

Oct. 22, 1968

R. R. WALTON

3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 1

Fig. 1

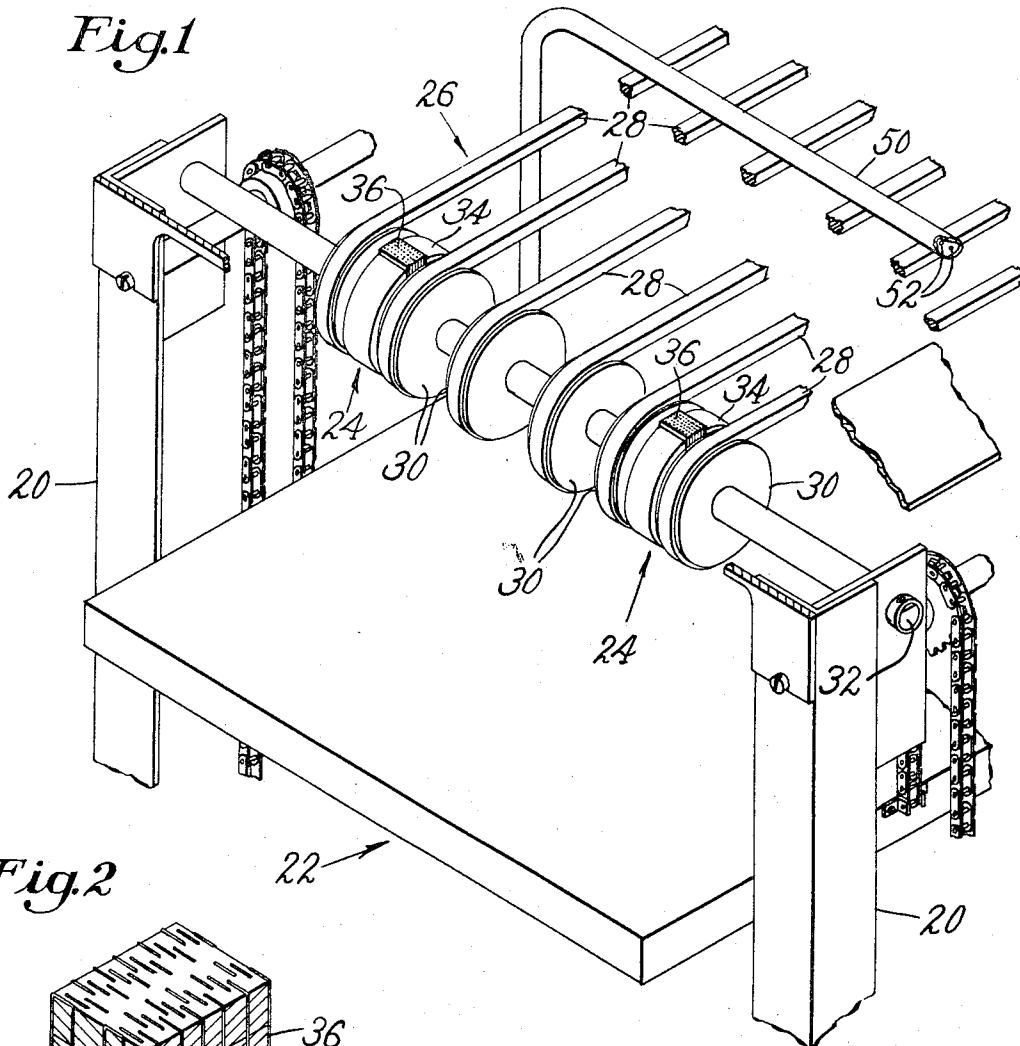


Fig. 2

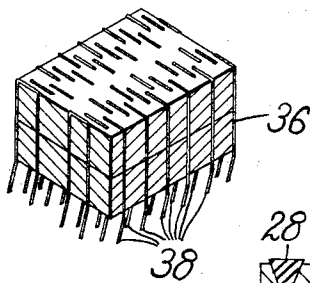
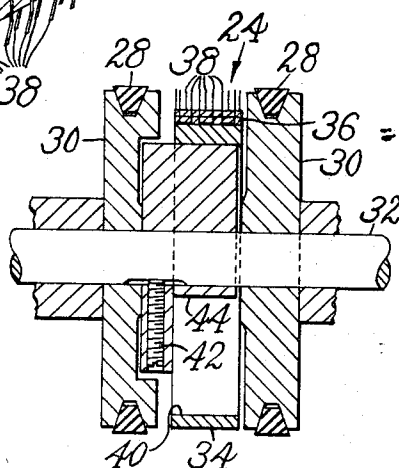


Fig. 3



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Oct. 22, 1968

R. R. WALTON

3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 2

Fig. 4

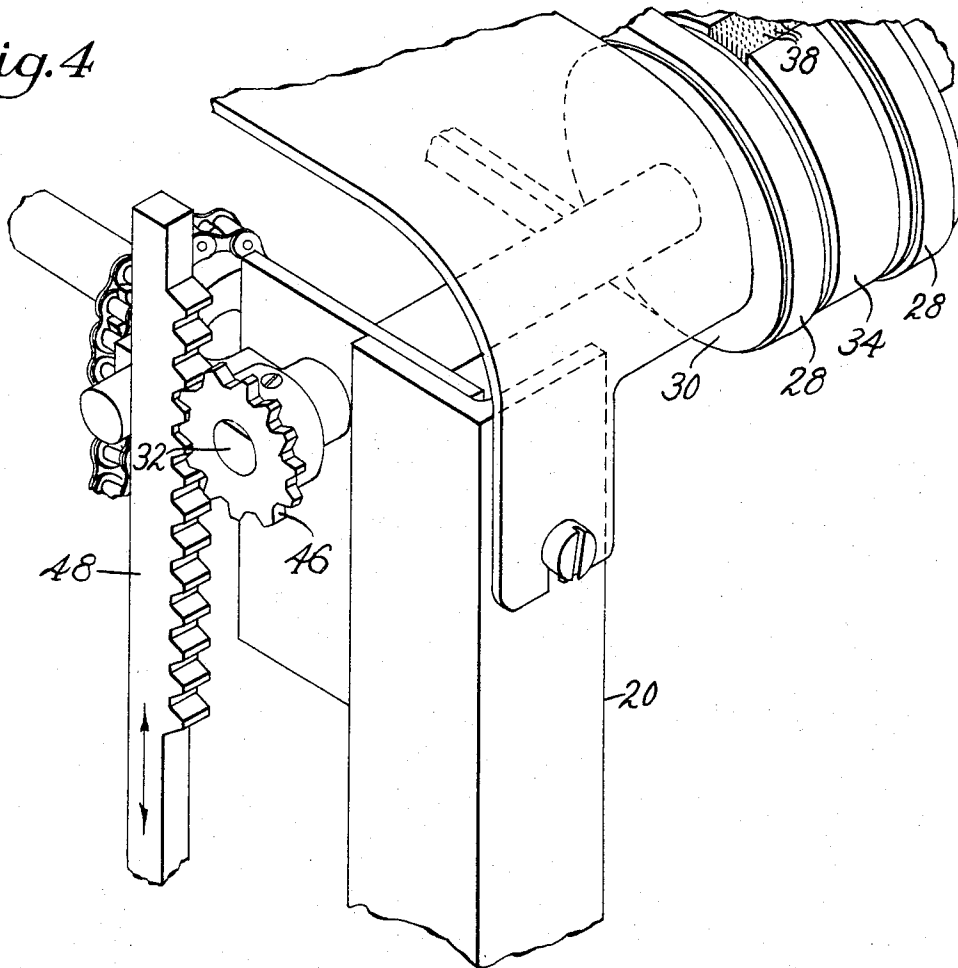


Fig. 5

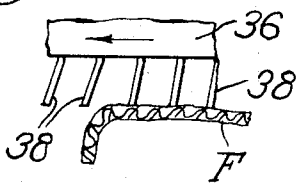
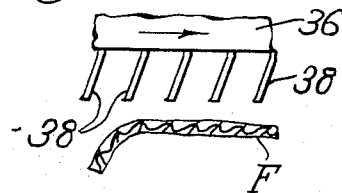


