Oct. 15, 1968 N. E. ELSAS 3,405,934

FABRIC HANDLING APPARATUS

Original Filed April 20, 1966 3 Sheets-Sheet 1

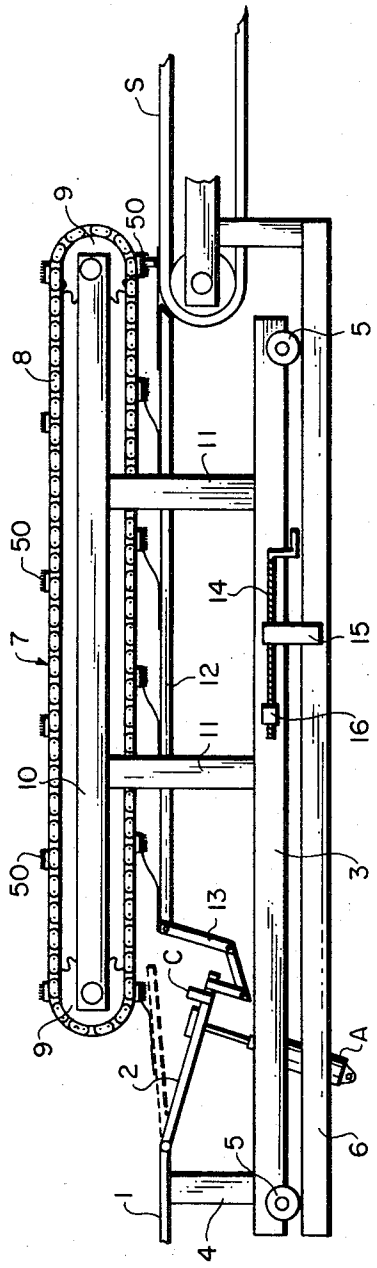


FIG 1

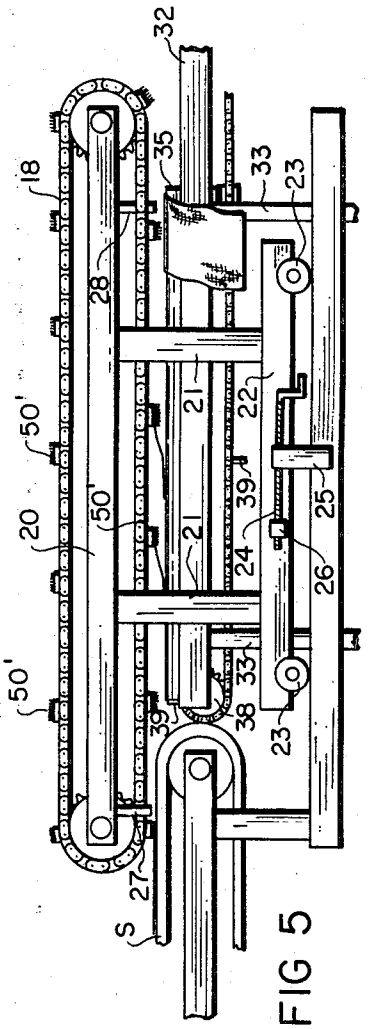


FIG 5

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FABRIC HANDLING APPARATUS

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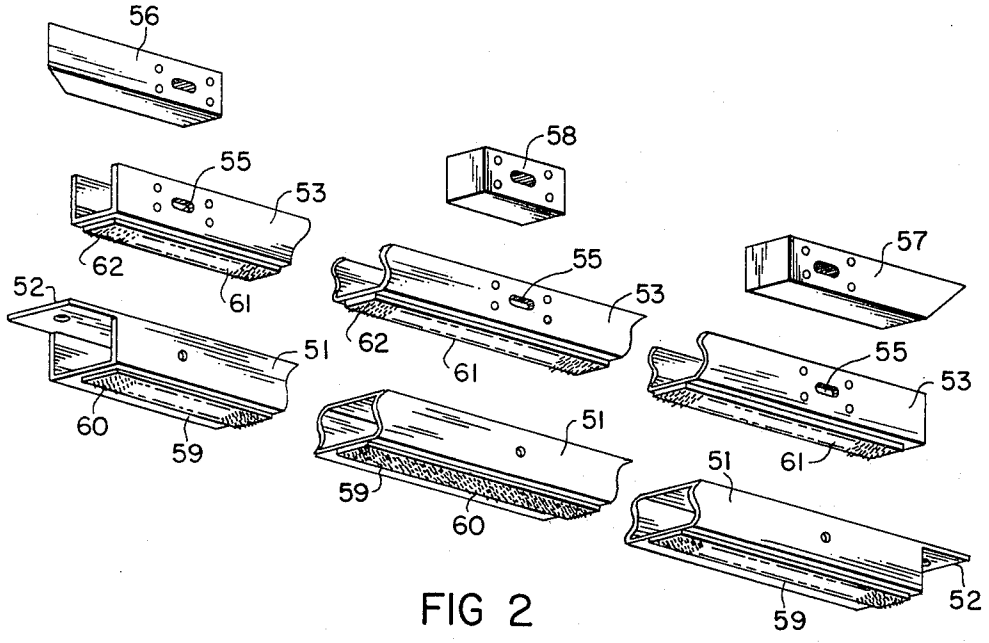


