleeve **50.** Sleeve **50** is fitted over an inner, fixed shaft **51** having a worm gear **53** attached at one end. Worm gear **53** is

mated to a gear **54** which extends through a cut-out portion **52** of sleeve **50** and is rotatably held in housing **59.** As sleeve **50** is rotated relative to shaft **51,** gear **54** follows worm gear **53** and thereby rotates. Gear **54** is fixedly attached to a pinion gear **55** which drives a tape take-up reel gear **56** which is supported in housing **59** by a shaft **56***a*. A tape take-up reel **56***b* is connected at the end of shaft **56***a* opposite gear **56.** As gear **56** is driven during the rotation of housing **59,** tape **49** is advanced from a tape supply reel **57** over the guide roller **58** and onto a tape receiving or take-up reel **56***b*. Suitable tape advance may be obtained by appropriately gearing the worm gear **53,** and take-up or tape receiving reel drive gears; gear **54,** pinion gear **55,** and take-up reel gear **56.** It has been found that a tape advance of 1/32 inch per revolution is sufficient to expose a fresh portion of tape **49** capable of securing a workpiece.

The take-up reel **56***b* and the tape supply reel **57** are placed on the opposite side of housing **59** from the take-up reel drive gear **56,** as shown in FIG. **6.** The take-up reel **56***b*, gears **54, 55, 56** and the supply reel **57** are carried by shafts which are attached to housing **59** and thereby fixedly interconnected to sleeve **50.** FIGS. **5** and **6** illustrate the relative locations of the previously descirbed gears and reels.

As shown in FIG. **2,** an extension of sleeve **50** also carries a stop cam **78,** an up air blast cam **79,** a puller cam **80** and a side air blast cam (the last cam is not shown but is similar to the others).

Upon rotation of sleeve **50,** the appropriately placed cams activate corresponding switches which include, a stop cam switch **81,** an up blast cam switch **82,** a puller cam switch **83** and a side air blast cam switch (not shown). The pick-up and transfer unit is enshrouded on one side thereof, i.e., on the side which carries the workpiece, with a sheet metal workpiece guide **60.**

A pick-up and transfer unit motor **48** is carried in an outwardly extending frame **40***a*. Activation of motor **48** causes unit **47** to transfer a workpiece of the upper position where the blank is placed over a stripper plate **69,** having a notched tappered leading edge. A double rib puller wheel **61,** located above stripper plate **69,** is activated by a puller cam **80** and switch **83** (as further explained in the discussion pertaining to the electrical control means) through a puller wheel solenoid valve activated pneumatic cylinder **95.** The puller wheel **61** then engages the workpiece thereby removing it from contact with tape **49** extending around a tape head roller **58.**

Puller wheel **61** is carried on a shaft **89** which extends between two fulcrum arms **63.** The fulcrum arms are pivotally attached at one end thereof to a shaft **85***a* and are driven constantly by a puller wheel belt **84** which extends between two pulleys **84***a* and **84***b*. Pulley **84***b* is attached to an extension of a shaft carrying one of the conveyor rollers **66.** Engagement of the puller wheel **61** with the workpiece is facilitated by a puller wheel spring **64** which urges the puller wheel **61** is caused by extension of the rod from cylinder **95.** By appropriately gearing pulleys **84***a* and **84***b*, the speed of the puller wheel **61** may be selected to provide suitable disengagement of the workpiece from tape **49.**

The operating cycle of the workpiece transfer device is initiated when motor **46** raises table **41** until the workpiece stack contacts tape **49.** The upward motion of table **41** and stack **72** continues until the stack touches a foot plate **73** having a foot plate joint **74** attached to a fulcrum arm **75.** Fulcrum arm **75** thereby pivots and actuates an up-limit microswitch **70** which causes the travel direction of table **41** to be reversed thereby lowering stack **72.**

The downward movement of table **41** is arrested when microswitch **71** is engaged by fulcrum arm **75** which is now activated by the weight of the freely suspended foot plate **73.** As previously mentioned, the stack is driven by motor **46** through shaft **76** and pinions **43.** In FIG. **4,** the housing which carries the rack guides **44** and motor **46** is identified as **77.**

