

March 10, 1964

C. ARBTER ETAL

3,124,348

COMBINED CONVEYER AND FABRIC FOLDING DEVICE

Filed Sept. 7, 1962

2 Sheets-Sheet 1

Fig. 1

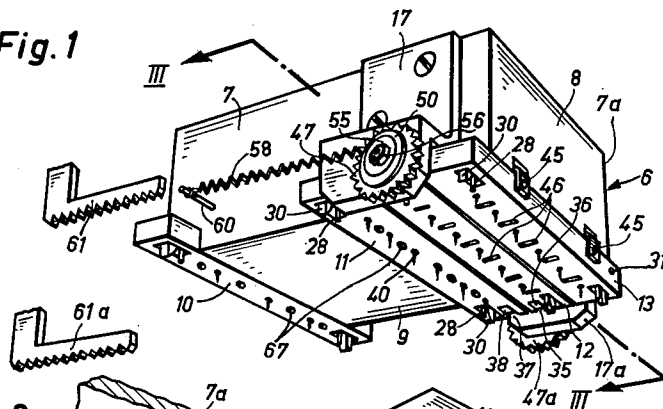


Fig. 2

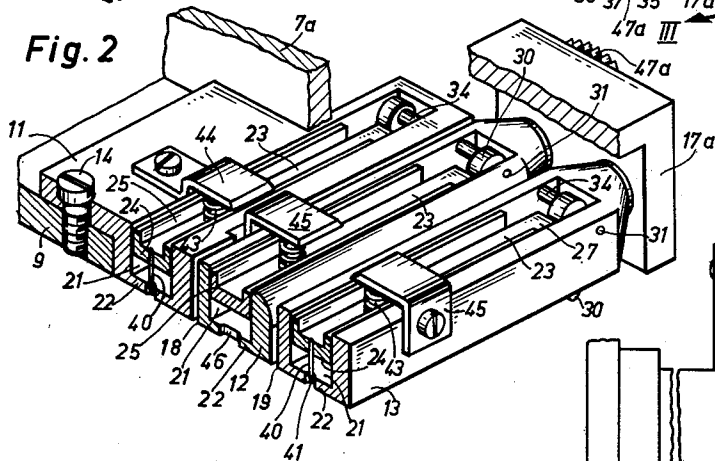
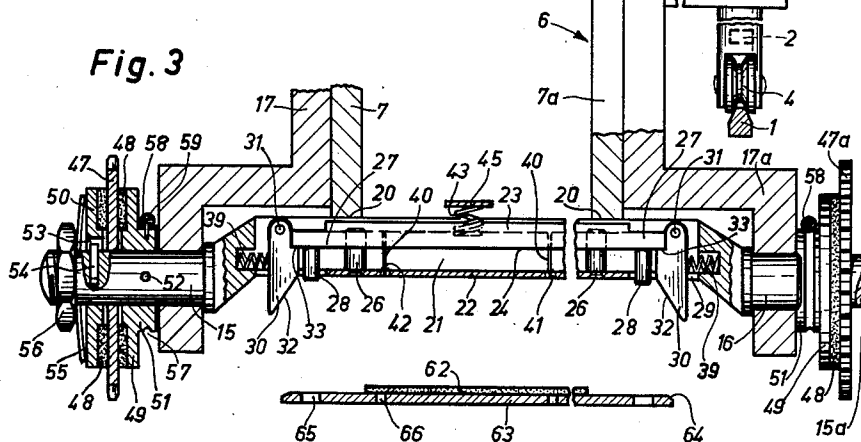