FIG 2

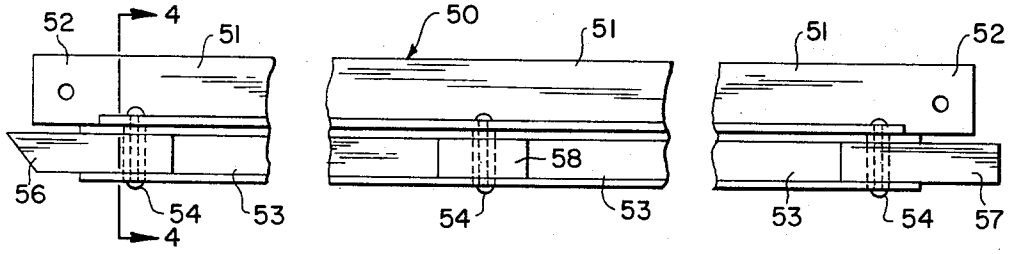


FIG 3

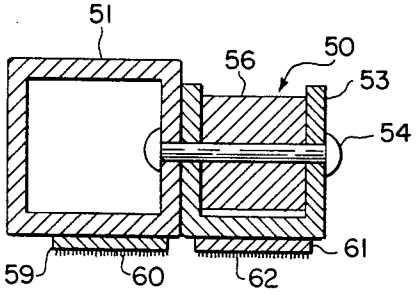


FIG 4

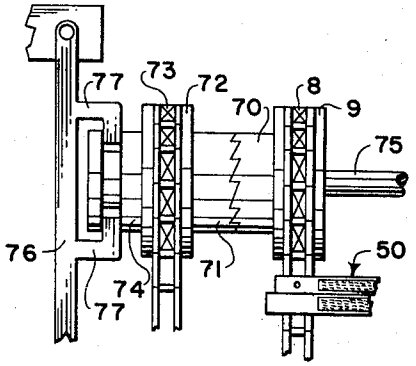


FIG 9

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Original Filed April 20, 1966 3 Sheets-Sheet 3