When up-limit microswitch **70** is activated, a solenoid valve is also activated to direct a side air blast through a side air blast tube **89***b* affixed between portions of housing **77.** Activation of the solenoid valve is caused by the rotation of the side air blast cam (not shown) with respect to the side air blast cam switch (not shown) which are affixed to the rotating portion of the shaft **50.** The duration of side air blast can be adjusted by appropriate electrical control means. The workpiece is prevented from being blown away or blown out of position because foot plate **73** still rests against the top of stack **72** when the air blast tube **89***b* is activated. However, the air blast does help in partially separating the individual workpiece which has been contacted by the tape **49.** As previously mentioned, as soon as the up-limit microswitch **70** is activated by the fulcrum arm **75,** the table **41** continues downwardly and the top limit microswitch **71** becomes activated. Activation of microswitch **71,** through the electrical means, also deactivates the side air blast solenoid valve. However, table **41** may continue to move downwardly if suitable electrical delay is used in operating pick-up motor **46.**

At this point, a single workpiece is now attached to the tape pick-up at pick-up head roller **58** and thus the tape **49** carries the workpiece as unit **47** rotates, upwardly. The step-by-step pick-up sequence is illustrated in FIGS. **3***a* to **3***c*. Although a single ply may be attached to tape **49,** it is possible that two workpieces may still adhere to each other and be picked up together by tape **49.** A short air pulse called a delayed air blast is employed in order to ensure that no additional workpieces are picked up. This air blast is effected through a nozzle **68** and is directed along the length of the workpiece, thus separating the two workpieces should the same be stuck together. The separated workpiece then settles down on the top of stack **72** to be ready for pick up again.

The delayed air blast may be keyed to the side blast nozzle cam switch **91** with appropriate delay elements. Nozzle **68** on the holding frame **86** may be adjusted in height by moving the nozzle within the slots **86**a provided on the end member **86***b* of frame **86.**

In addition to nozzle **68,** an up air blast tube **67** may consist of a plurality of tubes or an individual nozzle placed on end member **86***b* of frame **86** to reduce the wrinkling of the workpiece as it is being pulled over the sheet metal guide **60.** The up air blast is continued while the workpiece transfer device rotates through about 90° from its pick-up position. The purpose of the up air blast is to form a drooping front edge of the single workpiece by urging the blank against the sheet metal guide **60.** As the tape **49** carries the workpiece 180° from the pick-up position, a stripper plate **69** having a notched out portion **69***a*, cooperates with a puller

wheel **61** to strip the workpiece from its contact with tape **49.**

The puller wheel **61** stays in the down position until enough of the workpiece has been advanced onto the conveyor rollers **66** such that the friction of the conveyor roller **66** is sufficient to transport the workpiece without further assistance from the puller wheel **61.** It should be noted that although puller wheel **61** has been described as being raised by cylinder **95** and lowered by spring **64,** cylinder **95** also can be a double acting pneumatic cylinder which is activated in both upward and downward direction by solenoid valve **62.**

A side guide plate **66***a* is placed over the rollers **66** at an angle slightly askewed to the direction perpendicular to the axis of rotation of rollers **66** so as to cause the rollers **66** to urge and guide the workpiece into a proper position on the sewing table.

Unit **47** continues to rotate clockwise until it reaches its bottom position whereat a new cycle can begin. A side guide **87** for table **41** is also provided to appropriately constrain the stacked workpieces as the table **41** moves up and down.

The conveyor rollers **66** are housed in a housing **93;** and are appropriately driven by chains or intergeared and driven by a motor from a power take off gear conventionally known in the art. Motors **46** and **48** are motors which exhibit instant stopping characteristics. These motors are freely available in the trade.

