March 20, 1962 E. C. PFEFFER, JR 3,026,109

AUTOMATIC FEED DEVICE

Filed June 27, 1960 3 Sheets-Sheet 1

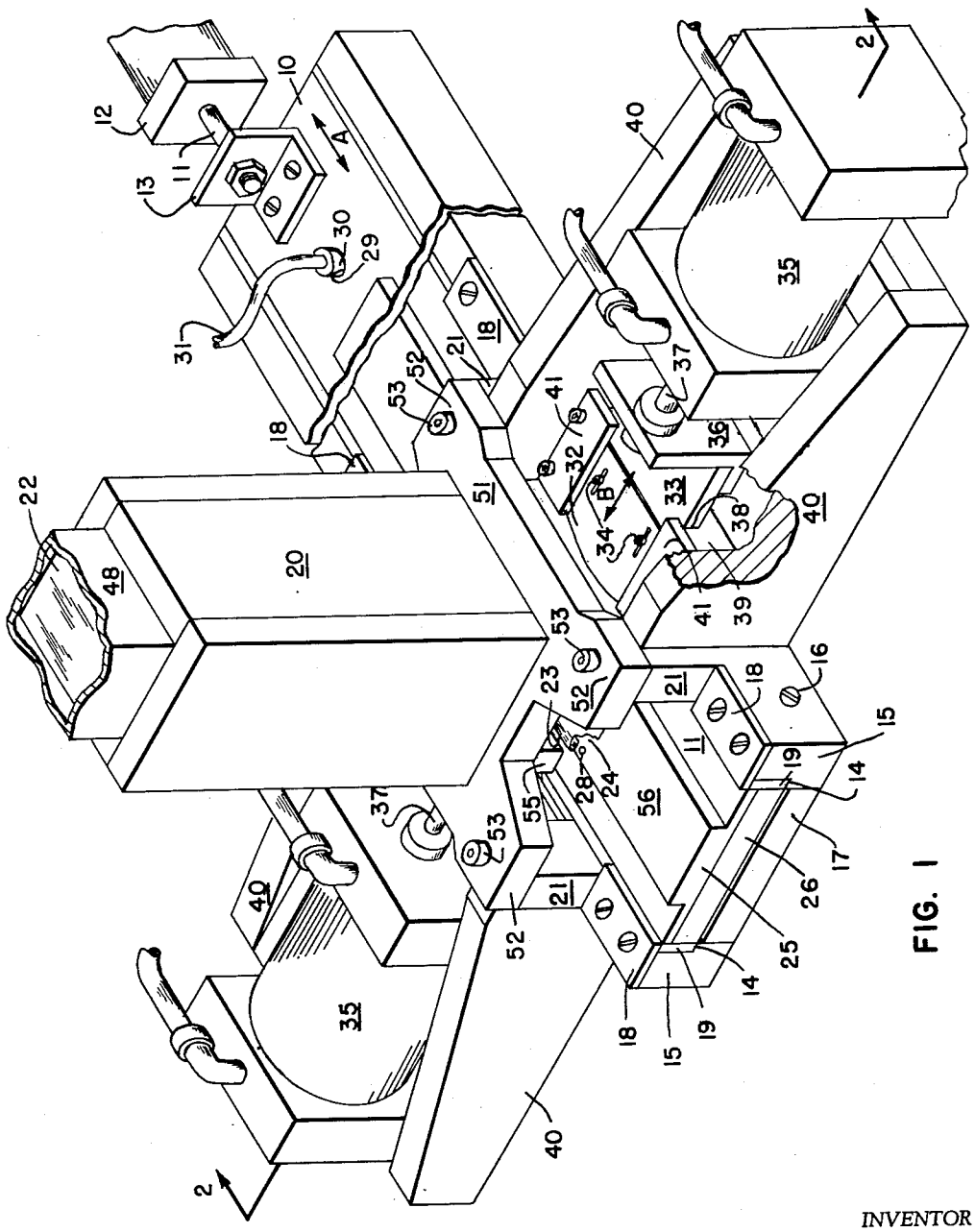


FIG. 1

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March 20, 1962 E. C. PFEFFER, JR 3,026,109