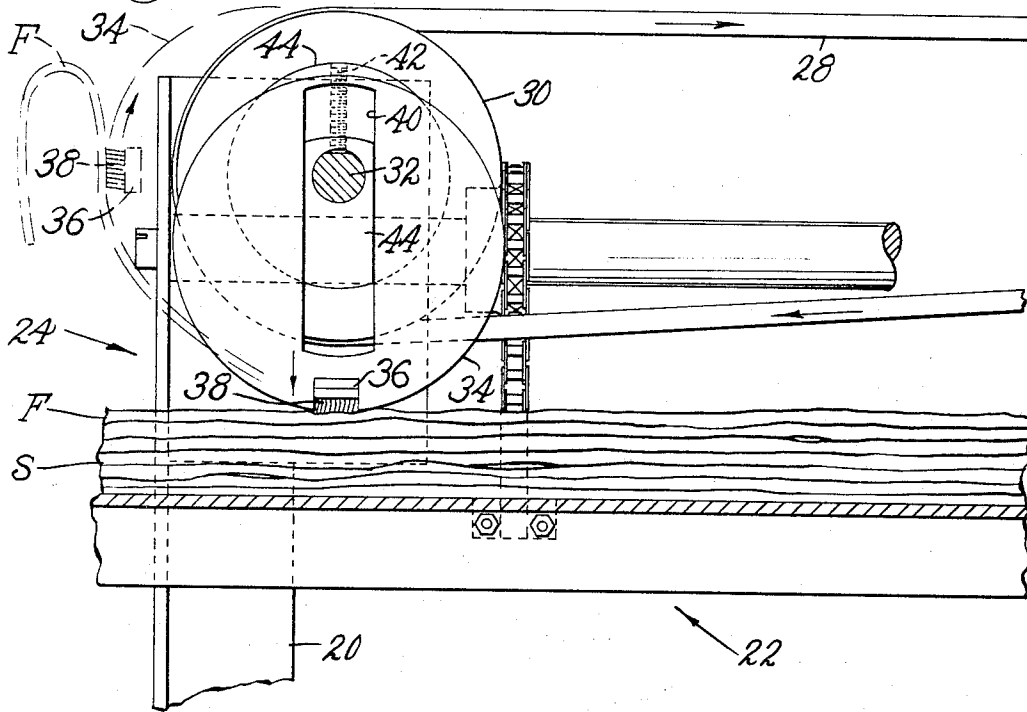
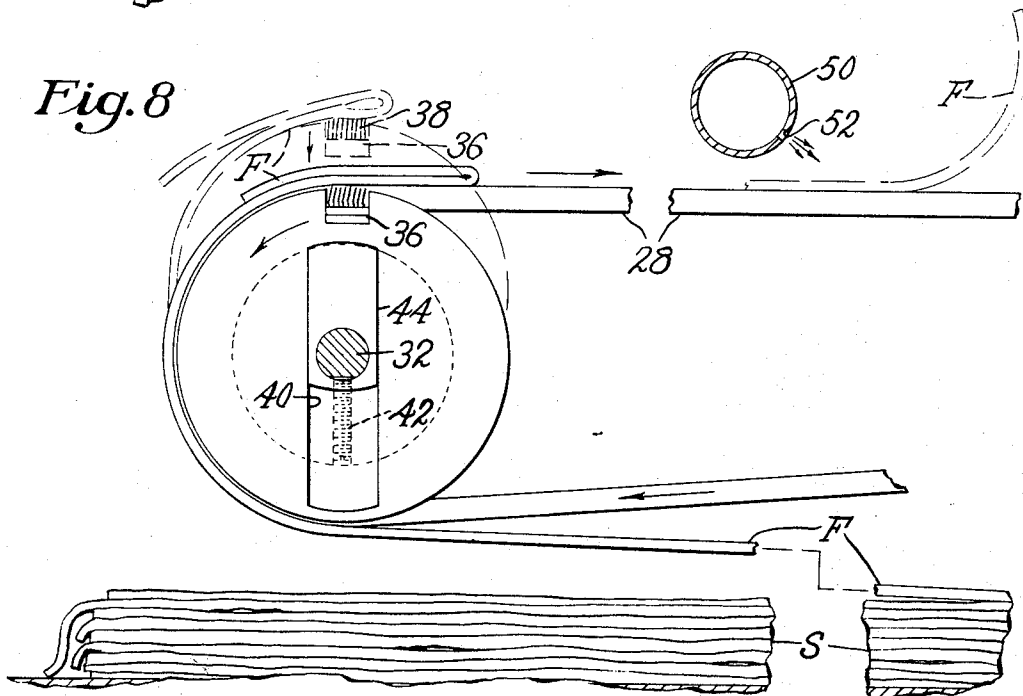
Fig. 6



R. R. WALTON

FABRIC FEEDING MEANS

9 Sheets-Sheet 3



Oct. 22, 1968

R. R. WALTON
FABRIC FEEDING MEANS

3,406,961

Filed Jan. 27, 1966

9 Sheets-Sheet 4

Fig. 9

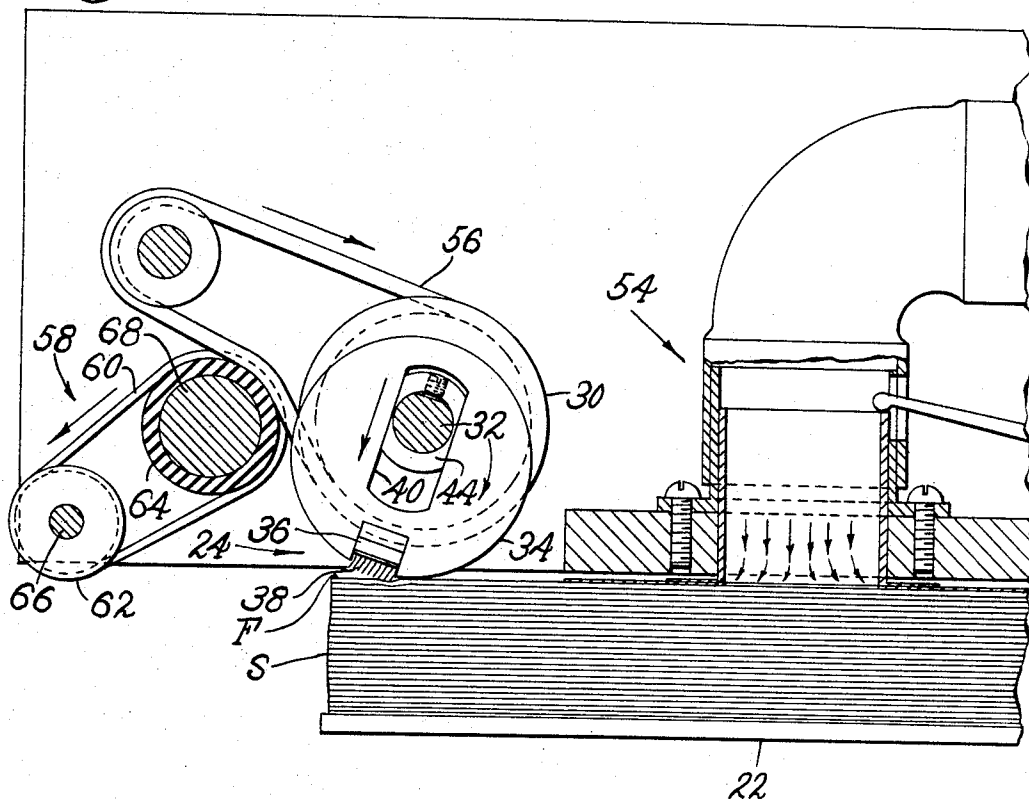
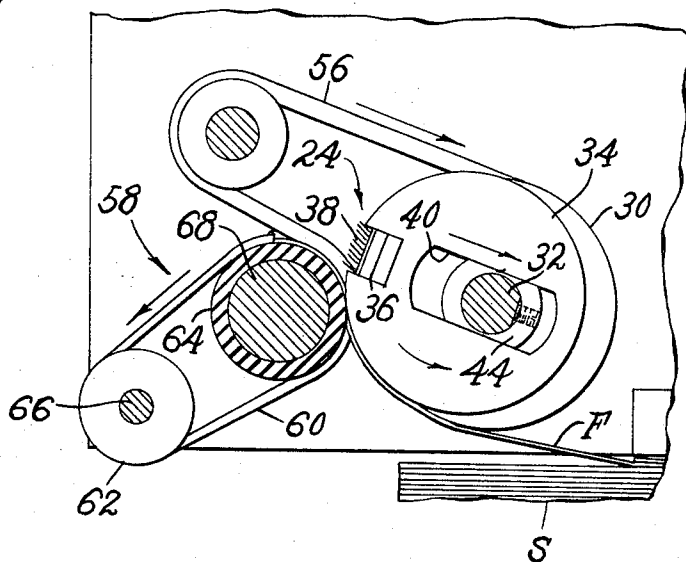