In reference to FIGS. **2** and **7** manual tape feed means are provided for manually winding tape **49** onto tape take-up reel **56***b*. During normal operation, a latch rod holder **96** engages a plunger latch wheel **96***a* at the end of crank **97** in such a manner as to prevent the fixed shaft **51** from rotating. When it is desired to feed the tape **49** manually, such as when installing a new reel of tape or when feeding the same around the head roller **58** and onto the take-up reel **56***b*, the small plunger latch wheel **96***a* is pulled out of the latch rod holder **96** against the restoring force of spring **96***b* and the crank **97** is rotated by hand. Shaft **51,** which is fixedly held by the crank **97,** then rotates turning worm gear **53** which drives gear **54** whithout rotating the housing **59,** (whereas normally, the worm gear **54** is driven around the worm **53**). A control panel, which houses the electrical and pneumatic control devices associated with the single ply pick-up and transfer device, is identified by **94.**

ELECTRICAL CONTROL MEANS

The electrical control circuit for the single ply workpiece pickup and transfer device **40** described above is illustrated as **800** in FIG. **8.** The manner in which control circuit **800** operates will now be explained by describing what happens at each step in its operating cycle.

Initial Conditions Prior to Start of Operating Cycle

Standard alternating current is applied to AC power terminal **803** and ground terminal **802.** 26 volts DC is applied between DC power terminal **801** and ground terminal **802.** The following conditions exist:

1. The stack holder table **41** is in a down position, causing down limit switch **71,** and up limit switch **70,** to assume the respective positions shown.
2. Relays **804, 805, 806, 807, 808,** and **809** are de-energized.
3. Diodes **820** and **830,** of first delay circuit **810** and second delay circuit **811,** respectively, are grounded through relay **806.** This places both delay circuits in a hold mode as follows:
   a. Capacitors **821** and **831** are by-passed to ground through diodes **820** and **830,** respectively.
   b. Zener diodes **825** and **835** are thus non-conductive.
   c. Transistors **827** and **837** are biased into non-conduction by resistors **826** and **836,** respectively.

Start of Operating Cycle

The operating cycle is initiated by completing the ground path to start terminal **812.** This is accomplished through the output terminal of another electrical control circuit, as described in the aforementioned co-pending application.

This provides a ground path for the coil of relay **804,** causing it to energize and latch through the up-limit microswitch **70.** The following then occurs:

1. The "up" winding of motor **46** is energized through relay **804,** causing the stack holder table **41** to travel up. As the stack **72** rises, down limit switch **71** is mechanically actuated, causing it to assume its respective position.
2. Transistor **844,** which is normally biased into non-conduction by diode **843,** is caused to conduct momentarily by a drive pulse through the pulse network composed of resistor **840,** capacitor **841** and resistor **842.** This momentarily energizes relay **805,** which is the emitter path of transistor **844.**
3. Workpiece transfer motor **48** is momentarily energized through relay **805.** The momentary rotation of workpiece transfer motor **48** mechanically actuates stop cam switch **81,** causing it to close, thereby energizing workpiece transfer motor **48.**
4. After ½ revolution of workpiece transfer motor **48,** puller cam switch **83** is momentarily mechanically actuated causing it to momentarily close. Puller solenoid valve **62***a* is thereby momentarily energized, causing the workpiece ply to be transferred away.
5. After one revolution of workpiece transfer motor **48,** stop cam switch **81** is mechanically actuated causing it to open, thereby deenergizing workpiece transfer motor **48.**

Stack Contacts Tape

When the stack contacts the tape, up-limit switch **70** is mechanically actuated, causing it to assume its up position, with the following results:

1. Relay **804** is de-energized, thereby de-energizing the "up" winding of pickup motor **46.**
2. Relay **806** is energized through the up-limit switch **70,** and latches to ground through relay **809,** with the following results:
   a. The "down" winding of pickup motor **46** is energized through relay **806,** causing the stack to travel down.
   b. Transistor **853,** normally biased into non-conduction by resistor **852,** is driven into conduction through resistor **840** and **851,** and relay **806.**
   c. Side air blast solenoid valve **89***a*, in the collector path of transistor **853,** is energized.

d. Diodes **820** and **830,** of first delay circuit **810** and second delay circuit **811,** respectively, are ungrounded. Both delay circuits remain in hold conditions, pending actuation of down limit switch **71,** which will provide DC voltage to the delay circuits.