AUTOMATIC FEED DEVICE

Filed June 27, 1960 3 Sheets-Sheet 2

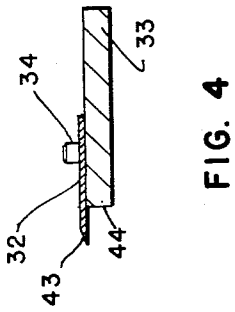
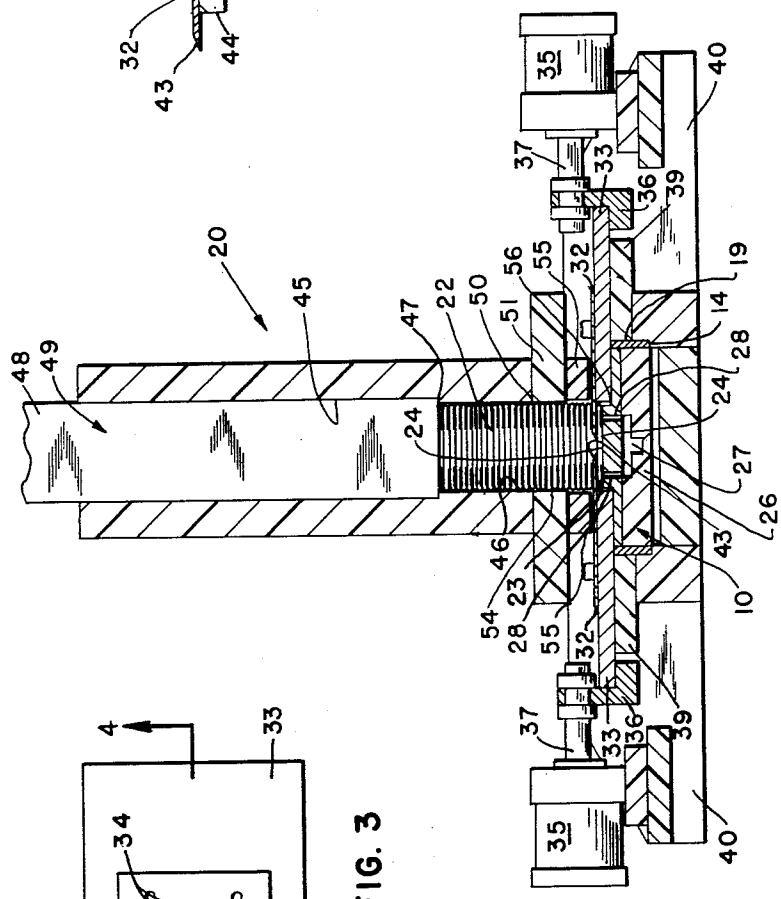