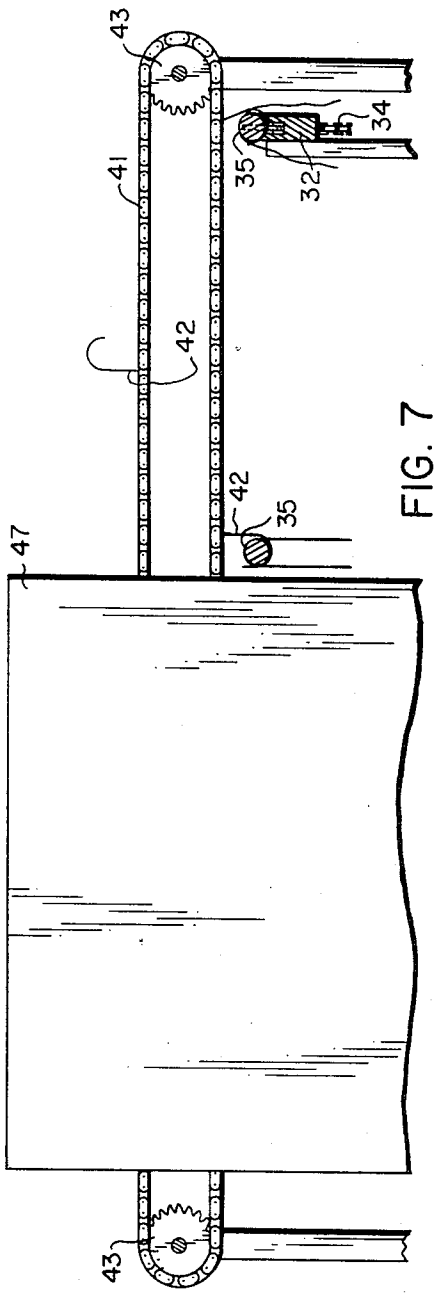


FIG. 7

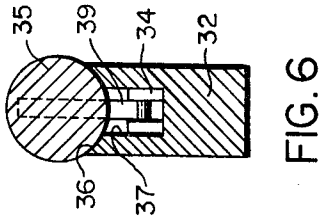


FIG. 6

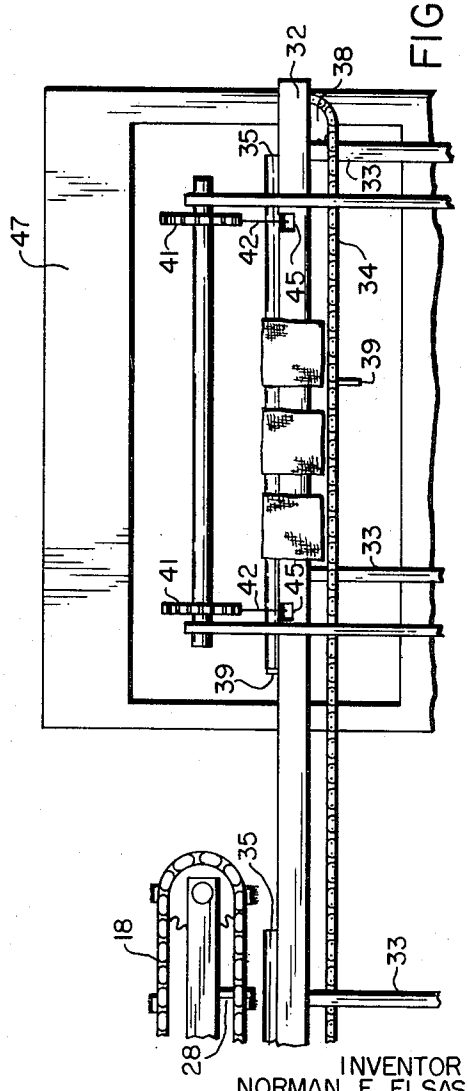


FIG. 8

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United States Patent Office 3,405,934
Patented Oct. 15, 1968

3,405,934

FABRIC HANDLING APPARATUS

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Continuation of application Ser. No. 549,125, Apr. 20, 1966, which is a continuation-in-part of application Ser. No. 450,330, Apr. 23, 1965. This application July 27, 1967, Ser. No. 656,597
7 Claims. (Cl. 271—3)

This application is a continuation of Ser. No. 549,125 filed Apr. 20, 1966, now abandoned, which is a continuation-in-part of U.S. application Ser. No. 450,330, filed Apr. 23, 1965, now abandonded.

The present invention relates to an improved apparatus for fabric handling. More particularly, the present invention relates to improvements in automatically feeding and doffing pieces of fabric in timed relationship in conjunction with a means for processing the pieces of fabric such as sewing machines, labeling machines, off-set printing machines, silk-screening machines, and the like.

While the present invention is applicable for use with a wide variety of fabric processing means the following description specifically relates the present invention to a silk-screening device for the purposes of achieving clarity and conciseness in disclosing the present invention. It should be understood that the same concepts and principles of operation and construction are applicable in connection with the use of the present invention with other means for processing fabrics.

Briefly described, the illustrated embodiment of the present invention includes a feed mechanism for receiving picking-up and conveying successive individual pieces of fabric to the flat conveyor belt of a conventional silk-screening unit. The individual pieces of fabric are released and deposited in timed sequence onto the conveyor belt whereafter they are subjected to printing operations by the silk-screens. A doffing and transfer mechanism is provided for sequentially removing in timed relationship successive pieces of fabric from the conveyor belt after they have been printed but while the printed designs are still wet and un-set. After removal this mechanism conveys and transfers the pieces of fabric to a novel hanger bar mechanism upon which the pieces of fabric are deposited or draped with the individual pieces of fabric being in adjacent relationship. A pick-up mechanism is provided for operatively engaging the hanger bars after they become completely draped with pieces of fabric and successively transporting each hanger bar through a drying chamber whereupon the freshly printed designs on the fabric is dried and converted to a set condition.

As is apparent from the above brief description the individual mechanisms comprising the improved fabric handling apparatus of the present invention are driven in timed relationship to the silk-screening unit and to each other with the complete operation being carried out in an intermittent but continuous manner.

Specifically, some other important features of the present invention include a novel gripping bar which is cam-operated for picking-up, conveying and releasing the individual pieces of fabric. The present gripper bars offer considerable advantage over those described in the prior application referred to above in that a much simpler design is employed along with a novel camming means.

In addition, the feeding and doffing and transfer mechanisms, as described above, may be provided with a novel adjustment device whereby pieces of fabric of various size may be processed through the silk-screens in a continuous manner.

As a result, the present invention provides a novel overall system of fabric handling, particularly suitable for silk-screening operations, wherein manual positioning or handling of the individual pieces of fabric during processing is unnecessary.

These and other features and advantages of the present invention will become more apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a side elevation of the feeding mechanism forming a part of the present invention for receiving, picking-up and conveying successive individual pieces of fabric to the belt of a conventional silk-screening unit.

FIG. 2 is a perspective view of the novel gripper bar included within the present invention wherein the parts are shown in disassembly.

FIG. 3 is a top view of an assembled gripper bar.

FIG. 4 is a cross sectional end view of the gripper bar taken along line 4—4 of FIG. 3.

FIG. 5 is a side elevation of the doffing and transfer mechanism of the present invention for removing successive printed pieces of fabric from the belt of a silk-screening unit and transferring them to a hanger bar mechanism.

FIG. 6 is a cross sectional view of the hanger bar mechanism illustrating the manner in which the hanger bars are supported and conveyed while being draped with printed pieces of fabric.