Fig. 3



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Fig. 4

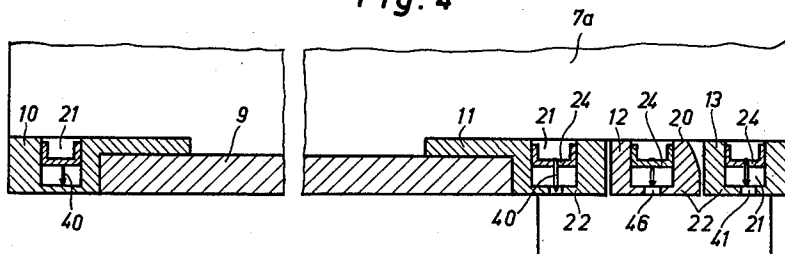


Fig. 5

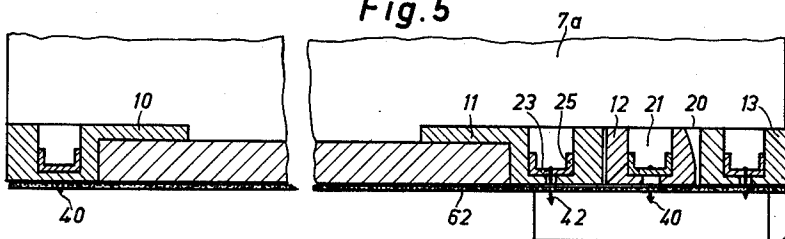


Fig. 6

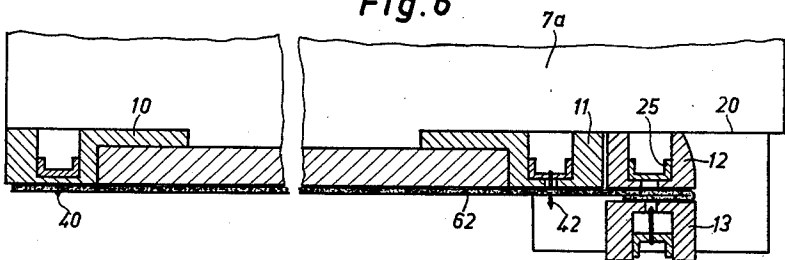


Fig. 7

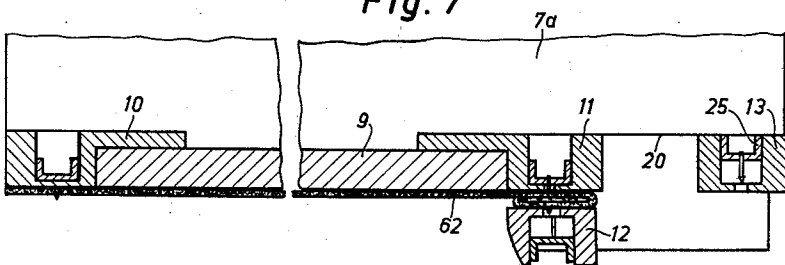
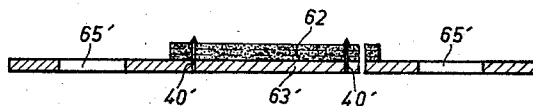


Fig. 3A



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## COMBINED CONVEYER AND FABRIC FOLDING DEVICE

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9 Claims. (Cl. 270—61)

The present invention relates to sewing and the like installations of the type including a conveyer for transporting fabric pieces or cuts to a sewing or processing station, and more particularly to the sewing of pre-folded pieces, such as is required in connection with hemming, binding and the like sewing operations.

An important object of the invention is the provision of a fabric pickup and transporting head or device operably associated with a conveyer and being equipped with folding means cooperating with the conveyer organs, whereby to fold the fabric pieces while en route to and to deliver the same in properly folded condition to a sewing station for instant use or processing.

Among the further objects of the invention is the provision of a composite conveyer and folding device of the type referred to which is both simple in construction and reliable in operation; which will automatically fold the pieces accurately and expeditiously by either single or multiple folding; and which will not require any basic change or re-design of conventional conveyer apparatus or devices.