FIG. 4



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AUTOMATIC FEED DEVICE

Filed June 27, 1960 3 Sheets-Sheet 3

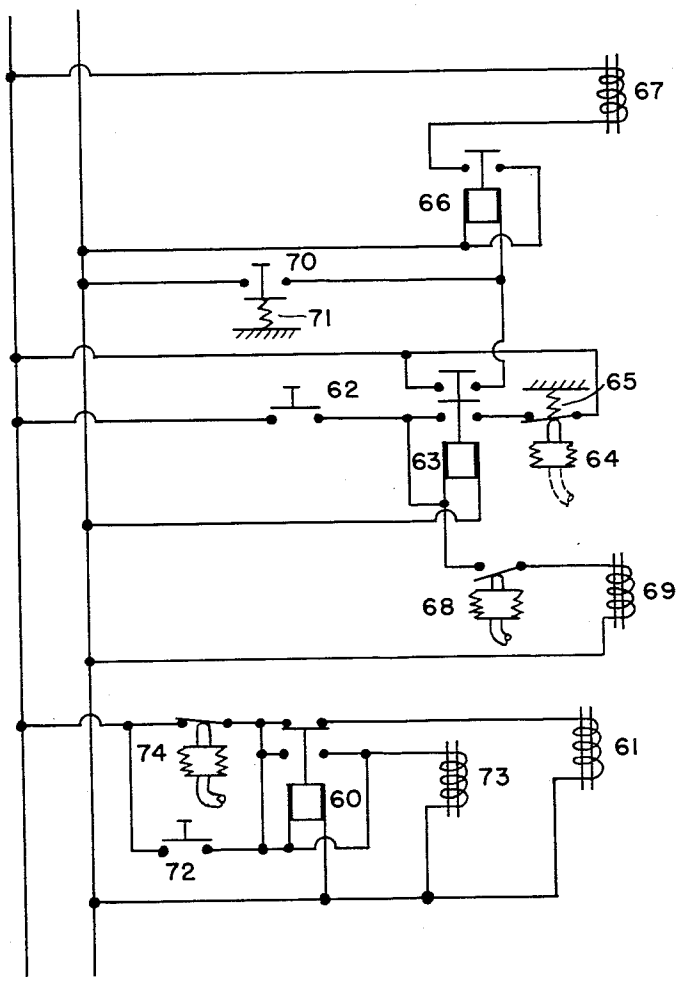


FIG. 5

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AUTOMATIC FEED DEVICE

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This invention relates to a device for automatic feed of cloth pieces.

Presently known devices feeding cloth pieces generally operate by working a supply stack of these pieces from the top down. This is undoubtedly because unlike a solid or inflexible material such as metal, the pieces of cloth cannot readily be removed by being scraped from the bottom of the supply stack since pressure of the scraping member would only cause buckling and crinkling of the cloth.

However, despite the extreme care that must be exercised in the handling of cloth, the feed device of the present invention successfully operates feeding individual cloth pieces from the bottom of a supply stack. As will be more fully explained subsequently, this is accomplished using a suction pressure and a separating blade means. Thus the feed device of the present invention possesses several noteworthy advantageous features. First, it is more satisfactory from the viewpoint of providing continuous operation since it can be loaded with an additional supply stack without interrupting operation as the stack being worked upon nears depletion. Second, after the bottom cloth piece of the stack is removed, the next piece comes into the feed position taking advantage of gravity feed.

In the feed device embodying the teachings of the present invention, the cloth pieces to be fed are supplied in a stack and suction pressure is applied against the bottom of this stack. Responsive to this suction pressure, the bottom cloth piece assumes a position below a prescribed plane. A separating blade means is provided that operates in this prescribed plane, and after the bottom cloth piece has assumed its position below this plane, this blade means is inserted into the stack. Thus, this blade means separates the bottom cloth piece from the remaining cloth pieces and provides support for these remaining cloth pieces while removal and feed of the bottom cloth piece is carried out.

In an embodiment of the feed device of the present invention which is especially adapted to feed cloth labels, this separating blade means consists more particularly of two blades, each mounted on a reciprocating slide. These slides are located on opposite sides of an upstanding magazine unit which is loaded with a stack of labels. This magazine is mounted above a main slide which has a deposit surface to receive successive bottom labels of the stack, the label stack being slideable vertically within the magazine bringing the bottom label in contact with this deposit surface. The slides on opposite sides of the magazine are moved towards each other to insert the separating blades into the stack and as previously mentioned, thereby isolate the bottom label from the remaining labels of the stack. Besides supporting the separating blades, these slides also function to orient or position each label to be fed in the same manner on the previously referred to deposit surface prior to feeding. This is done by making the width of the deposit surface slightly smaller than the width of the labels so that the side edges of the label resting on the deposit surface overhang the edges of this surface. The extent of movement of the slides towards each other is limited to that where the distance between their leading edges just equals the width of a label. Thus, if the overhang of the bottom label is too far to one side, the leading edge of the slide approaching the stack from this side engages this edge of the label and centers the label on the deposit surface. Thus each label is made to assume the same oriented position on the deposit surface prior to being fed, thereby greatly facilitating later handling and processing of the label.

It is a prime object of the present invention to provide a device which successfully individually feeds cloth pieces from the bottom of a supply stack.

A further object is to provide a feed device handling stacks of cloth pieces, these stacks being successively loaded in the device for feeding without the need to interrupt operation.

Another object is to provide a feed device which takes advantage of gravity feed to move each unit to be fed into the feed position.