FIG. 7 is a side elevation of the pick-up mechanism for engaging and transporting successive fabric draped hanger bars through a drying chamber.

FIG. 8 is an end elevation of the mechanism as shown in FIG. 7 illustrating the manner in which each hanger bar is operatively engaged at each end by the pick-up mechanism.

FIG. 9 is a partial side view of the novel clutch adjusting means which may be used with the present invention.

Referring to FIG. 1, the feed mechanism which comprises a part of the present invention is illustrated. As shown therein, a fabric supply panel **1** is provided having a hinged feed board **2** attached at the leading end thereof. The fabric supply panel is mounted on a movable platform **3** by means of supports **4**. The movable platform is, in turn, suitably mounted on a plurality of casters or wheels **5** which operate over the upper surface of a fixed rail **6**. The fixed rail serves as a base for the overall fabric handling apparatus of the present invention.

Also mounted on the movable platform **3** is a fabric pick-up and release conveyor generally indicated by numeral **7**. This conveyor comprises a pair of oppositely mounted endless chains **8** or the like, only one of which may be seen in FIG. 1. Each of the chains **8** is mounted on a pair of sprockets **9** which are suitably driven at the same speed and in timed relationship with the conveyors of a silk-screening unit. Sprockets **9** are mounted on axles attached to a horizontal rail **10** which is supported above the movable platform by means of vertical supports **11**. Continuously extending beneath the endless chains **8** is a fabric supporting table **12**. This supporting table is secured to vertical supports **11** immediately beneath the lower runs of the endless chains and substantially at the same level as the upper run of the conveyor S of the silk-screening unit. At the rear or feed end of the table **12** is a downwardly and rearwardly extending angled member **13** which cooperates with the front edge of the hinged feed board **2** as a guide for the individual pieces of fabric being fed to the conveyor **7**. This cooperation is generally indicated by the relative positioning of the elements as shown in FIG. 1.

Positioned transversely between the endless chains **8** and in spaced apart relationship are a plurality of gripper bars **50**. These gripper bars are secured to the endless chains for intermittent travel therewith. The spacing be-

tween adjacent gripper bars is preferably such that successive pieces of fabric may be deposited in appropriate positions on the conveyor S for movement through the silk screens.

The construction of the gripper bar **50** may be more readily understood by reference to FIGS. 2–4. Each gripper bar comprises a tubular member **51** having extension tabs **52** at opposite ends thereof for attachment to the opposite endless chains **8**. Such attachment may be by any suitable means such as pins, bolts, or the like. Upon attachment, the body portion of the tubular member **51** lies outside of the plane defined by the endless chains **8**. Slidably secured to one side of tubular member **51** is a channel member **53** of substantially the same length. As is apparent from the drawings, the channel member is secured to the tubular member by means of a series of pins **54**. In order to be slidable with respect to tubular member **51** the sides of the channel member **53** are provided with a series of slots **55** through which the corresponding pins **54** extend.

With the channel of member **53** there are provided a series of reinforcing blocks **58** which correspond to the regions of the member wherein the pins **54** are located. These blocks are also provided with slots corresponding to the slots in the sides of the channel member and are preferably secured in place by riveting or the like.

At opposite ends of the channel member **53** there are provided a pair of camming blocks **56** and **57** seated within the channel and extending outward from the ends thereof. The camming blocks also have slots therein and are secured to the channel member. The outer ends of these blocks are beveled in a suitable manner to provide camming surfaces whereby the channel member **53** may be moved in alternate directions relative to the tubular member **51** which is fixedly secured to the endless chains **8**. It is this relative movement between the channel member **53** and the tubular member **51** which enables the gripper bar to operate to pick up and release the pieces of fabric. This will be more apparent from the following discussion.

As best seen in FIGS. 2 and 4 the lower faces of the tubular member **51** and the channel member **53** are provided, respectively, with needle strips **59** and **61**. These needle strips comprise relatively thin strips of material from which a plurality of angularly inclined needles **60** and **62** project. As is apparent from FIG. 2, the needles **60** carried by the tubular member **51** are inclined in the opposite manner to the needles **62** carried by the channel member **53**.

The operation of the gripper bars **50** is illustrated in the following sequence of steps. A piece of fabric is initially placed in contact with the needles **60** and **62** when the needles are in an angularly separated relationship such as would be obtained when the channel member **53** has been moved completely to the right as shown in FIGS. 2 and 3. After the fabric has been placed in contact with the needles **60** and **62** the channel member **53** is cammed through camming block **57** in a direction towards the left in FIGS. 2 and 3. As a result, the needles **62** move into closer angular relationship with needles **60** thus effecting a gripping action on the fabric. The fabric will remain gripped by the combined action of needles **60** and **62** as long as they are maintained in this close angular relationship. The fabric may be released by merely camming the channel member **53** through camming block **56** in a direction toward the right as shown in FIGS. 2 and 3. In this manner, the needles **62** will again become angularly separated from needles **60** and the fabric will be free to fall from both sets of needles.