Fig. 10



Oct. 22, 1968

R. R. WALTON

3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 5

Fig. 11

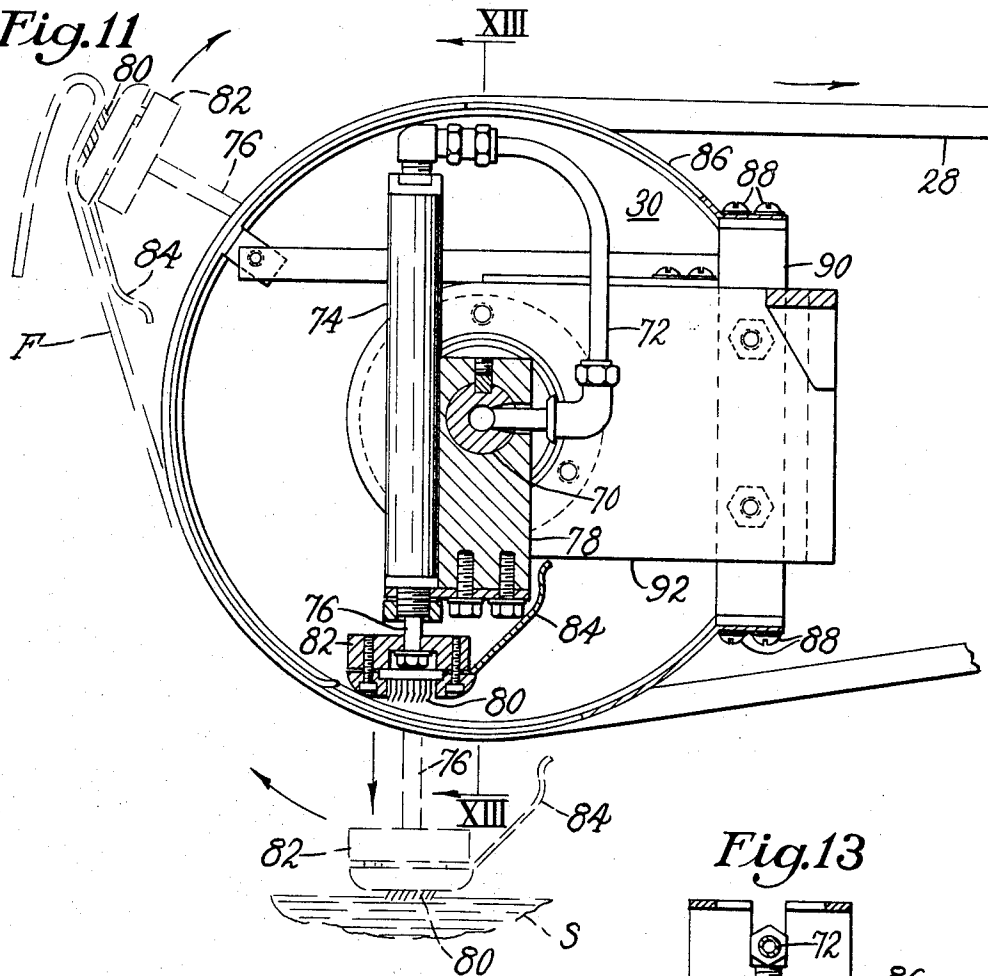


Fig. 12

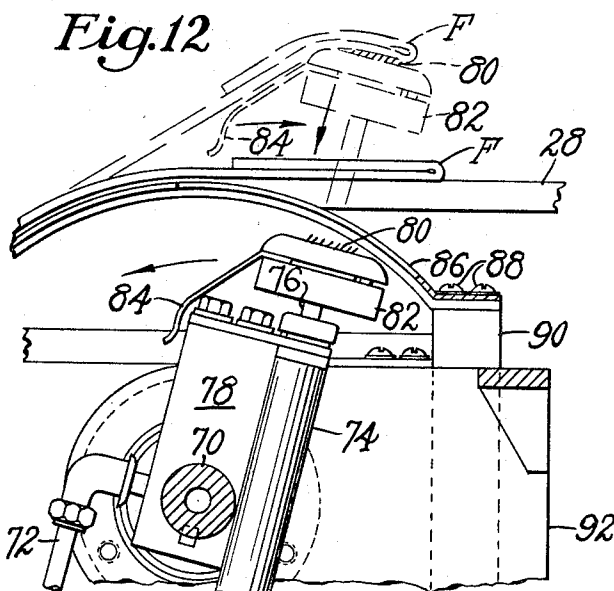
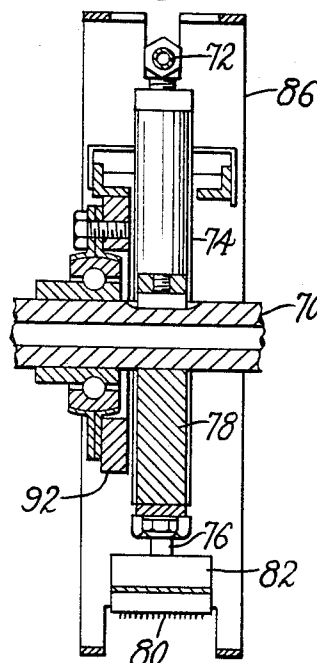


Fig. 13



Oct. 22, 1968

R. R. WALTON

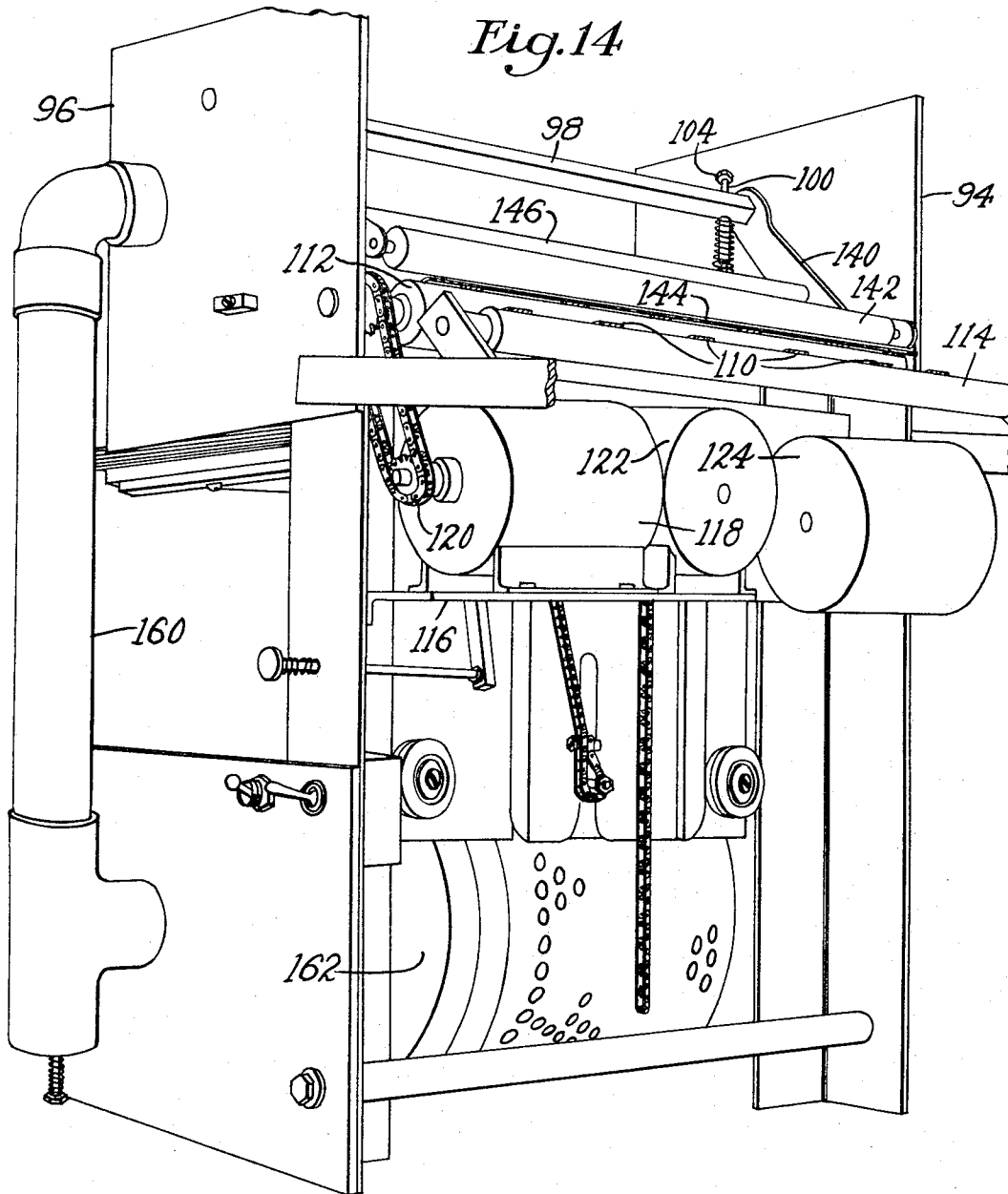
3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 6