A still further object is to provide an automatic feed device for cloth labels, these labels being placed in the feed device in a vertical stack and efficiently fed one at a time.

A more particular object is to provide a label feeding device which feeds these labels in an oriented condition, thereby greatly facilitating later handling and processing of the labels.

Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein:

FIG. 1 is a perspective elevation of the feed device of the present invention;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is a partial plan view of a separating blade assembly;

FIG. 4 is a section taken along the line 4—4 of FIG. 3; and

FIG. 5 is a schematic electrical circuit diagram.

Illustrated in the drawings is a feed device constructed according to the teachings of the present invention and especially adapted to feed cloth labels. These labels are loaded in the feed device and individually fed to a processing station which will be understood to be to the left of the device as shown in FIG. 1. At the processing station the label is then attached to the yoke of a shirt body.

Each label is carried to the processing station on a main slide **10**. A piston arm **11** of an air motor **12** is connected to a bracket **13** mounted at one end of main slide **10**, and operation of air motor **12** reciprocates slide **10** along the path denoted by the arrow designated by the letter A. Main slide **10** is moved along the path A in guideways **14** machined in a pair of side plates **15** which are connected by screws **16** in upright position along opposite sides of a flat base plate **17**. Plates **18** connected to the tops of side plates **15** extend over main slide **10** and keep this slide within the guideways **14**. Strips **19**, preferably of high wear resistant material, are connected to opposite sides of main slide **10** and ride in the guideways **14**.

The labels being individually carried by main slide **10** to the processing station are fed onto this slide through an upstanding hollow magazine **20**. This magazine is mounted in an elevated position above main slide **10** on projections **21** machined in the side plates **15**. More particularly, a stack of labels **22** is loaded in magazine **20** and falls by gravity onto the main slide **10**. This brings bottom label **23** of this label stack in contact with a deposit surface **24** on the main slide **10**.

In accordance with the teachings of the present invention a suction pressure is applied through the deposit surface **24** against bottom label **23** to firmly draw this label against this surface. Thus main slide **10** is con-

structed by assembling an upper plate 25 to a lower plate 26, and as best seen in FIGURE 2, lower plate 26 is provided with a channel 27. This channel starts below the deposit surface 24 and extends rearwardly to a point just forward of the bracket 13. Spaced along the marginal edges of the deposit surface 24 are a plurality of small bores 28 which extend into the channel 27. A larger bore 29 is extended into the other end of channel 27 and an outlet fixture 30 of a flexible hose 31 is seated in this bore. Hose 31 will be understood to be connected to a vacuum producing means (not shown) which when operated applies a suction pressure through the hose 31, channel 27, and through the small bores 28 of the deposit surface 24.

When subjected to suction pressure, the bottom label 23 is drawn firmly against deposit surface 24 and thus assumes a position below a prescribed plane. Stated otherwise, the suction pressure removes the resiliency inherent in the cloth of which label 23 is made so that its height measures an exact dimension. This dimension will be understood to be 30 mils. Thus in the illustrated embodiments, the so-called prescribed plane is that plane which measured from the deposit surface 24 is above this surface by 30 mils.

Arranged to operate or to be reciprocated back and forth within this prescribed plane and along the path denoted by the arrows designated by the letter B are a pair of identically constructed separating blades 32. Each of these blades is mounted securely on the forward end of a slide 33 by screws 34, and these slides are reciprocated towards and away from each other by a pair of air motors 35. Thus each slide 33 has a bracket 36 at one end to which the piston arm 37 of each air motor 35 is connected. Further, each slide 33 rides in a guideway 38 formed in the top surface of a plate 39 which is connected to side plate 15 and is supported in a horizontal elevated position between a pair of side plates 40. Plates 41 are connected along the marginal edges of each plate 39 and extend over each slide 33 to keep these slides within the guideways 38.

Thus when the air motors 35 are operated to move the slides 33 towards each other this results in insertion of the blades 32 from opposite sides into the label stack 22. This movement of the slides 33 is initiated by an appropriate signal to the air motors 35 after the bottom label 23 is induced by suction pressure to assume a position below a prescribed plane, and thus insertion of the blades 32 into stack 22 in this prescribed plane results in physical separation of the bottom label 23 from the remaining labels of this stack. In this regard, the plane in which the blades 32 enter the stack 22 is a function of the height of each slide 33, and therefore each of the slides is accurately machined so that its top surface is higher than the deposit surface 24 by exactly 30 mils.