By providing angularly inclined needles the fabric is actually urged upward onto the needles as the needles **62** move into closer angular relationship with needles **60**. Conversely, movement of the needles **62** toward an angularly separated relationship with needles **60** urges the fabric off of the needles.

Referring back to FIG. 1, the operation of the mechanism illustrated therein will be described. An operator manually positions a single piece of fabric on the hinged feed board **2** making sure to position the leading edge of the piece of fabric adjacent the guide formed by the extension member **13**. The piece of fabric is also positioned laterally of the feed board **2** by means of suitable transverse guides. It should be understood that while the piece of fabric is being manually positioned on the feed board one of the gripper bars **50** is advanced by endless chains **8** into position above and adjacent the leading edge of the piece of fabric on the board. While the gripper bar is temporarily in a stationary position, the feed board **2** is pivoted upward toward the gripper bar by any well known means such as an air cylinder A. As the feed board pivots upward the leading edge of the piece of fabric is first placed into contact with the two sets of needles, **60** and **62**, of the gripper bar. Almost simultaneous with the contact between the fabric and the two sets of needles a cam C carried on the lateral edge of the feed board **2** engages the camming block **57** of the gripper bar thereby causing the needles **62** to move into angularly closer relationship with needles **60** whereby the leading edge of the fabric becomes gripped by the combined action of the two sets of needles. Thereafter, the feed board **2** is automatically retracted to its original position by the air cylinder A and the endless chains **8** again advance a distance equal to the distance between adjacent gripper bars whereby the gripped piece of fabric is moved onto table **12** on its way to conveyor S. Of course, while the endless chains are moving again another piece of fabric is being placed in position on the feed board **2** for being gripped by the next successive gripper bar.

During the intermittent but continuous movement of the endless chains **8**, the successive pieces of fabric which have been picked up and gripped by the gripper bars are conveyed across the upper surface of the table **12**. The table **12** terminates adjacent the feed end of a conveyor S of a conventional silk screening unit. As the gripper bars **50** pass above the conveyor S, a fixed camming bar extending downward from the supporting structure of the endless chains **8** engages camming block **56** located on the opposite end of the gripper bar from camming block **57**. This fixed camming bar cannot be seen in FIG. 1 but merely comprises a rigid bar which is located in such a manner that the camming surface of camming block **56** rides up against it to produce relative movement in the channel member **53**. As the gripper bar **50** passes by this camming bar the needles **62** are moved into an angularly separated relationship from the needles **60** whereby the leading edge of the piece of fabric is urged from the needles and allowed to fall to the surface of the conveyor S.

Since the conveyor S is conventionally provided with a sticky surface, the pieces of fabric are immediately held in position as they are dropped thereon. The conveyor S also moves intermittently in the same timed relationship as do the endless chains **8**. As a result, the successive individual pieces of fabric are deposited in accurate positions on the conveyor S for the subsequent printing during the silk screening operation.

In the event it is desired to process pieces of fabric of varying sizes, it is merely necessary to adjust the positioning of the fabric release point relative to that of the conveyor S. Such adjustment is essential since each piece of fabric to be printed must be accurately positioned beneath the silk screens for proper printing. The positioning of the fabrics on the conveyor S, of course, relates to ensuring that the center lines of each piece of fabric are always positioned on the corresponding center line markings on conveyor S regardless of size. This is provided for by means of a threaded crank **14** which is fixedly journaled in block **15** attached to rail **6**. The free end of crank **14** threadedly engages a block **16** fixedly secured to the movable platform **3**. As a result, the entire feed mech-

anism mounted on the movable platform 3 may have its relative position adjusted with extreme ease.

As an alternative means for adjusting the fabric release point relative to conveyor S, a clutch arrangement such as that illustrated in FIG. 9 may be employed. Specifically, the clutch arrangement allows the fabric feed mechanism to be temporarily disconnected from the central driving means which is also used to drive conveyor S. After being disconnected, the chains 8 of the feed mechanism may be freely rotated on sprockets 9 to move the gripper bars 50 into a new relative positioning with respect to conveyor S. Thereafter, the clutch is re-engaged and the feed mechanism will have a new fabric release point relative to conveyor S as well as a new relative fabric pick-up point. The fabric pick-up point is easily adjusted on hinged feed board 2 by a corresponding adjustment in the front guide position as provided by angled member 13. The overall result when the present invention is employed with a silk-screening machine is that a piece of fabric, regardless of size, may be accurately deposited on conveyor S so that its transverse center line will correspond with the transverse center lines of the silk screens.