The invention, both as to its ancillary objects as well as novel aspects, will be better understood from the following detailed description, taken in conjunction with the accompanying drawings forming part of this specification and in which:

FIG. 1 is a perspective view of a composite fabric pickup head and folding device forming part of a conveyer system and constructed in accordance with the principles of the invention;

FIG. 2 is an enlarged perspective fractional view of FIG. 1, more clearly showing the construction of the folding mechanism of the invention;

FIG. 3 is a cross-sectional view of the complete folding and conveying device taken on line III—III of FIG. 1, the device being shown in its position at a distributing station prior to the pickup of a fabric piece to be transported;

FIG. 3A is a fractional view of FIG. 3 showing the fabric piece upon delivery at a sewing or processing station;

FIG. 4 is an enlarged cross-section of the pickup and folding device of FIG. 2 in the normal position, or prior to the pickup of a fabric piece;

FIG. 5 being similar to FIG. 4 shows the device in the position after picking up a fabric piece;

FIG. 6 shows the device of FIG. 5 in the position after the first folding step; and

FIG. 7 shows the same device after the second folding step in carrying out a double folding operation in accordance with the invention.

Like reference numerals denote like parts and elements in the various views of the drawings.

With the foregoing objects in view, the invention involves generally the provision, in connection with a conveyer system for transporting fabric cuts or pieces to a processing station, of a composite fabric conveying pickup and folding device comprising essentially a fabric pickup and transport head having a substantially plane pickup surface and being provided with at least one rotatable folding flap adjoining an edge of and being flush with said surface. Said surface and flap are fitted

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with suitable fabric holding or retaining means, preferably in the form of a multiplicity of spring-urged retaining pins or needles projecting therefrom, to cause a fabric cut or piece to be transported to adhere to said flap and surface during the conveying and folding operations. There are further provided, according to the invention, a pair of cooperating stationary and movable actuating means, such as in the form of a rack and pinion mechanism or the like, arranged, respectively, at a predetermined fixed point in the path of and mounted upon said head, whereby to intermittently rotate and operate said flap and the adhering fabric piece to folding position by said head while en route to a processing station.

Further means may be provided for returning said flap to its initial position upon completion of a folding operation and to project and retract said pins, in such a manner as to cause the folded fabric portion to be released from the pins of the folding flap and to be seized by the pins holding the remaining fabric portions projecting from said surface and/or the next following flap in the case of a multiple folding device, as shown by the drawings and further understood as the following description proceeds.

Referring more particularly to the drawings, the numeral 1, FIG. 3, represents a pair of transporting rails engaged by the wheels 4 of a movable frame comprised of a pair of cross-arms 2 and side arms or guide rods 3. The latter embrace a pair of slide members 5 which are arranged for vertical movement or displacement by the provision or suitable actuating means (not shown) for picking up and depositing, respectively, a fabric piece at a central station and at a processing or receiving station, in a manner well known. Secured to the member 5 is the fabric pickup and folding device or head being described in greater detail in the following.

Secured to the slide members 5 is a casing (see also FIG. 1) having longitudinal walls 7 and 7a, side walls 8, and a bottom wall or plate 9. The latter is fitted with a pair of inserts 10 and 11 adjoining the side walls 8 and a pair of rotatable folding flaps 12 and 13 adjoining the insert 11, said flaps and inserts having their undersurfaces coinciding with the undersurface of the bottom wall 9, to form a continuous pickup plane or surface, as more clearly shown in FIG. 4.

The inserts 10 and 11 are secured to the bottom wall 9 by means of screws 14, FIG. 2, while, the flaps 12 and 13 are rotatably supported by a pair of angle pieces 17 and 17a, secured to the walls 7 and 7a, respectively, of the casing 6, by means of relatively long shafts or journals 15 and 15a, FIG. 3, and relatively short journals or shafts 16 and 16a, respectively, the latter being invisible in the drawing and located behind the shaft 15. More particularly, the shaft 15 of the folding flap 13 is journaled in the angle piece 17, while the shaft 15a of the flap 12 is journaled in the angle piece 17a. The rotary axis of the shafts 15a and 16a of the flap 12 coincides essentially with the prolongation of the lower edge 18 of the flap 12 adjoining the insert 11, while the rotary axis of the shafts 15 and 16 of the flap 13 coincides essentially with the prolongation of the lower edge 19 of the flap 13 adjoining the flap 12. The lower ends 20 of the wall 7 and 7a act as stops or abutments for the flaps 12 and 13 in their normal or inoperative position.