To facilitate entry or insertion of each blade 32 into the stack 22, each blade should be made of a smooth metal, such as steel, so that frictional resistance is minimized. Additionally, the leading edge 42 of each blade should be tapered, as at 43, and should be cut away at an angle of preferably 30 degrees. It is also desirable that only the tip of each blade extend beyond the leading edge 44 of each slide. This leaves little of the blade unsupported and minimizes the tendency of the blades to bend out of the prescribed plant of operation.

As best seen in FIG. 2, the hollow magazine 20 has an upper section 45 which is slightly larger than its lower section 46 and thereby forming an internal ridge 47 part way down the magazine. In practice, the label stack 22 is supplied in a box 48 and this box is loaded through the magazine top opening 49 and forced down the magazine until ridge 47 is engaged. From this point on, only the label stack 22 descends through the lower section 46 passing through the magazine lower end opening 50 onto the deposit surface 24. A mounting plate 51 connected to the underside of the magazine 20 retains this magazine in a vertical position to take full advantage of gravity feed of the label stack 22 onto the deposit surface 24. Mounting plate 51 has ears 52 which fit on each of the side plates projections 21 and are secured to these projections by screws 53. An opening 54 is provided in plate 51 in the same size as, and in vertical alignment with the magazine bottom end opening 50 to permit passage of the labels 22 to deposit surface 24. To accurately guide the labels 22 onto the deposit surface 24 a pair of guide members 55 are connected to the underside of mounting plate 51 on opposite sides of the opening 54.

Referring to FIGURES 1 and 2, it will be noted that deposit surface 24 is part of the surface area of a raised section 56 on main slide 10 and that the width of this section is slightly smaller than the width of the labels being fed. As a result, the side edges of bottom label 23 resting on deposit surface 24 overhang the edges of section 56. The slides 33, when moved towards each other to insert the blades 32 into the stack 22, are brought together only to the extent where the distance between the leading edges 44 of these slides equals the width of the labels. Thus, if the overhang of bottom label 23 is too far to one side, the leading edge 44 of the slide 33 approaching the stack 22 from this side engages this edge of the label and centers this label on deposit surface 24. Thus each bottom label 23 either naturally assumes or is made to assume the same oriented position on deposit surface 24 prior to being fed, thereby greatly facilitating later handling and processing of this label.

At the start of a cycle of operation, the condition of the apparatus is as shown in FIGURE 1. That is, label 23 is resting on the slide deposit surface 24 and the separating blades 32 are not yet inserted into the label stack 22. The cycle is started by applying a suction pressure through the flexible hose 31, the channel 27, and the bores or ports 28 against the bottom label 23. This draws this label against the deposit surface 24 forcing it to assume a position which is below the contemplated plane of insertion of the blades 32.

Upon an appropriate signal, the air motors 35 are then simultaneously operated resulting in the insertion of the blades 32 from opposite directions into the label stack 22. The blades 32 enter the stack 22 above the bottom label 23 and below the next superposed label. Thus, the blades 32 separate the bottom label 23 from the remaining labels of the stack 22 and further provide support for these remaining labels. Bottom label 23 is then transferred by sliding movement of the main slide 10 from beneath the stack 22 to a processing station. During this time the suction pressure is maintained on the label 23. However, when the processing station is reached, which preferably is at the end of the stroke of the main slide 10, this suction pressure is expeditiously transferred to a surface of the processing machinery (not shown). This surface will be understood to be located in close proximity to the deposit surface 24 so that the transferred suction pressure removes label 23 from the deposit surface 24. The main slide 10 is then fully retracted placing the deposit surface 24 again beneath the label magazine 20. At this time, the blades 32 are withdrawn and the cycle of operation as just described is repeated.