Referring specifically to FIG. 9, one embodiment of a typical clutch arrangement is illustrated. As shown therein, one of the sprockets 9 is provided with a clutch plate 70 fixedly secured to its outer face through which the driving power to the feed mechanism, including endless chain 8 and gripper bar 50, is transmitted. Power is transmitted to clutch plate 70 through a corresponding clutch plate 71 which is fixedly secured to a sprocket 72 and driven by endless chain 73 from the central driving means of the entire apparatus. A grooved hub 74 is fixedly secured on the opposite side of sprocket 72. It should be understood that clutch plate 71, sprocket 72 and hub 74 are secured together and are rotatably mounted on an outer extension of axle 75 while sprocket 9 and clutch plate 70 are fixedly secured to and rotate with axle 75.

A lever arm 76 is provided to move clutch plate 71 out of engagement with clutch plate 70. This is accomplished by means of angled lugs 77 on the lever arm which ride in the groove of hub 74. The lever arm 76 is appropriately pivotally mounted on a frame member. In this manner, the lever arm may be used to disengage and re-engage the clutch plate 71 with clutch plate 70.

When the clutch plates are disengaged, the feed mechanism may be conveniently rotated to the desired new position whereupon the clutch plates are re-engaged thereby providing for a new relative positioning of the gripper bars 50 as the feed mechanism is intermittently driven.

Referring next to FIG. 5, there is shown the doffing and transfer mechanism whereby successive freshly printed pieces of fabric which are still in an unset condition are removed from the conveyor S and transferred to the novel hanger bar mechanism. The mechanism is very similar to that shown in FIG. 1. There are provided a pair of oppositely mounted endless chains 18 or the like (only one of which is shown) having secured transversely therebetween in spaced apart relationship a plurality of gripper bars 50'. These gripper bars are of substantially the same construction as those previously described with the exception that the camming surfaces of the camming blocks 56 and 57 are symmetrical on both ends of the gripper bar. The endless chains 18 are mounted on sprockets 19 which, in turn, are supported by a pair of horizontal rails 20 (only one of which is shown). A pair of vertical legs 21 support each horizontal rail 20 with a lower movable support 22 which is mounted on casters 23. The casters 23 travel over the upper surface of the rail 6 which extends from the feed mechanism.

The endless chains 18 operate on an intermittent basis in timed relationship and at the same speed as the conveyor S. As a result, there is no relative movement between the gripper bars and pieces of fabric which are in the same plane.

The doffing and transfer mechanism is also provided with a threaded crank 24 which is fixedly journaled in block 25 secured to rail 6 while the free end of the crank threadedly engages block 26 secured to movable support 22. In this manner the transfer mechanism is provided with an adjustment capability to accommodate pieces of fabric of varying sizes in the same manner as the mechanism described in FIG. 1.

Again, the clutch arrangement described with respect to FIG. 9 may alternatively be employed to relatively position the gripper bars with respect to the pieces of fabric in the same manner as with the feed mechanism.

In operation, the doffing and transfer mechanism is positioned so that the gripper bars 50' move into engagement with the leading edge of a piece of freshly printed fabric as it is conveyed by the conveyor S. Since both the endless chains 18 and the conveyor S are moving at the same speed the fabric remains undisturbed except to the extent of being contacted by the two sets of needles, 60 and 62, carried by the gripper bar. As the piece of fabric and the gripper bar move forward, camming block 57 of the gripper bar strikes the camming bar 27 and the movable set of needles 62 on the gripper bar are moved into closer angular relationship with the stationary needles 60 whereby the piece of fabric becomes urged upward onto the needles and gripped thereby. Further movement of the endless chains 18 cause the freshly printed piece of fabric to be peeled from the surface of conveyor S. The pieces of fabric remain gripped by the gripper bars 50' until camming block 56 on the opposite end of the gripper bar strikes corresponding camming bar 28 which extends downward from the opposite horizontal rail of the doffing and transfer mechanism. The action of the camming bar 28 causes the movable needles 62 of the gripper bar to move into an angularly separated relationship with respect to the stationary needles 60. As a result the piece of printed fabric is urged from the needles and allowed to fall from the gripper bar and onto the hanger bar mechanism as described below in detail.

Located beneath the doffing and transfer mechanism and approximately mid-way of the gripper bars is a hanger bar mechanism. The hanger bar mechanism generally comprises a guide trough 32 vertically supported on legs 33 and having an endless chain 34 cooperating therewith for moving successive hanger bars 35 along the trough.

As seen in FIG. 6 the guide trough 32 is of a width less than the diameter of the hanger bar 35. In this manner the pieces of fabric will not contact the trough as they are draped over the hanger bar. The upper surface 36 of the guide trough is arcuately shaped in a concave manner so as to correspond with the curvature of the hanger bars. The arcuate surface provides positive support and guidance for the hanger bars during conveyance. Located centrally of the arcuate upper surface 36 and running longitudinally with the guide trough is a channel 37 within which the upper run of endless chain 34 travels. The endless chain 34 is mounted on sprockets 38 located at opposite ends of the guide trough 32. Lugs 39 are periodically secured to the chain along its length and are mounted in such a manner as to extend upward from the chain as it passes along its upper run through the channel 37 of the guide trough. These lugs serve to engage the rear portions of the hanger bars 5 and thereby move them in the longitudinal direction of the guide trough.