Both the flaps 12 and 13 and inserts 10 and 11 are provided with inner recesses 21, FIG. 2, being open at the top and closed by bottom walls 22. Movably mounted within each of said recesses is a channel-shaped slide 23 having a bottom 24 and side walls 25 serving as guides engaging the sides of said recesses. The slides 23 being provided with parallel guide or aligning means in the form of upstanding posts or bolts 26 mounted upon the bottom 22 of the recesses 21, FIG. 3, are, in turn, fitted at their

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opposite ends 27 with a pair of depending actuating pegs or pins 28 projecting through slots or openings 29 in the bottom 22 of the recesses 21. Further projecting through the slots 29 are a pair of pawls 30 rotatably mounted at the opposite ends of the recesses 21 by means of pins 31 and being formed with tapering edges 32 and projections or noses 33. The pawls 30 of both the flaps 12 and 13 and of the insert 11 are suitably positioned in the recesses 21 by the provision of separator sleeves 34, FIG. 2, in such a manner as to prevent mutual interference between and during rotation of the flaps 12 and 13. For the same purposes, the pegs 28 are arranged in staggered relation. Further provided within slots 35, FIG. 1, of the flap 12 are adjustable stops 36 for the pegs 28 of the flap 13, while similar adjustable stops 38 for the pegs 28 of flap 12 are arranged within slots 37 of the insert 11. Coil springs 39, FIG. 3, act to urge the noses 33 of the pawls 30 into engagement with the ends 27 of the slides 23.

Mounted at spaced intervals within the bottom 24 of each slide 23 of both the inserts and folding flaps are a multiplicity of retaining pins or needles 40 projecting in a downward direction through corresponding holes or bores 41 in the bottom 22 of a recess 21, said pins being advantageously provided adjacent to the outer points, with constricted portions 42, FIG. 3, for the purpose of ensuring a secure hold of the fabric pieces during transporting and folding, in the manner as will be further understood from the following.

Coil springs 43, FIG. 2, arranged to engage the bottom 24 of the slides 23, on the one hand, and angular abutments 44, 45, secured to the inserts 10, 11 and flaps 12, 13, on the other hand, serve to normally urge the pins 40 in the downward or projecting direction from the flaps and inserts.

The bottom walls 22 of the recesses 21 of the flaps 12 and 13 are provided with slots 46 being aligned with the pins 40 of the next following rows and serving to receive said pins during the rotation of the flaps or folding operations, as will become further apparent from the following.

The shaft 15, FIG. 3, of the flap 13 projecting beyond the angle piece 17 carries a toothed wheel or gear 47 being loosely mounted thereon between two coupling disks 49 and 50 each fitted with a friction ring 48. The hub 51 of disk 49 is fixedly secured to the shaft 15 by means of a pin 52, while disk 50 having a groove 53 is axially displaceable and prevented from rotation by a pin 54 secured to shaft 15 and projecting into the groove 53. A dished spring 55 adjustable by means of nut 56 engaging the end of shaft 15 serves to control the pressure between the gear 47 and the friction rings 48 of the disks 49 and 50. Hub 57 of disk 49 is formed with a groove 57 serving to receive a coil spring 58 having one end affixed to a pin 59 secured to said hub and having its opposite end held by a pin 60, FIG. 1, secured to the casing 6.

The shaft 15a of the flap 13 projecting through the angle piece 17a carries a further gear 47a corresponding to the gear 47 of the flap 13. In a similar manner, the remaining parts cooperating with the shaft 15a and gear 47a correspond to the parts 48 to 56 cooperating with the gear 47 and flap 12, whereby to render a detailed description thereof unnecessary.

Disposed outside the pickup and folding head, in a direction parallel to the longitudinal wall 7 of the casing 6 and in the path of the gear 47 of flap 13, is a stationary rack 61, a similar rack 61a being arranged parallel to the wall 7a and in the path of the gear 47a of the flap 12. The rack 61a is displaced relative to the rack 61 in the direction of movement of the pickup head, in such a manner as to effect a sequential engagement first between the gear 47 and rack 61 and thereafter between the gear 47a and the rack 61a, respectively, to result in a double folding operation as described in the following. If only a single folding of the fabric is desired, the flap 12 and its associated operating elements may be omitted, as will be understood.