Stack's Downward Travel Actuates Down Limit Switch

As the stack travels down, the down limit switch **71** is mechanically actuated, causing it to assume its respective position, with the following results:

1. Side air blast solenood voave **80***a* is de-energized. Diode **819** prevents transistor **853** from being damaged by the back e.m.f. generated when side air blast solenoid valve **89**a is de-energized.
2. 26 volts DC is applied to resistors **824** and **834,** of first delay circuit **810** and second delay circuit **811,** respectively. This causes both delay circuits to be energized as follows:
   a. Resistor **824,** variable resistor **823,** capacitor **821** and resistor **822** form a first series RC circuit. Resistor **834,** variable resistor **833,** capacitor **831** and resistor **832** form a second series RC circuit. **26** volts DC is applied to both series RC circuits through down limit switch **71.**
   b. Capacitors **821** and **831** charge at rates which are adjustable by variable resistors **823** and **833,** respectively. Component values are selected so that the time constant of the first series RC circuit is shorter than the time constant of the second RC circuit, thereby causing capacitor **821** to charge faster than capacitor **831.**

End of First Delay Interval

After a period of time, corresponding to that required for capacitor **821** to charge until the voltage at the junction of capacitor **821** and zener diode **825** equals the zener voltage of zener diode **825,** first delay circuit **810** switches as follows:

1. Zener diode **825** conducts, providing base drive to transistor **827.**
2. Transistor **827** assumes a conducting state causing relay **807,** in its collector path, to energize with the following results:
   a. Capacitor **815,** which was previously charged through resistor **816,** is connected to the coil of relay **808.** This momentarily energizes relay **808.**
   b. Delayed air blast solenoid valve **68***a* is momentarily energized through relay **808,** producing the delayed air blast referred to hereinbefore. Capacitor **813** and resistor **814** form an arc suppressing circuit to protect the contacts of relay **808.**

End of Second Timing Interval

After a period of time, corresponding to the time required for capacitor **831** to charge until the voltage at the junction of capacitor **831** and zener diode **835** equals the zener voltage of zener diode **835,** second delay circuit **811** switches as follows:

1. Zener diode **835** condudts, providing base drive to transistor **837.**
2. Transistor **837** assumes a conducting state causing relay **809,** in its collector path, to energize.
3. The ground path to the coil of relay **806** through relay **809** is opened, causing relay **806** to de-energize.
4. Diodes **820** and **830,** of first delay circuit **810** and second delay circuit **811,** respectively, are grounded. This causes both delay circuits to reset as follows:
   a. Capacitors **821** and **831** discharge through diodes **820** and **830,** respectively.
   b. Zener diodes **825** and **835** thus return to their non-conducting states.
   c. Having no base drive, transistors **827** and **837** return to their non-conducting states, causing relays **807** and **809** to de-energize. Diodes **817** and **818** prevent transistors **827** and **837,** respectively, from being damaged by the back e.m.f. generated when relays **807** and **809** de-energize.

All circuits have thus returned to their initial conditions, marking the completion of one operating cycle of the workpiece blank pickup and transfer.

What is claimed is:

1. An apparatus for providing individual work pieces comprising, means for holding a stack of work pieces in a supply position including means for raising and lowering said holding means, rotatable transfer means positioned above said holding means for transferring said work piece from a surface down position to a surface up position including adhesive means for adhesive contact with a work piece operatively interconnected with said transfer means, said adhesive means comprising an adhesive tape and said transfer means comprising, a housing pivotally supported about a horizontal axis, a plurality of reels for supporting and receiving said adhesive tape rotatably supported on said housing, means for guiding said adhesive tape to a periphery of said transfer means, and means for advancing said adhesive tape between said reels;

means for directing a first blast of air along the sides of said holding means and towards the uppermost work piece on said stack and means for directing a second blast of air towards the uppermost work piece on said stack adjacent said adhesive means to insure separation of said uppermost work piece from the next piece in the stack;

means for rotating said transfer means about a horizontal axis, means for supporting a work piece on said transfer means, and means for disengaging a work piece from adhesive contact with said adhesive means.

2. An apparatus as described in claim **1** including means for controlling and cycling said apparatus.

3. An apparatus as described in claim **1** and wherein said means for holding a stack of workpieces comprises a vertically positionable table, and wherein said means for raising and lowering said holding means comprises, at least one rack attached to said table, an intermediate gear mated to each rack, and reversible driving means for rotating said intermediate gear.