Suitable driving means (not shown) are provided to drive the endless chain 34 in timed relationship and at the same speed as the endless chains 18 of the doffing and transfer mechanism. In this manner, after each freshly printed piece of fabric has been released from the transfer mechanism and dropped onto the hanger bar 35 the endless chain 34 will advance the hanger bar to a new position for receipt of another printed piece of fabric without overlapping the previously received piece of fabric. As each hanger bar becomes filled with several pieces of printed fabric additional hanger bars are successively pro-

vided to the trough either by manual means or by a feed magazine. As a result, a hanger bar is always present to receive the printed pieces of fabric from the transfer mechanism. It should be understood that the lugs **39** on the endless chain **34** are located at sufficient distances from each other to accommodate successive hanger bars.

Referring next to FIGS. 7 and 8, the hanger bar pick-up mechanism may be seen mounted transversely of the end of the hanger bar mechanism. Specifically, this mechanism comprises a pair of endless chains **41**, or the like, having J-shaped pick-up hooks **42** secured at spaced apart points along their lengths. The pick-up hooks **42** of each endless chain **41** are located symmetrically with respect to each other so that a hanger bar may be conveniently supported therebetween. The endless chains are mounted on corresponding sprockets **43** which are suitably supported by axles connected to a supporting framework.

Again, the endless chains **41** are driven in timed relationship and at the same speed as the endless chain **34** of the hanger bar mechanism. However, the timed relationship is such that the endless chains **41** intermittently move while the endless chain **34** is temporarily at rest. Thus, it may be seen that the hanger bars **35** are engaged and picked up by the pick-up hooks **42** only while they are in a stationary position.

Pick-up of the hanger bars is accomplished by providing the guide trough **32** with a pair of slots **45** in its upper surface and spaced apart a distance corresponding to the separation distance between the endless chains **41**. These slots allow the pick-up hooks **42** to pass through the guide trough while engaging, picking up and removing the hanger bar **35** from the trough. As shown in FIG. 7, the pick-up hooks are mounted in any well known manner to pivot on the endless chains **41** while engaging the opposite ends of the hanger bar. In this manner, the hanger bar is allowed to firmly seat itself within the curved portion of the pick-up hooks prior to being withdrawn from the guide trough. As a result, there is substantially no possibility that the hanger bar will become dislodged from the trough without being securely held by the pick-up hooks.

It should be noted that the endless chains **41** are separated a sufficient distance so that the pick-up hooks will engage the hanger bar **35** at its opposite ends so as not to interfere with the several pieces of freshly printed fabric which are hanging from the bar.

After being picked up by the pick-up hooks, the hanger bars **35** having the freshly printed pieces of fabric hanging therefrom are intermittently conveyed through a drying chamber **47**. This drying chamber is maintained at suitable temperatures to effect drying and setting of the printed designs on the pieces of fabric. Such means for maintaining adequate temperatures within the drying chamber may include such conventional means as hot air currents or heating elements installed within the chamber. This, of course, is all well within the skill of the art and may vary according to the particular types of printing inks employed.

As the pieces of fabric exit from the drying chamber **47** the hanger bars **35** are removed from the pick-up hooks **42**. The individual pieces of printed fabric are then manually removed from the hanger bar and placed in appropriate stacks while the hanger bars **35** are returned to the hanger bar mechanism and subsequently replaced in the guide trough **32**.

It is emphasized that the various mechanisms comprising the overall fabric handling apparatus of the present invention must be driven in timed relationship with respect to each other to enable the individual pieces of fabric to be properly printed in the silk screening operation as well as preventing damage to the fabric. It is preferred that the various mechanisms of the overall apparatus be driven through inter-related gearing systems from a single power source. It is believed unnecessary to further describe such gearing systems since they are but mere matters of design for those skilled in the art.

Therefore, it should be apparent from the above description that an overall fabric handling apparatus has been provided, particularly for use in silk-screening operations, wherein individual pieces of fabric may be subjected to several process steps without necessity for intermediate manual handling. It should also be understood that while the present invention has been described with respect to silk-screening operations, the various independent mechanisms may also be employed in other operations requiring individual handling of successive pieces of fabric, either individually or in any combination, as was pointed out in the introduction of this specification.

Thus having described the present invention, it will be understood by those skilled in the art that various modifications may be made without departing from the spirit and scope of the invention. Therefore, it is intended that the present invention be limited only as defined in the appended claims.