Fig. 14



Oct. 22, 1968

R. R. WALTON
FABRIC FEEDING MEANS

3,406,961

Filed Jan. 27, 1966

9 Sheets-Sheet 7

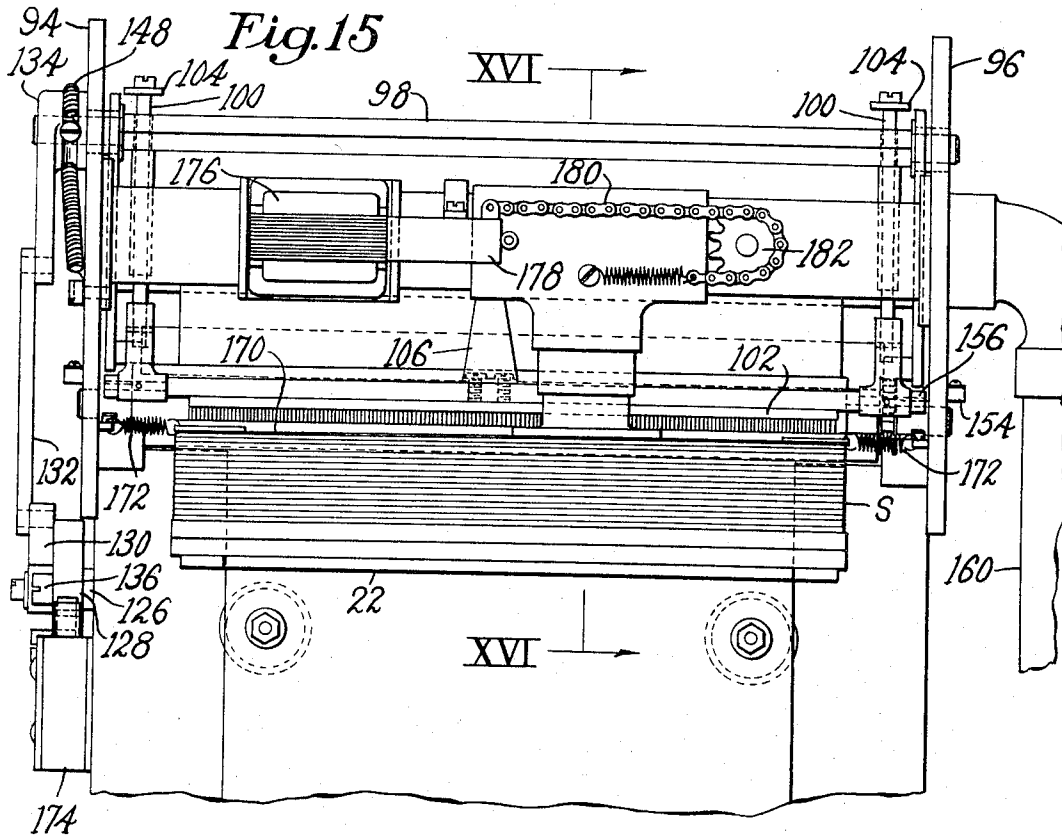
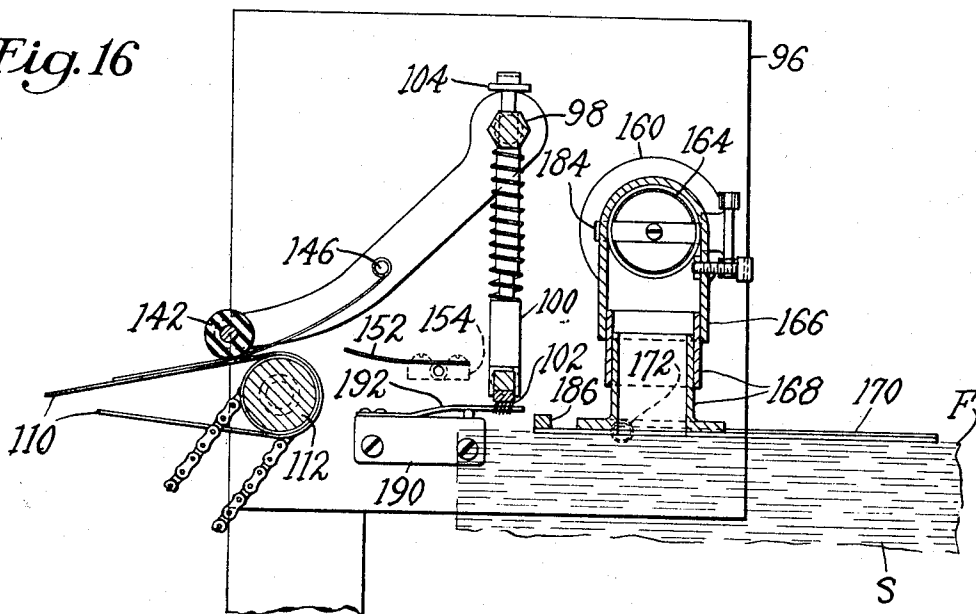


Fig. 16



Oct. 22, 1968

R. R. WALTON

3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 8

Fig.17

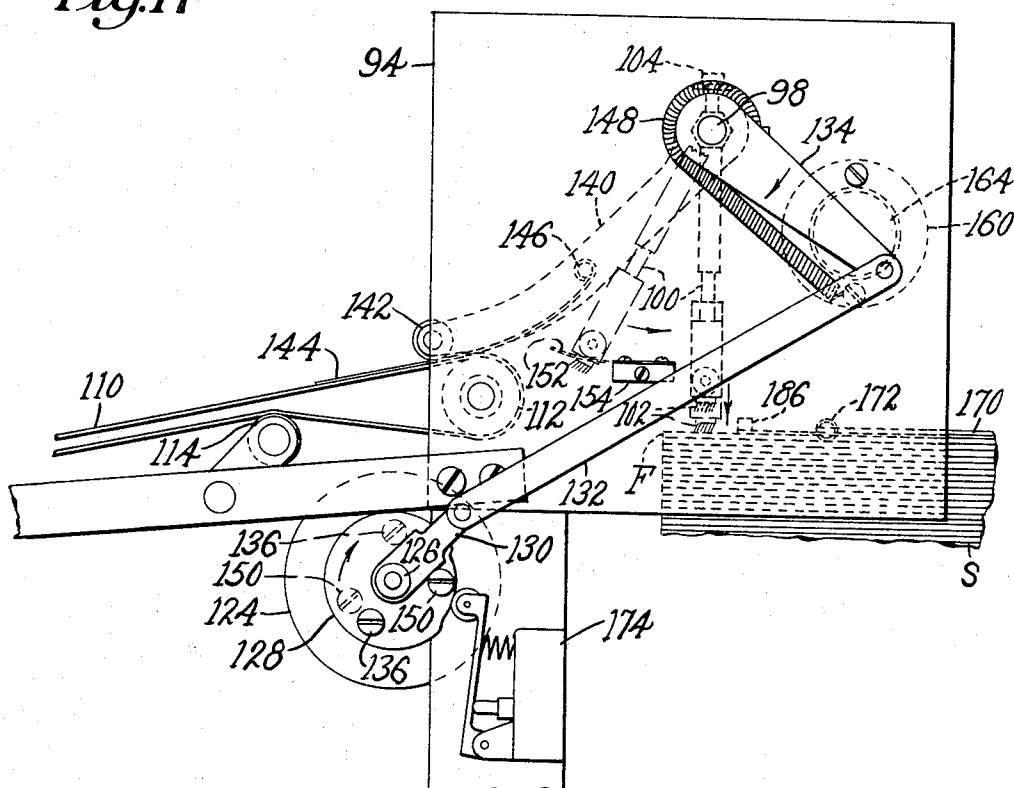
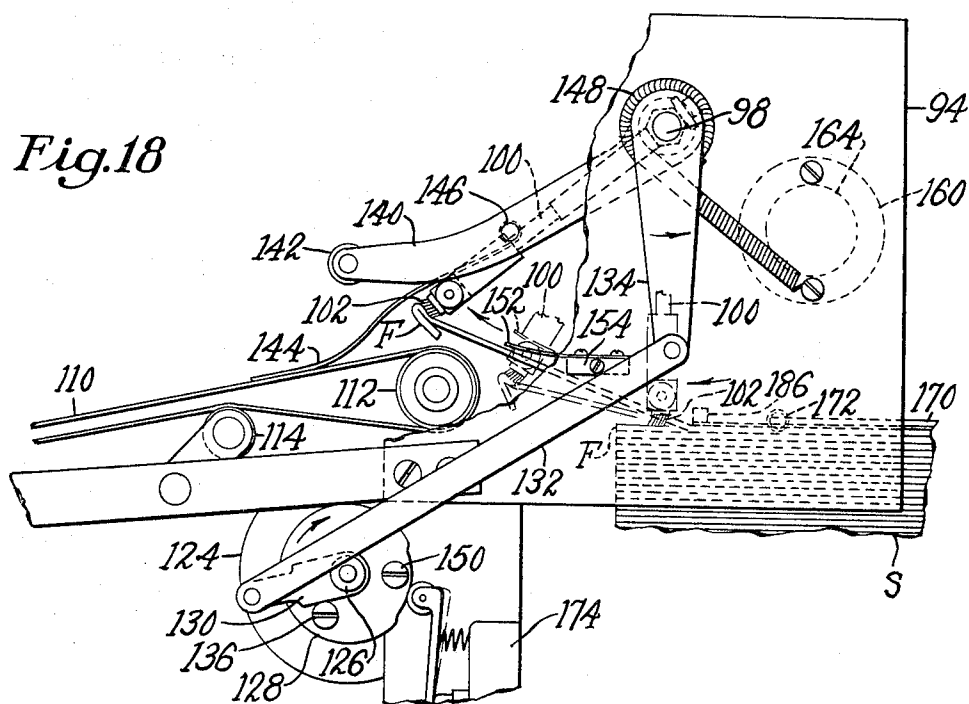