4. An apparatus as described in claim **1** and wherein said means for disengaging a workpiece from adhesive contact with said adhesive means comprises, a plate having a tapered edge and having a notch on said tapered edge, a puller wheel vertically positionable adjacent said notch, and means for positioning said puller wheel.

5. An apparatus for providing individual work pieces comprising, means for holding a stack of work pieces in a supply position including means for raising and lowering said holding means, rotatable transfer means positioned above said holding means including adhe-

sive means for adhesive contact with a work piece operatively interconnected with said transfer means, means for rotating said transfer means about a horizontal axis, means for supporting a work piece on said transfer means, means for disengaging a work piece from adhesive contact with said adhesive means, and means for controlling and cycling said apparatus; said means for controlling and cycling said apparatus including an electrical circuit which comprises:

a. means for sensing a raised position of said stack of work pieces;

b. means, responsive to said means for sensing a raised position, for directing a blast of air towards the sides of said holding means and towards the uppermost work piece on said stack;

c. means for energizing said means for rotating said transfer means responsive to said means for sensing a raised position;

d. means for energizing said means for lowering said holding means operatively interconnected to said means for sensing a raised position;

e. means for sensing a lowered position of said stack of work pieces;

f. first delay means operatively interconnected to said means for sensing a lowered position;

g. means, operatively interconnected with said first delay means, for directing a blast of air towards the top of the stack along the side thereof adjacent said adhesive means;

h. means for activating said means for disengaging a work piece operatively interconnected to said means for rotating;

i. means for energizing said means for raising said holding means operatively interconnected to said means for sensing a lowered position; and

j. second delay means operatively interconnected to said means for sensing a lowered position for returning said electrical circuit to its initial conditions.

6. An apparatus for furnishing workpieces comprising:

a. a frame;

b. a vertically movable workpiece supply table slidably mounted on a lower portion of said frame, said supply table having a plurality of vertically positioned racks attached thereto;

c. a supply table drive motor having an extended drive shaft, said drive shaft having a plurality of pinion gears mounted thereon in engagement with said racks;

d. a horizontal tubular shaft rotatably mounted on said frame above said supply table, including drive means for rotating said tubular shaft about its longitudinal axis;

e. a housing rigidly attached to said tubular shaft, said housing having an adhesive tape supply reel, an adhesive tape receiving reel and an adhesive tape guide roller rotatably mounted thereon in mutual planar relationship, and said guide roller positioned at the periphery of said housing;

f. an inner shaft rotatably mounted within said tubular shaft and extending therefrom, said inner shaft having a worm gear at one end thereof and a crank at the other end thereof;

g. a manually releasable latch mounted on said housing and engagable with said crank;

h. a first reel drive gear axially connected to said adhesive tape receiving reel;

i. a second reel drive gear rotatably mounted on said housing and interconnected to said first gear;

j. a third reel drive gear axially connected to said second gear and interconnected to said worm gear on said inner shaft;

k. a workpiece stripper plate attached to said frame above said tubular shaft and said housing, said stripper plate having a beveled edge and a notch in said beveled edge;

l. a rotatable puller wheel pivotally mounted on said frame above said stripper plate;

m. conveyor means for advancing a workpiece away from said stripper plate and for driving said puller wheel;

n. means for controlling and cycling said apparatus;

o. a workpiece supply position sensor positioned above said supply table including a fulcrum arm having a suspended plate attached to one end thereof, and two microswitches vertically positioned on alternate sides of the other end of said fulcrum arm, said microswitches operatively interconnected to said means for controlling and cycling said apparatus;

p. at least one side air blast jet horizontally mounted on said frame and directed toward said supply table, said side air blast jet operatively interconnected to said means for controlling and cycling said apparatus;

q. at least one up air blast jet mounted on said frame and directed toward said housing, said up air blast jet operatively interconnected to said means for controlling and cycling said apparatus;

r. a pneumatic cylinder attached to said frame and having a vertically positioned piston rod interconnected with said puller wheel, said pneumatic cylinder operatively interconnected to said means for controlling and cycling said apparatus;

s. at least one cam attached to said tubular shaft; and,

t. a cam switch mounted on said frame for each cam, said cam switch operatively interconnected to said means for controlling and cycling said apparatus.

* * * * *