The controls for operating the feed device of the present invention in the manner just described will now be explained in connection with the circuit diagram shown in FIG. 5. Utilized in this circuit are solenoid valves of the type having two operative positions and operating such that one operative position is assumed under the biasing force of a suitable spring except when the valve is energized into its other operative position.

As previously indicated, the cycle of operation is started when a suction pressure is applied through the slide deposit surface 24. The application of this suction pressure is controlled by a relay 60, which relay

when in the inoperative condition illustrated functions to complete an electrical circuit through an upper closed pair of contacts including the coil of a solenoid valve **61**, thereby operating this valve. The operation of valve **61** will be understood to be such as to apply the suction pressure of a vacuum producing means through the ports **28** of the deposit surface **24**.

The insertion of the blades **32** is then initiated by depressing push button **62** which completes an electrical circuit including the coil of a relay **63**, thereby energizing this relay. Relay **63** has two normally open pairs of contacts.

The closing of the lower pair of contacts of relay **63** completes a circuit through a vacuum pressure actuated switch **64** held normally closed by a spring **65**. This completed circuit maintains relay **63** operative even when push button **62** is subsequently released and opens. In other words, relay **63** is maintained closed until the vacuum pressure which operates switch **64** is sufficient to overcome the urgency of its spring **65** to thereby break this holding circuit. It will soon be explained when during the cycle of operation this occurs.

The closing of the upper pair of contacts of relay **63** completes an electrical circuit including the coil of a relay **66**, thereby energizing this relay. When relay **66** closes this completes an electrical circuit including the coil of a solenoid valve **67**, thereby operating this valve. The operation of valve **67** will be understood to be such as to admit high pressure air into the air motors **35** so as to cause extension of the piston arms **37** and thus insertion of the blades **32** into the vertical label stack **22**.

When the piston arms **37** of the air motors **35** are fully extended, it is anticipated that pressure will build up in a common inlet line to these air motors and that this pressure build-up will be transmitted to a pressure switch **68**, thereby causing this switch to close. The closing of pressure switch **68** completes an electrical circuit including the coil of a solenoid valve **69**, thereby operating this valve. The operation of valve **69** will be understood to be such as to admit high pressure air into the air motor **12** causing sliding movement of main slide **10** and thus removal of the bottom label **23** then on the slide deposit surface **24** from a position beneath the stack **22** to the processing station. As a result of movement of slide **10**, a switch **70** which is held open by this slide in its retracted position is permitted to close under the urgency of a spring **71** thereby completing a holding circuit for the relay **66**. Thus, even though relay **63** should subsequently drop out, relay **66** is maintained operative through the holding circuit including the now closed switch **70** to insure that valve **67** is maintained operative and that the blades **32** remain in position to support the vertical stack **22**.

When the piston arm **11** of air motor **12** is fully extended it is adapted to close a switch **72**. The closing of this switch completes an electrical circuit including the coil of the previously mentioned relay **60**, thereby operating this relay. As previously explained, when relay **60** is inoperative it permits the energizing of the solenoid valve **61** to the end of applying a suction pressure through the deposit surface **24** of the slide **10**. However, when it is now operated, the effect is to break the electrical circuit for valve **61** and to simultaneously complete an electrical circuit operating a solenoid valve **73**. The operation of valve **73** will be understood to be such as to transfer the suction pressure from the slide deposit surface **24** to a suitable lifting surface associated with the processing machinery in a position above deposit surface **24** at the end of the stroke of the main slide **10**. This transferred suction pressure removes the label **23** from the slide deposit surface **24**. Relay **60** will remain operative through a holding circuit including a pressure switch **74** even after switch **72** is released by the withdrawal of main slide **10** and subsequently opens.

When the suction pressure builds up in the processing machinery, it is at this time anticipated that the vacuum switch **64** will be operated and break the holding circuit for relay **63** causing this relay to drop out. The dropping out of relay **63** breaks the electrical circuit for the solenoid valve **69** with the result that this valve under the urgency of a spring moves to its operative position wherein it directs high pressure air into the air motor **12** so as to cause retraction of the slide **10**. It will be noted that despite the fact that relay **63** has dropped out, relay **66** is nevertheless maintained operative through its holding circuit including the closed switch **70** and thereby maintains valve **67** operative so as to keep the blades **32** in position to support the vertical stack **22**.