Fig.18



Oct. 22, 1968

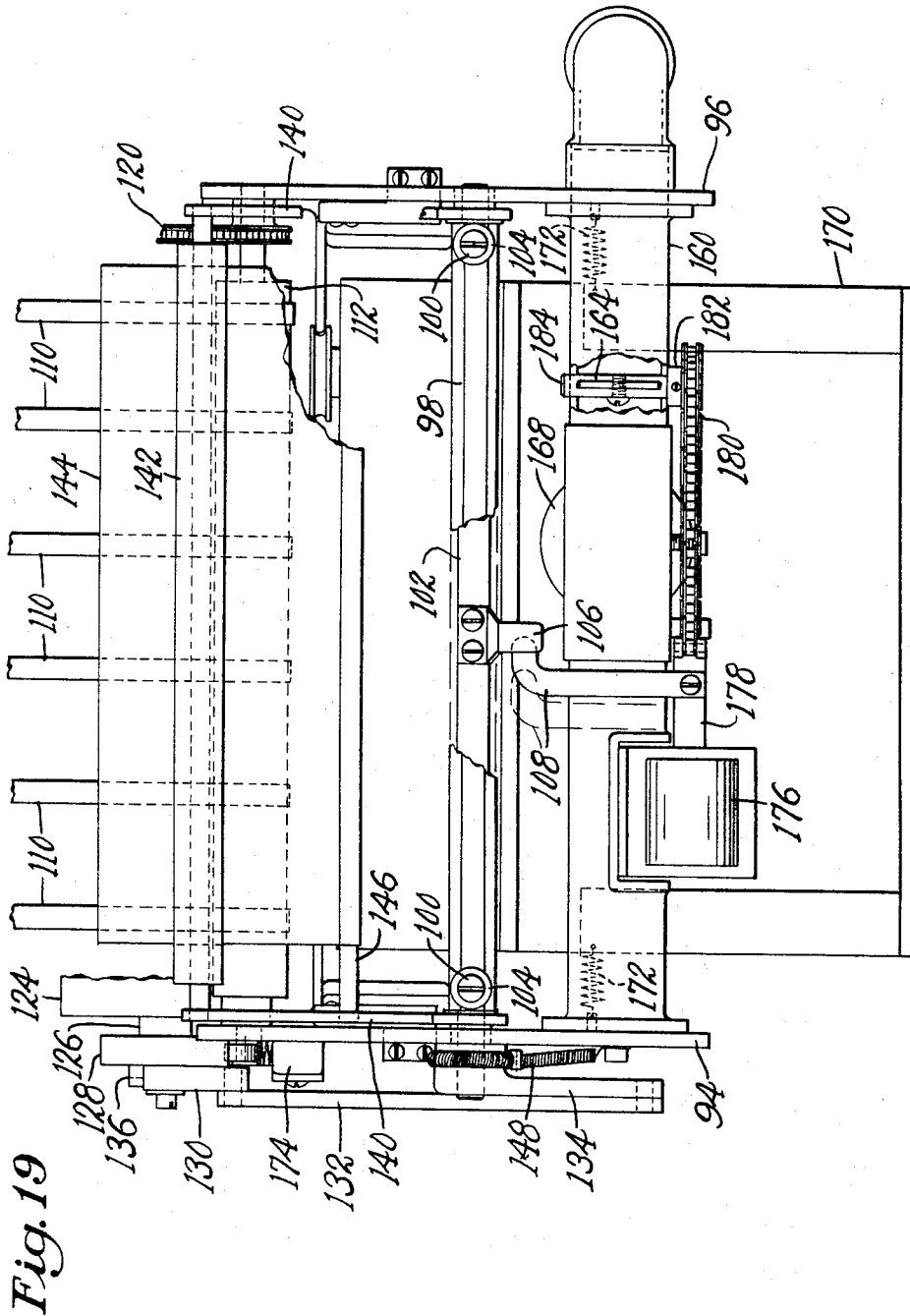
R. R. WALTON

3,406,961

FABRIC FEEDING MEANS

Filed Jan. 27, 1966

9 Sheets-Sheet 9



1

3,406,961

FABRIC FEEDING MEANS

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23 Claims. (Cl. 271-10)

ABSTRACT OF THE DISCLOSURE

A machine for feeding fabric sheets singly from a stack thereof and having a multi-point pick-off device comprising a cluster of substantially co-planar work engaging points adapted for unidirectional pick-off action when contacting a fabric work piece.

This invention relates to means for feeding flexible sheet materials, and is more particularly concerned with a novel method and improved apparatus for successively removing work pieces of fabric and the like from a stack or other work supporting means. While the invention is herein shown in several illustrative embodiments it will be understood that various changes may be made to accommodate different types of work or to perform various work transfer operations without departing from its spirit and scope.

As set forth in such prior art as United States Letters Patent No. 3,168,307 and 3,168,308 issued on Feb. 2, 1965, in the names of R. R. Walton and G. E. Munchbach, the matter of automating the garment, laundry, and other fabric handling industries is difficult since the work pieces, whether of fabric or otherwise, may be of widely varying and peculiar characteristics. Even when fabrics to be handled are of reasonably constant nature, such factors as their limpness, surface friction or adhesion, compressibility, low mass, and textural composition usually impose tedium when manually processed, and tend to make them non-susceptible to known mechanical feeding means. Devices for transferring blanks by gripping or impaling and the like are cumbersome and generally unsatisfactory in dealing with layers of cloth, for example. The mentioned patents recognize that a primary requisite to facilitating production is to be able successively to remove individual plies from a stack of work pieces without disturbing the stack. They accordingly disclose advantageous solutions employing a stream of air for loosening and lifting, together with unique removal or pick-off means adapted to act on the margin of the loosened sheet and thus separate it without disruption of the stack. More particularly, the cited patents disclose sheet transfer means involving the directing of pressurized air or subatmospheric air, one embodiment also including means for transferring thick material by a snagging device consisting of discretely spaced, straight pins projecting in a row from the edge of a plate.

A primary object of the present invention is to provide a simple, yet reliable and more versatile means for singly moving fabric work pieces or portions thereof with respect to a support or with respect to other such work pieces stacked on the support.

Other objects of this invention are to provide improved mechanical means for lifting and transferring successive topmost pieces of fabric from a stack without disruption thereof; to exercise positioning control of one piece of fabric with respect to another by movement of a fabric engaging means without danger of injuring or incurring unwanted distortion or displacement of either piece; to provide an economical machine for quickly removing one flexible sheet member from another with or without the auxiliary aid of an air stream; and to provide a fabric pick-off means automatically compensating for variations in the level of the surface of the piece to be moved.

2

To these ends and in accordance with a feature of the invention, movement of a piece of fabric or a portion thereof from its support, in a selected direction and at a desired time, can be attained by pick-off means comprising at least one cluster of substantially co-planar work engaging points, and mechanism for relatively moving the cluster and the fabric on the support first in one direction to effect pick-off and then in another direction relative to the fabric to effect work release thereof. In contrast to the use of impaling means, for instance, the invention contemplates pick-off means having multiple, non-piercing, closely grouped elements adapted to contact only surface and/or near-surface fibers. Specifically, and as herein illustrated, the pick-off means may comprise one or more cards, i.e., wire toothed cloths sometimes called card cloth; it will be appreciated, however, that in accordance with the invention other generally equivalent pick-off means, for example materials having a rough or spiny work contacting surface affording numerous points of engagement per square inch, such as sharkskin, certain abrasively coated members or burred surfaces, may be employed. An important characteristic common to these pick-offs is their ability to seize a fabric layer and transfer it without a change of relative orientation; another is that penetration of any fabric surface is limited due to its aggregate resistance to the multiplicity of simultaneously acting points in a cluster.

In accordance with a further feature of the invention one or more of the novel pick-off means may be caused, merely by the influence of gravity effectively to engage a work piece to be removed, or if desired, be power driven into and out of work pick-off relation. Mounting of a plurality of these pick-off means for concerted action on each fabric piece, and not necessarily limited to operation on margins, is herein shown as advantageously self-adjusting to accommodate the variable surface level of each succeeding piece or portions thereof to be removed; the considerable range of relative surface depression often encountered in successive top fabric pieces of a stack, for instance, make this feature especially valuable.

While not essential, as hereinafter to be shown the preferred pick-off means generally is characterized by being uni-directional in operation. This is to say that its multiple work-contacting points, when moved in one direction with a component generally parallel and tangentially of the fabric to be removed, will, due to inertia and/or drag on the fabric, non-slippingly engage with surface fibers to produce sufficient cumulative tangential force to draw the fabric from its supporting means, even though the latter may itself afford considerable frictional drag, as is often the case with such stacked material, for instance, as towelling. However, when the points contact the work while moving in other directions with respect to the fabric, relative sliding and no pick up is effected. An advantage of this uni-directional characteristic of the pick-off means is that its reversal of movement relative to a picked-up piece will automatically release it in a desired position.

In a method aspect, the invention comprises removing successive top fabric pieces from an irregular stack by simultaneously facially engaging each top piece with multiple, closely spaced contact points and then relatively moving the points as a group to tension it in translation, the initial engagements being repeatedly effected along a general vertical plane spaced just inwardly of the marginal edge of the piece of fabric having the least extension from the irregular stack.