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Provided at the central or distributing station is a supporting plate or table 63 holding the fabric piece 62, said plate having edges 64 arranged for cooperation with the pawls 30 and being, in turn, provided with slots 65 and 66 for passing the pegs 28 and pins 40 of the slides 23. A similar plate 63' at the receiving or processing station, FIG. 3A, is provided simply with slots 65' for passing the pawls 30, plate 63' being further fitted with upwardly projecting retaining pins 40' arranged to engage bores or holes 67, FIG. 1, in the inserts 10 and 11, to enable the deposit of the fabric pieces 62 in folded condition at the end of a conveying operation.

In operation, upon lowering the pickup head at the central or pickup station, FIGS. 3 and 4, upon the plate or table 63 supporting fabric piece 62, the edges 64 of said plate are engaged by the tapering edges 32 of all the pawls 30 of the inserts 10, 11 and flaps 12, 13, whereby to rotate the pawls in clockwise direction and to release the noses 33 from the slides 23. As a consequence, the slides are lowered by the pressure of the springs 43, whereby to cause the pins 40 to penetrate the fabric 62, as shown in FIG. 5. Due to the constricted portions 42 of the pins 40, the fabric is caused to adhere to the undersurface of the pickup head for lifting and transporting thereby to the receiving or processing station by movement of said head along the rails 1.

During the transport of the pickup head and at a predetermined position of the head while enroute to the processing station, or prior to its arrival at the latter, the gear 47 of flap 13 is engaged by the rack 61, whereby to rotate the flap 13 about its shafts 15 and 16 through an angle of substantially 180°, as shown in FIG. 6 of the drawings. This, in turn, results in a first folding of the edge portion of the fabric 62 about the rotary axis of the flap 13 with the material being maintained in proper folded position or prevented from displacement by the pins 40. During the transfer of the folded portion of the fabric piece from the flap 13 to the pins of the flap 12, engagement of the pegs 28 of flap 13 with the stops 23 results in the retraction of the slide 23 of flap 13 from the bottom 22 of the recess 21 against the action of the spring 43, whereby, in turn, to cause the pins 40 of flap 13 to be withdrawn from the fabric and retracted below the surface of the bottom wall 22 of the recess 11. At the same time, the pins 40 of flap 12 penetrate through the folded fabric into the slots 46 of the flap 13, while the pawls 30 of the flaps being rotated during the rotation of the flaps enter the slots 35 such as to cause the ends 27 of the slide 23 to engage the noses 33, whereby to lock the slides in the retracted position.

Due to the frictional engagement of the disks 49 and 50 with the gear 47, a continued movement of the pickup head after reaching of the end position of the folding flap 13 will result in a slipping of the gear. After the latter has been disengaged from the rack 61, the flap 13 is returned to its initial or starting position by the action of the spring 53 which has been tensioned during the folding operation, the final or end position of the flap being determined by the engagement of the flap with the end 70 of the walls 7 and 7a.

During the further movement of the pickup head, gear 47a of the flap 12 engages the rack 61a to effect operation of the flap 12 in substantially the analogous manner as described in reference to the operation of the flap 13, thus resulting in a double folding of the fabric, in the manner as shown in FIG. 7. Flap 12 is returned to its starting position by a return spring (not shown) in the same manner as the flap 13.

Upon arrival of the fabric piece at the receiving or processing station, the pickup head with the folded piece is lowered upon the support 63', FIG. 3A, upon engagement of the pegs 28 of the inserts 10 and 11 with said plate, the slide 23 is retracted in the manner described by the spring 43, to thereby lock the pawls 30 and to cause the pins 40 of the inserts to be withdrawn from the fabric.

At the same time, the fabric is penetrated by the pins 40' of the plate 63', thus depositing and retaining the fabric in the properly folded condition ready for instant use in connection with a sewing or the like processing operation.