I claim:

1. A fabric handling mechanism for use with a fabric processing means comprising;

(a) an endless conveying means having a fabric pick-up end and a fabric depositing end,

(b) a plurality of spaced apart fabric gripper bars mounted transversely on the conveying means for movement therewith, each of the gripper bars comprising a stationary member and a movable member wherein the movable member is cam-operated,

(c) a stationary first cam member positioned adjacent the fabric pick-up end of the conveying means for camming the movable member of each gripper bar into a fabric gripping position as each gripper bar passes the pick-up end of the conveying means and while a piece of fabric is in contact with each gripper bar,

(d) a stationary second cam member positioned adjacent the fabric depositing end of the conveying means for camming the movable member of each gripper bar into a fabric release position as each gripper bar passes the depositing end of the conveying means whereby successive pieces of fabric are released and deposited from successive gripper bars,

(e) means for intermittently and synchronously driving the endless conveying means in timed relationship with the fabric processing means in which the fabric handling mechanism is employed,

(f) means for adjusting the fabric gripping position and fabric release position of the gripper bars relative to the fabric processing means with which the fabric handling mechanism is employed,

(g) a hanger bar mechanism for receiving successive pieces of fabric as they are released and deposited from the fabric handling mechanism, comprising an elongated hanger bar, an elongated trough for supporting and guiding the hanger bar for movement in a position below and outward from the fabric release position of the fabric handling mechanism, and means for moving the hanger bar along the trough.

2. A fabric handling mechanism and hanger bar mechanism combination according to claim **1** wherein the means for moving the hanger bar along the trough in the hanger bar mechanism comprises an endless chain driven in intermittent timed relationship with the fabric handling mechanism so as to receive successive pieces of fabric in adjacent non-overlapping positions along the hanger bar.

3. A fabric handling mechanism and hanger bar mechanism combination according to claim **2** wherein there is provided a hanger bar pick-up mechanism in combination therewith which comprises a pair of endless conveyors mounted transversely above the end of the trough and having corresponding pick-up hooks suspended therefrom and wherein the trough of the hanger bar mechanism has a pair of spaced apart slots in its upper side at its outward end through which the pick-up hooks may pass to engage

and pick-up the fabric-laden hanger bars for transporting through a drying and curing oven.

4. Apparatus for conveying pieces of material to a movable surface in timed relationship with said movable surface wherein the pieces of material must be positioned with the center of their areas at predetermined equally spaced positions on the movable surface, said apparatus comprising,

an endless feed conveyor driven at a velocity equal to the velocity of the movable surface including a pick-up end and a delivery end, and a plurality of material gripping means carried at equally spaced intervals along said feed conveyor,

a material feed table positioned at said pick-up end of the feed conveyor, means for intermittently moving said feed table and the edge of the material present thereon into contact with said gripping means in timed relationship with said feed conveyor, whereby the gripping means engage an edge of the material,

actuating means positioned at said pick-up end of the feed conveyor for actuating said gripping means to grip the material present on the feed table,

deactuating means positioned at said delivery end of the feed conveyor for deactuating said gripping means to disengage the material to deposit the material on the movable surface,

clutch means for repositioning the material gripping means of said feed conveyor with respect to the movable surface whereby pieces of material varying in size can be positioned with the center of their areas at the predetermined equally spaced positions on the movable surface, and

adjusting means for varying the distance between said material feed table and the feed conveyor when the material gripping means have been repositioned so that the gripping means continue to engage the edge of the material.

5. In a conveyor system of the type utilized to transport material comprising an endless conveyor belt including an upper flight driven in a first direction, the combination therewith of doffing means for retrieving the material from the conveyor comprising an endless carrier including a lower flight partially overlapping the delivery end of the conveyor belt upper flight and driven in timed relationship with and generally in the same direction as said conveyor belt upper flight, said doffing means including a series of spaced gripping members eash extending laterally of and entirely across said endless carrier lower flight and each including fabric impaling pickup means, and means for actuating said gripping members as they pass over the delivery end of the conveyor belt upper flight so that the impaling means engage the material adjacent its leading edge across its width and the material is carried by said doffing means along its lower flight, away from the conveyor belt.

6. In a conveyor system for transporting material comprising an endless conveyor belt including an upper flight driven in a first direction for transporting the material, the combination therewith of doffing means for retrieving the material from the conveyor belt comprising an endless carrier with a lower flight including a portion thereof overlapping the delivery end of the conveyor belt upper flight and driven in timed relationship with and generally in the same direction as the conveyor belt upper flight, said doffing means including a plurality of pickup members spaced apart on and extending laterally of said endless carrier and each being of a length sufficient to extend across at least a major portion of the width of the material transported by the conveyor system, said pickup members including means for impaling the material across at least a major portion of its leading edge as the material reaches the delivery end of the conveyor belt upper flight so that thepickup members continue to carry the material generally in said first direction as the conveyor belt upper flight is moved away from the material.

7. The invention of claim 6 wherein said pickup members each comprise a first support member including a plurality of needles extending parallel to one another, a second support member adjacent said first support member including a plurality of needles extending parallel to one another and at an inclined angle with respect to the needles of said first support member, and actuating means for reciprocating said first and second support members with respect to each other so that the needles of the first and second support members move relative to each other from an inactive position to a gripping position to impale the material upon the needles, and from a gripping position to the inactive position to discharge the material from the needles.

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