The foregoing and other features of the invention, together with various novel details and combinations of parts, will now be more particularly described in connection with illustrative embodiments and with reference to the accompanying drawings thereof, in which:

FIG. 1 is a perspective view, with portions broken away, of a fabric feeder including a rotary-gravitational type pick-off means, a work support in the form of a stack elevator, and cooperating conveyor means;

FIG. 2 is an angular sectional view of a cord cloth such as used in a pick-off block shown in FIG. 1;

FIG. 3 is an axial section showing the mounting of one of two card cloth carrying devices shown in FIG. 1;

FIG. 4 is a perspective view of a portion of mechanism for oscillating the card cloth carrying devices;

FIG. 5 is an enlarged detail view illustrating uni-directional pick-off action;

FIG. 6 is a view similar to FIG. 5 but showing a reversal of card movement to release a work piece;

FIG. 7 is a view in side elevation and partly in section of a gravitational card cloth device in an initial pick-off position in relation to a cooperating conveyor;

FIG. 8 is a view corresponding to FIG. 7 but showing the card cloth device in a subsequent work releasing position;

FIG. 9 is a view in side elevation and partly in section of a portion of a machine largely corresponding to that shown in FIGS. 1-8 but modified to provide through-feed and including an optional pneumatic sheet fluttering means;

FIG. 10 is a view corresponding to FIG. 9 but showing the pick-off means in a later stage in a cycle;

FIG. 11 is a view corresponding to FIG. 7 but showing a fluid-pressure-operated form of automatic pick-off means;

FIG. 12 illustrates the pick-off means of FIG. 11 at a later work releasing stage;

FIG. 13 is a section taken on the line XIII-XIII of FIG. 11;

FIG. 14 is a perspective view looking toward the back of a fabric through-feeder having a bar-type pick-off and cooperating sheet-separating means;

FIG. 15 is a view in front elevation of the upper portion of the machine shown in FIG. 14;

FIG. 16 is a vertical section taken on the line XVI-XVI of FIG. 15;

FIG. 17 is a view in side elevation of actuating mechanism shown in FIG. 15 and indicating the pick-off bar in pick-off position, a subsequent return position being shown in phantom;

FIG. 18 is a view largely corresponding to FIG. 17 but indicating the parts in work releasing condition, and showing them in phantom at return positions; and

FIG. 19 is a plan view with portions broken away of the machine of FIGS. 14-18.

Referring first to the fabric feeder of FIGS. 1-8, the machine comprises a frame 20 in which there is mounted for vertical movement work supporting means herein shown in the form of a conventional work elevator generally designated 22 (FIGS. 2, 8 and 9), a gravitational type fabric pick-off means generally designated 24, and a cooperating endless conveyor 26 including, in this case, spaced parallel V-belts 28 (FIGS. 1, 5, 8 and 9) and their pulleys 30. Other forms of work supporting means, movable or stationary, but relatively movable with respect to the fabric removing and separating means 24 about to be described may be used. The conventional platform elevator 22 is selected for purposes of illustration since it is adapted to maintain a substantially fixed general upper level of a supported stack S (FIGS. 7, 8), the successive top fabric pieces F of which are to be automatically removed without disturbing the stack. The invention also has application, it will be understood, to other and more general situations involving work transfer, for instance the removal or repositioning of fabric pieces or the like, or portions thereof, when individually presented or supported by a conveyor or work table.

The pulleys 30 are freely and rotatably mounted on a shaft 32 journaled transversely in the frame 20 and preferably arranged with its axis above and inward of a margin

of the top stack piece F on the elevator 22. A pair of coacting pick-off means 24 mounted in axial spaced relation on the shaft 32 is shown in FIG. 1, it being recognized that only a small one may suffice for handling small work pieces and that additional ones, or ones of different size or shape, may be used for larger or heavier fabrics. Each pick-off device 24 consists of a holder 34 and a card cloth backing or block 36 (FIGS. 3, 6, 7 and 8) mounted in the holder and carrying projecting, angularly biased wires 38, the clustered work engaging ends of which form an operating face lying substantially in a common plane. As herein shown, the holder 34 is circular (though it may be slabbled off or have other configurations), may be made of wood, and preferably has a work engaging surface adjacent to the card cloth operating face disposed substantially tangential thereto.

As illustrated in FIGS. 3, 7 and 8, to enable each of the holders 34 to adjust to irregularities of height in a top piece of fabric to be removed, they are respectively formed with a diametric slot 40 aligned with a card cloth block 36. A set screw 42 (FIG. 3) threaded into a collar of a key or guide 44 secures it to the shaft 32 in selected axial position for oscillation therewith. A portion of the guide extending into the slot 40 thus serves to limit diametral sliding movement of the holder 34 between its extended lower or pick-off position shown in FIG. 7 and an upper or work release position shown in FIG. 8. In order to oscillate the pick-off means 24 simultaneously and precisely in the same phase between the pick-off and release positions (in this instance about 180°), the shaft 32 carries at one end a pinion 46 (FIG. 4) meshing with a rack 48 reciprocable by suitable mechanism not herein shown. Resultant, reversal of rotation of the shaft 32 is of no practical effect on the idler pulleys 30.

Referring more specially to FIGS. 7 and 8, operation of the single pick-off means 24 will now be described, it being understood that they function synchronously. The holder 34 shown in full lines in FIG. 7 is radially projected eccentric to the shaft 32 and about to be moved clockwise to carry the block 36 from an initial position in which its clustered wires 38, being biased in the direction of pick-off, tangentially engage at multiple, closely spaced points, the surface fibers of the top piece F. The card cloth wires 38, it will be understood, are preferably selected individually to yield more in the case of more flimsy fabric to be transferred. Thus no single wire 38 penetrates the work piece or mars it by unduly displacing or distorting its fibers; instead the wires act cumulatively to exert a tangential removing force which is, in this case, at first horizontal. At this time any resistance to withdrawal of the piece F due to its own inertia and drag afforded by the stack S only tends to enable the card cloth to obtain a better "bite" or hold. As the pick-off means 24 moves forwardly from the stack S to remove the piece F, centrifugal force plus frictional binding of the walls of the slot 40 with the guide 44 tend to maintain the radially projected position of the holder 34 as indicated by phantom lines in FIGS. 7 and 8. Any free, leading marginal portion of the piece F being removed is usually whipped over into inverted outspread position on the conveyor belts 28. To insure such advance marginal positioning there is provided a conduit 50 (FIGS. 1 and 8) connected to a source of air pressure and having vents 52 spaced transversely of the conveyor 26, the downwardly directed jets acting, if need be, to unfurl and flatten each passing work piece. As the holder 34 approaches its uppermost position it commences radial inward movement and leading portions of the fabric F are transferred to the belts 28. At its top or 180° position (FIG. 8) the holder 34 falls under the influence of gravity from its extended to its substantially concentric or inner radial position to release the fabric to the conveyor, the rack 48 then reversing to return the pick-off device 24 to its lower starting position shown in FIG. 7. Usually the conveyor 26 is operated at about the same or slightly greater linear feed speed than the pick-off device so that the fabric piece F once picked

5

up will thereafter be in partial wrapping relation to the belts 28 until completely inverted. A second pick-off action by the card cloth block 36 on a trailing portion of the same piece F, accordingly, does no harm. Normally, however, the reciprocations of the rack 48 will be timed to enable a second picked-off piece F closely to follow on the trailing margin of a first picked-off piece F thus, for instance, to be conveyed in close order to an operating station such as a sewing machine.

It is important to note that, despite the fact that the level of the top surface of the stack S may vary considerably at any one time and may change greatly throughout as unstacking proceeds, the holders 34 automatically adjust heightwise by sliding on their guides 44 as required. Moreover, in thus returning and readjusting heightwise the card cloth wires make only brief, harmless, non-displacing contact with the next work piece to be picked off.

FIGS. 9 and 10 illustrate a modified form of rotary-gravity type pick-off means adapted to through-feed successive top sheet material without inverting as was done by the device of FIGS. 1-8, like parts bearing like reference characters. A stack S of fabric pieces may be supported on an elevator 22 or other work supporting means. As with the device of FIGS. 1-8, a ply separating assist in the form of a pneumatic fluttering means 54, as disclosed in United States Letters Patent No. 3,168,307, issued Feb. 2, 1965, in the name of Messrs. R. R. Walton and G. E. Munchbach, may optionally be employed. This is especially useful when considerable resistance to relative movement in translation would otherwise be encountered. The through-feed machine comprises endless conveyor belts 56 operating over freely rotating pulleys 30 and the shaft 32, and a cooperating inclined conveyor 58 consisting of endless belts 60 running over pulleys 62, 64 on shafts 66, 68, respectively. As in the device of FIGS. 1-8, pick-off means 24 are mounted on the shaft 32 and oscillated, but each pick-off oscillation instead of being about 180°, is now only sufficient to remove leading margins of the successive pieces F to the bite of the conveyors 56, 58 or, in the arrangement shown, a little more than 90°. It will accordingly be understood that, having rotated clockwise to this extent from its initially downwardly projected pick-off position, the holders 34 move through and slightly beyond a locality of work-gripping tangency between the belts 56, 60 wherein the work piece F is stripped from the card cloth wires 38. The piece F is thereafter progressively advanced, uninverted, over the conveyor 58.