In the foregoing the invention has been described with reference to a specific illustrative device. It will be understood, however, that variations and modifications as well as the substitution of equivalent parts and elements for those shown herein for illustration, may be made without departing from the broader scope and spirit of the invention as set forth in appended claims. The specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

We claim:

1. The combination with a conveyer for transporting fabric pieces, of a combined fabric conveying and edge folding device comprising a fabric pickup and transporting head having a substantially plane surface, a folding flap rotatably mounted upon said head, said flap being normally substantially flush with and having an edge adjoining the edge of said surface, spring-urged fabric retaining means upon said head projectable from and retractible below said surface, to penetrate and pick up a fabric piece in the projected position and to release the same in the retracted position of said retaining means, first actuating means upon said head to rotate said flap towards and into engagement with said surface, to fold the edge of said fabric piece, second stationary actuating means positioned in the path of said head for cooperation with said first actuating means, to operate said flap to folding position by said head while en route along said conveyer, said flap being recessed to receive said retaining means in the folded position, whereby to cause said retaining means to seize and to hold the folded portion against the unfolded portion of said fabric, and means to return said flap to its initial position upon completion of a folding operation.

2. In a fabric conveying and folding device as claimed in claim 1, said holding means consisting of a multiplicity of retaining pins slidably mounted in said head and projecting from and retractible into said surface.

3. In a fabric conveying and folding device as claimed in claim 2, said holding means consisting of a multiplicity of retaining pins slidably mounted in said head and flap and projecting from said flap and surface, said flap having a plurality of recesses to receive said pins of said head in the folded position, and means to retract the pins of said flap in the folded position.

4. In a fabric conveying and folding device as claimed in claim 2, said pins being provided with constricted portions near the points thereof.

5. In a fabric conveying and folding device as claimed in claim 1, said actuating means being comprised of a pinion connected to said flap and a stationary rack arranged to engage said pinion at a predetermined position of said head while en route to a processing station.

6. In a fabric conveying and folding device as claimed in claim 3, including means to operate said pins to projecting position upon picking up of a fabric piece at a supply station and to operate said pins to retracted position upon depositing said piece at said processing station.

7. The combination with a conveyer for transporting fabric pieces, of a combined fabric conveying an edge folding device comprising a fabric pickup and supporting head having a substantially plane surface, a folding flap normally flush with said surface and adjoining said head, to provide a continuous fabric retaining surface by said head and flap, means rotatably supporting said flap by said head for rotating said flap to folded position towards and into engagement with said surface, spring-urged fabric retaining means upon both said head and flap projectable from and retractible below said surface, to penetrate and pick up a fabric piece in the projected position and to release the same in the retracted position of said retaining means, cooperating stationary and movable actuating means disposed, respectively, at a predetermined point in the path of and upon said head, to operate said flap and adhering fabric to folded position, and means to retract the retaining means of said flap in the folded position, said flap being recessed to receive and cause the retaining means of said head to seize and hold the folded portion against the unfolded portion of said fabric.

8. A fabric folding device comprising a supporting head having a substantially plane fabric retaining surface, a folding flap rotatably mounted upon said head, said flap being normally flush with and having an edge adjoining said surface, spring-urged fabric retaining means upon said head projectable from and retractible below said surface, to seize and retain a fabric piece in the projected position and to release the same in the retracted position of said retaining means, actuating means to rotate said flap to folded position towards and into engagement with said surface, to fold the fabric piece by said flap, said flap being recessed to receive said retaining means in the folded position, whereby to cause said retaining means to seize and to hold the folded portion against the unfolded portion of said fabric.

9. A fabric folding device comprising a supporting head having a substantially plane fabric retaining surface, a folding flap rotatably mounted upon said head, said flap being normally flush with and having an edge adjoining said surface, spring-urged fabric retaining means upon both said head and flap projectable from and retractible below said surface, to seize and retain a fabric piece in the projected position and to release the same in the retracted position of said retaining means, actuating means to rotate said flap to folded position towards and into engagement with said surface, to fold said fabric piece by said flap, and means to retract the retaining means of said flap in the folded position, said flap being recessed to receive the retaining means of said head in the folded position, whereby to cause said last retaining means to seize and to hold the folded portion against the unfolded portion of said fabric.

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