While slide **10** is returning to its retracted position it will be understood that operation of the processing machinery is in progress to accomplish attachment of the label **23** to the yoke of a shirt. Part of this operation involves movement of the surface of the processing machinery which carries label **23** against the yoke of a shirt. This movement is accomplished using an air motor and when completed results in a pressure build up in this air motor. This pressure build up is transmitted to pressure switch **74** and results in the opening of this switch. The opening of switch **74** breaks the holding circuit maintaining relay **60** operative and causes this relay to drop out. This has the result of transferring the suction pressure from the lifting surface of the processing machinery back to the slide deposit surface **24** in preparation for the next cycle.

When the slide **10** eventually returns to its fully retracted position, switch **70** is then opened and the holding circuit maintaining relay **66** operative is broken. Thus, this relay drops out with the result that valve **67** under the urgency of its spring moves to its operative position wherein it directs high pressure air into the air motors **35** so as to cause retraction of the blades **32** which then completes the cycle of operation.

It will be understood that the feed device of the present invention is not to be limited to the construction and arrangement of parts shown but that modifications may be made within the invention as defined by the claims.

I claim:

1. In a feed device for cloth pieces, an upstanding member having a hollow interior within which cloth pieces are disposed in a vertical stack and having an opening in its bottom end, a first horizontally slidable means disposed beneath said upstanding member and having a deposit surface thereon in communication with the bottom end opening of the upstanding member, means producing a suction pressure operatively connected to the first means to apply a suction pressure through said deposit surface for drawing the bottom cloth piece of the stack against this deposit surface, and a pair of second slideable means each arranged to be slideably inserted from opposite directions into said stack immediately above the bottom cloth piece to separate this cloth piece from the remaining cloth pieces of the stack and to support these remaining cloth pieces while the first slideable means is operated to feed the bottom cloth piece.

2. In a feed device for cloth pieces, an upstanding member having a hollow interior within which cloth pieces are disposed in a vertical stack and having an opening in its bottom end, a first slideable means disposed substantially perpendicularly of said upstanding member and having a raised centrally located deposit surface thereon in communication with the bottom end opening of the upstanding member, said deposit surface having a width just slightly less than the width of the cloth pieces to be fed, means producing a suction pressure operatively connected to the first means to apply a suction pressure through said deposit surface for drawing the bottom cloth piece of the stack against this deposit surface, a pair of second slideable means each arranged to be slideably moved from opposite directions towards the stack such that the forward edges thereon are adapted to engage

and thereby center the bottom cloth piece then on the deposit surface, and a blade connected to each second slideable means and adapted when said slideable means are moved towards each other to be inserted into the stack immediately above the bottom cloth piece to separate this cloth piece from the remaining cloth pieces of the stack and to support these remaining cloth pieces while the first slideable means is operated to feed the bottom cloth piece.

3. The combination as claimed in claim 2 wherein the forward edge of each blade is tapered and the opposite side portions thereof are preferably cut away at an angle of 30 degrees.

4. In a feed device for cloth pieces, an upstanding member having a hollow interior within which cloth pieces are disposed in a vertical stack and having an opening in its bottom end, a first slideable means disposed substantially perpendicularly of said upstanding member and having a raised centrally located deposit surface thereon in communication with the bottom end opening of the upstanding member, said deposit surface having a width just slightly less than the width of the cloth pieces to be fed and having a plurality of ports spaced along its edges, means producing a suction pressure operatively connected to the first means to apply a suction pressure through the spaced ports of the deposit surface for drawing the bottom cloth piece of the stack against this deposit surface, a pair of second slideable means each arranged to be slideably moved from opposite directions towards the stack such that the forward edges thereon are adapted to engage and thereby center the bottom cloth piece then on said deposit surface, and a pair of blades each having a tapered forward edge and a generally triangular shape and each connected to a second slideable means and adapted when said slideable means are moved towards each other to be inserted into the stack immediately above the bottom cloth piece to separate this cloth piece from the remaining cloth pieces of the stack and to support these remaining cloth pieces while the first slideable means is operated to feed the bottom cloth piece.

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