In the through-feed arrangement of FIGS. 9 and 10 oscillation of the pick-off means 24 to as much as 180° may be employed when desired. On being released from the picked up piece F the holder 34 may, due to gravity, first slide down and radically inward on the guide 44 as shown in FIG. 10 and then return to pick-off position by again moving radially outward. By reason of continued top ply fluttering and separating effect of the means 54, it will usually be unnecessary to repeat operation of the pick-off means 24 on any one piece F.

FIGS. 11-13 illustrate a fluid pressure operated version of the pick-off device shown in FIGS. 1-8 which is thus rendered particularly useful in transferring individual heavier plies or those having tougher or smoother surface texture. It may be assumed that the pulleys 30, as above described, rotate freely upon a transverse shaft 70 and carry the conveyor belts 28. The shaft 70 is hollow and thus serves to transmit pressurized fluid such as air to tubing 72 and hence to one end of a cylinder 74 having a piston (not shown) and a spring-returned piston rod 76. The cylinder and its tubing 72 are carried by a block 78 affixed to the oscillatory shaft 70. Card cloth 80 in a holder 82 secured to an end of the rod 76 is accordingly retracted beneath the upper reach of the belts 28 upon shut off of fluid pressure (by suitably timed means not shown) at a work release point just beyond top center as shown in FIG. 12. When the shaft

6

70 has thereafter oscillated counterclockwise to return the cylinder 74 to its retracted position indicated in FIG. 11, fluid pressure is restored to thrust the card cloth 80 and its holder 82 downward into work-engaging relation as shown in phantom lines in FIG. 11. Preferably a resilient deflector 84 is secured to the trailing end of the holder 82. It serves during pick-off action in cooperating with a circular stationary deflector 86 to guard against the fabric being caught up by engagement with the fastener rotating belts 28. The deflector 86 has its ends secured by screws 88 to a bracket 90 on a frame 92 mounting the block 78.

In FIGS 14-19 there is shown a bar type automatic through-feeder for transferring fabric as will next be explained. For purposes of illustration the elevator type work support 22 (FIG. 15) for holding a diminishing stack S of work pieces F with its uppermost surface substantially fixed at a general level, is in this instance mounted for operation within the front portion of a frame comprising opposed side plates 94, 96. Rockably supported between these plates and above the stock S is a rod 98 for supporting at its opposite ends, respectively, an extensible arm 100, these arms carrying at their lower ends an elongated or bar type card cloth pick-off 102 which is particularly well suited to remove pieces having rectilinear margins, for instance towels. The arrangement is such that a collar 104 on each arm 100 limits the downward spring-pressed projection of the pick-off 102 from its retracted position and toward work engagement when a tab 106 (FIG. 19) on the pick-off is released therefrom, as later explained, from a shiftable latch 108.

From FIGS. 16-18 inclusive it will be clear that each top piece F will first be engaged by movement of the pick-off 102 in a vertical plane inwardly of a marginal edge of the stack S. The pick-off is then intermittently oscillated clockwise about the rod 98 by power means later described to transfer the leading portion of each work piece F to the upper reach of an endless conveyor consisting in this case of a series of belts 110. These belts run on a driven pulley 112 journaled in the plates 94, 96, over an idler roll 114, and about another roll (not shown) but positioned, for instance, in the vicinity of a station having means for next operating on the delivered pieces F. As shown in FIG. 14 a shelf 116 mounted on the back of the machine supports a motor 118 providing a chain drive 120 for the pulley 112, a motor 122 for operating the stack elevator 22, and a motor 124 for controlling oscillation of the bar pick-off 22 as will now be described.

The motor 124 continuously rotates (clockwise as seen in FIGS. 17, 18) a shaft 126 carrying an actuating cam 128 subsequently referred to. The shaft 126 pivotally supports one end of a crank arm 130. The other end of this arm is connected by means of a link 132 to a lower end of an oscillatory crank 134 the upper end of which is affixed to an external portion of the rod 98. For actuating successive pick-off strokes of the card cloth by operation of the crank 134, a screw 136 projecting from the side of the cam 128, in moving clockwise from its full-line position in FIG. 17 to its phantom position indicated, engages an upper side of the arm 130, the latter thus being swung clockwise about the shaft 126 and shifting the link 132 beyond dead center to its position indicated in FIG. 18. The pick-off 102 has now been moved clockwise to its work releasing position shown in full lines in FIG. 18. In moving the arms 100 heightwise toward the work release position, arms 140 pivotal on the rod 98 and carrying a hold-down roll 142 are displaced upwardly to an inactive position shown in FIG. 18 so that a leading marginal portion of the pick-off piece is flung outspread over the belts 110. When the pick-off 102 is lowered from pick-off position, as next explained, the arms 140 are allowed to descend by gravity so that the roll 142 may now bear on the transferred portion of the piece F resting on the conveyor and hence insure the remainder

of the piece being drawn for removal from the stack S in continuous manner. A flap 144 (FIGS. 17-19) preferably of transparent flexible material extending loosely over the belts and interposed beneath the roll 142 may be provided as a work deflector and a shield from extraneous air currents, the flap 144 being anchored at one end between the arms 140 by a cross rod 146.

For quickly returning the pick-off 122 counterclockwise from its work releasing position shown in FIG. 18 to a retracted dwell position in its initial vertical plane of operation, i.e., directly above the pick-off points, a spring 148 (FIGS. 15, 17, 18) has one end affixed to the plate 94 and its other end secured to the crank 134. Accordingly, the spring 148 having been further tensioned in the pick-off stroke and the link 132 being beyond dead center, the arm 130 is rapidly pivoted clockwise from its position shown in FIG. 18 until it engages a stop screw 150 projecting from the cam 128 as shown in FIG. 17. The angular starting position of the pick-off 102 in a cycle is thus determined.

It is to be noted (comparing FIGS. 17 and 18) that leaf springs 152, 152 secured to the respective plates 94, 96 by blocks 154, 154 are arranged to control the heightwise position of the pick-off 102 by cooperating with rolls 156 disposed one on each end of the pick-off. Thus in swinging outwardly to transfer a picked-off piece, the spring-projected rolls 156 bear upwardly on and lift the free ends of the springs 152 as seen in FIG. 18, and when returning, the rolls 156 ride over the springs 152 as shown in FIG. 17 to raise the spring-pressed pick-off 102 for latching by the latch 108.

The machine being described is rendered especially effective in peeling off successive uppermost fabric layers the texture of which resists relative movement in translation (for instance cotton undergarments or the like) when ply lifting and loosening means 54 (FIGS. 15, 16) of the pneumatic type above referred to is used. Thus the pick-up 102 repeats its closed loop action on the stack S as described and the non-picked off portions of each piece F, instead of disrupting the fabric ply beneath it by the drag due to considerable interfacial friction, are enabled easily to be withdrawn from the stacks as they largely float on an air cushion toward the belts 110. It is essential for best performance to coordinate operation of the ply fluttering means 54 with that of the pick-up 102. Accordingly continuous "blower" air, i.e. a stream of essentially uncompressed or low pressure air, is provided from a tube 160 (FIGS. 14-19) connected to a motor driven blower 162 (FIG. 14) but is valved, as will now be explained, to assist in the removal of each top piece and to avoid premature lifting effect on the fabric ply immediately thereunder next to be transferred. As more fully explained in my above cited patent, the lighter and more porous the sheet material to be transferred, the less air pressure is required. The air stream, when a butterfly valve 164 (FIGS. 16 and 19) pivoted in the tube 160 is in open position, is directed vertically down in a duct 166 and through telescoping nozzle portions 168 which are adjustable heightwise. The exit end of the portions 168 is surrounded by a horizontal flexible baffle plate 170 the side margins of which are yieldably secured by springs 172 to the side plates 94, 96. As hitherto disclosed this plate 170 does not generally engage the top fabric F but is spaced slightly heightwise thereof to enable a crater wall to be formed in the piece being removed, entrapped air at least partially passing through the porous fabric wall and thence laterally between the stack and the top fabric F to loosen the latter.

Preferably each top ply is air-loosened as indicated in each cycle just before the pick-off 102 engages the fabric margin to commence removal. For this purpose a switch 174 (FIGS. 17 and 18) operated by the cam 128 is actuated to energize a solenoid 176 (FIGS. 15 and 19) secured on the tube 160, a plunger 178 of the solenoid acting via a spring-retained chain 180 on a sprocket 182

to rotate the latter and hence the valve 164, both the sprocket and the valve being secured to a pivot pin 184 mounted in the tube 160. As shown in FIG. 16 the rear edge of the plate 170 may be weighted as at 186 to prevent the locality of pick-off from fluttering and to cause the air flow to be distributed laterally. The arrangement preferably is such that the cam 128 terminates effective air flow from the nozzle 168 as the trailing margin of each top piece F passes thereunder. In reopening the valve 164 to air lift the next piece, the plunger 178, to which the latch 108 is secured at one end, disengages this latch from the tab 106 thereby allowing the retracted pick-off 102 to descend into work-engaging relation. Incidentally, a switch 190 (FIG. 16) secured to the plate 96 has an operating arm 192 depressible by engagement therewith of a portion of the pick-off 102 as it first moves into work-engaging position. The switch 190 is so constructed and disposed heightwise that, after every few top pieces F have been removed by the pick-off means 102, the vertical travel of the pick-off toward the stack S becomes adequate to operate the switch 190 thereby reenergizing the motor 122 and raising the elevator 22 slightly to re-establish a generally fixed upper level of the stack S.

The invention has been illustrated and described in several embodiments featuring simplicity in design, and many modifications thereof to suit particular fabrics and for transferring successive work pieces from one position or support to another, or in changed relation to another piece, may be made.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for feeding fabric sheets singly from a stack, a pick-off device having multiple, closely grouped elements for contacting surface fibres, means for moving the device from a starting position in a cycle relatively downwardly into work engagement and thereafter with a component initially parallel and then away from the top of the stack to remove at least a part of its upper sheet, means for maintaining the general level of the top of the stack, means to reverse movement of said device moving means from its pick-off direction to release the fabric therefrom, and conveyor means operative adjacent to the operating path of the device to transfer said upper sheet from the control of said pick-off device.

2. A device for transferring successive pieces of fabric from a work support comprising a pick-off means having at least one cluster of closely grouped elements having substantially co-planar fabric-engaging points, such that penetration of the fabric surface is limited by the aggregate resistance to the multiplicity of said points, mechanism for moving the pick-off points into substantially surface engagement with each piece and then away from the support, to remove the piece engaged, and means provided to operate said mechanism to reverse movement of the pick-off means from its pick-off direction to release the fabric therefrom.

3. A device as set forth in claim 2 wherein the pick-off means comprises card cloth having the elements thereof disposed for unidirectional pick-off action.

4. A machine for transferring successive fabric or the like comprising a work support for the fabric, movably mounted unidirectional pick-off means including a multiplicity of non-piercing, closely grouped protrusions having their work-engaging ends disposed substantially in a plane and adapted to engage surface fibres of the fabric on the support such that penetration of the fabric surface is limited by the aggregate resistance to the multiplicity of said points, and mechanism for relatively moving the pick-off means and the fabric on the support engaged thereby, first in one direction to effect pick-off, and thereafter in another direction to effect release of the fabric from the pick-off means.

5. For use in mechanism for feeding fabric sheet ma-

terial and the like, a work support adapted to hold the sheet material in substantially flat horizontal position, at least one pick-off device having multiple closely grouped work engaging, protrusions having co-planar ends, mechanism swingably mounting the device above the support for movement between an operative position, in which the protrusions engage and cumulatively exert on a portion of the material a translational force for removing that portion of the material from the support, and a work release position, and means for moving said pick-off device from said operative position to said work release position.

6. Fabric feeding mechanism as set forth in claim 5 wherein the pick-off device is rotatable about a horizontal axis and yieldable heightwise thereof to accommodate variation in the general upper level of work pieces successively to be transferred from said support.

7. Fabric feeding mechanism as set forth in claim 5 and further characterized in that the operative position of the pick-off device is arranged inwardly of the corresponding margins of work pieces in a stack on said support, and conveyor means is arranged to cooperate with the device in its work releasing position to strip the successively pick-off work pieces therefrom for further movement.

8. In a fabric feeder having means for supporting a stack of fabric pieces and means for substantially maintaining the upper level of the stack, an oscillatory pick-off device having multiple closely grouped work-engaging protrusions with ends disposed substantially in a plane arranged and adapted to engage closely spaced surface fibres of the topmost piece in the stack and actuating means cyclically operable to move the device from a first inoperative retracted position into engagement with the topmost piece, then tangentially of the stack level in one direction to remove said piece in translation therefrom, next heightwise of the stack supporting means to remove said piece then to reverse movement of the pick-off device from its pick-off direction to release the fabric therefrom, and lastly to return the device to said inoperative position.

9. A feeder as set forth in claim 8 wherein the device comprises a rotatable card cloth holder, said holder being radially slidable under the influence of gravity with respect to an axis about which it rotates, and conveyor means arranged to receive each fabric piece released from the pick-off device.

10. In a fabric feeder, means for supporting fabric work pieces in horizontal position, a horizontal shaft disposed above said means, endless conveyor means including at least one pulley mounted on the shaft, a pick-off device rotatably carried by the shaft and disposed for movement from a retracted inoperative position to an operative work-engaging position beneath the shaft, mechanism for oscillating said device to transfer each work piece carried by the device from said work-engaging position to a position for release to said conveyor means, and means to operate said mechanism to reverse movement of the pick-off direction to release the fabric therefrom.

11. In a fabric feeder, means for supporting fabric pieces to be successively fed, endless conveyor means for receiving successive work pieces, and transfer mechanism including a pick-off device operable between a work-engaging position adjacent to the supporting means and a work release position above and adjacent to the conveyor means, said device comprising card cloth having closely grouped work-engaging wires having their ends lying substantially in a plane and bent unidirectionally to effect movement of the work in translation from the pick-off position, and automatic means for reversing the device on arrival at the work release position to transfer the work to the conveyor means.

12. In combination, a shaft, an endless conveyor operable over a free running pulley on said shaft, a work

support, and an oscillatory fabric feeding device operable by said shaft to engage a work piece on the support and transfer the piece to said conveyor, said feeding device including a fabric pick-off means, and means mounting the pick-off means for yielding self-adjusting movement transversely of the shaft between a locality in which the pick-off piece is transferred to the conveyor and a locality wherein the next piece on the work support is to be picked off thereby.

13. The combination set forth in claim 12 wherein said mounting means comprises a holder for the pick-off means, and a guide secured to the shaft for rotation therewith and relatively movable with respect to the holder to permit eccentric projection of the pick-off means between said localities.

14. The combination set forth in claim 12 wherein fluid pressure operated means is provided for controlling movement of said pick-off device between said localities and in time relation to its oscillation.

15. A fabric feeder for removing successive top work pieces from a stack comprising a work support, a pick-off device movably mounted for operation between a pick-off position proximate to the leading margin of successive top work pieces in the stack and a work release position, pneumatic means for loosening and facilitating separation of each top piece of fabric from the stack, power means for actuating the pick-off device cyclically between said positions, and automatic control means for effectively operating the pneumatic means during at least a portion of each cycle while the pick-off device is moving toward its work release position and until a trailing margin of the top work piece being transferred passes from the influence of said pneumatic means.

16. A machine for removing successive fabric work pieces from a work support adapted to support them in generally level condition comprising, a movably mounted pick-off including clustered protrusions having co-planar ends adapted to engage the surface of each work piece, the pick-off being adapted, during tangential engagement in relative movement in one direction to slide on the work piece, and in the opposite direction to exert a cumulative force to separate the work piece tangentially engaged from the support, and power means for cyclically moving the pick-off in a closed loop tangential to the work pieces engaged on said support, the movement of the pick-off toward each work piece being in said one direction and with each work piece while tangentially engaged being in said opposite direction.

17. The machine of claim 16 and further characterized in that low pressure air blower means is provided for directing air against each fabric piece to be removed by said pick off, in a locality adjacent to but rearwardly of a leading portion of the piece to be engaged by the pick off, for facilitating separation of the piece from the work support.

18. The machine of claim 17 further characterized in that control mechanism is provided for automatically rendering said blower means effective just prior to the work removal action of said pick off and until a trailing portion of the work piece is withdrawn from the influence of said air blower means.

19. A fabric feeding machine comprising an endless conveyor, means adjacent to the conveyor for supporting a stack of fabric work pieces to be consecutively transferred to the conveyor, a pick-off means swingably mounted above the stack on said supporting means for movement between a pick-off position and a work release position adjacent to the conveyor, air blower means for facilitating separation by the pick-off means of the successive work pieces from the stack, power means for driving the conveyor, and control means operable by said power means for actuating the pick-off means and the air blower means sequentially on each work piece.

20. A machine as set forth in claim 19 wherein the

11

pick-off means includes card cloth arranged yieldingly to engage the marginal portion of each work piece, and means for projecting the card cloth heightwise of the stack from an initial inactive position to a work engaging position, said projecting means being rendered cyclically operable by said control means.

21. A machine as set forth in claim 19 wherein said blower means is connected to emit air from beneath a flexible baffle plate closely overlying the trailing portion of a top work piece in the stack, a leading edge of the plate in the vicinity of said pick-off position being held in closer relation to the piece than the remainder of the plate to avoid displacement by air of the locality of the piece being engaged by the pick-off.

22. The method of successively removing top fabric pieces from a stack which consists in providing a pick-off means having a multiplicity of non-piercing, closely grouped protrusions with their work-engaging ends disposed substantially co-planar, causing the pick-off means facially to engage each top piece simultaneously at multiple, closely spaced contact points extending widthwise thereof, relatively moving the pick-off means in generally parallel relation to said engaged top piece and then

12

heightwise of the stack and with a component in longitudinal translation counter to the drag exerted by the stack on the remainder of the top piece not engaged by the pick-off means, and reversing the direction of the pick-off means to release the fabric therefrom.

23. The method set forth in claim 22 wherein the initial engagements of the pick-off means on successive top pieces are effected along a general vertical plane spaced just inwardly of the marginal edge of that horizontal piece in the stack having least longitudinal extension therefrom.

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