United States Patent

[11] 3,611,961

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[22] Filed **June 9, 1970**
[45] Patented **Oct. 12, 1971**

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

[54] **AUTOMATIC WELTING PATCH AND LINER ASSEMBLER AND SEWING DEVICE THEREFOR**
17 Claims, 32 Drawing Figs.

[52] **U.S. Cl.** **112/121.11**, 112/203, 112/65, 270/58, 101/287, 112/121.29
[51] **Int. Cl.** **D05b 33/00**
[50] **Field of Search** ..... 112/121.29, 121.11, 121.12, 121.15, 2, 203, 262, 65; 270/58, 53; 101/287; 12/146 C; 112/10; 271/60

[56] **References Cited**

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Primary Examiner—James R. Boler
Attorney—Curtis, Morris & Safford

ABSTRACT: A machine has been disclosed which produces from a facing patch blank and a stiffener blank for it a facing patch used for a welt defining the outlines of a pocket. The machine performs the feeding of each individual patch, a patch inverting, the patch mating as well as sews the facing patch and its stiffener together, severs one sewn patch from the other, marks two successive, correctly related patches with the same number and stacks the patches with the same number into two different receptacles. The machine is automatically operated and sequentially interlocked; a circuit with an operating mode and an alarm mode is provided for the machine. As a result, numerous manual steps have been eliminated, better workpieces obtained, as well as sequentially more correct lots of the facing patches obtained.

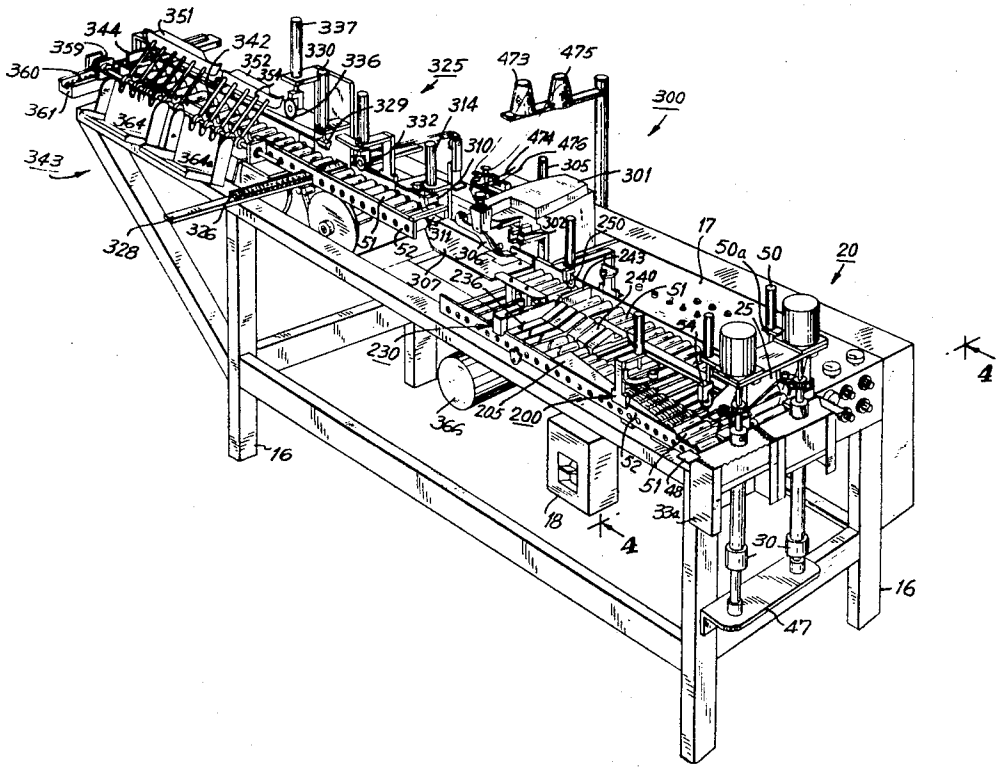

FIG. 1b

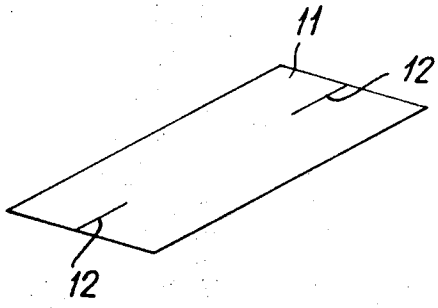

FIG. 1a

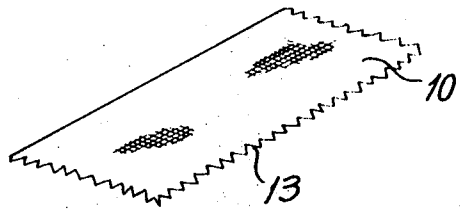

FIG. 1c

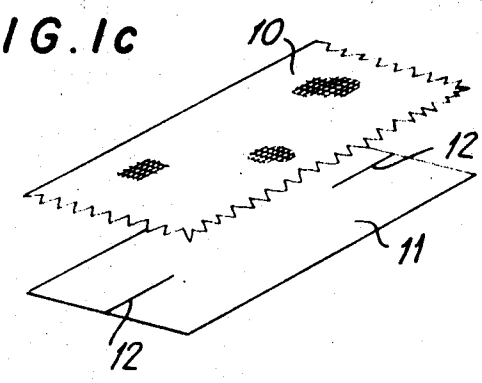

FIG. 1d

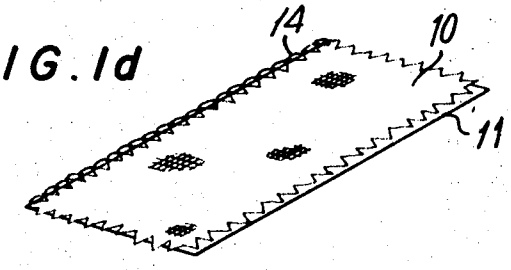

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FIG. 2

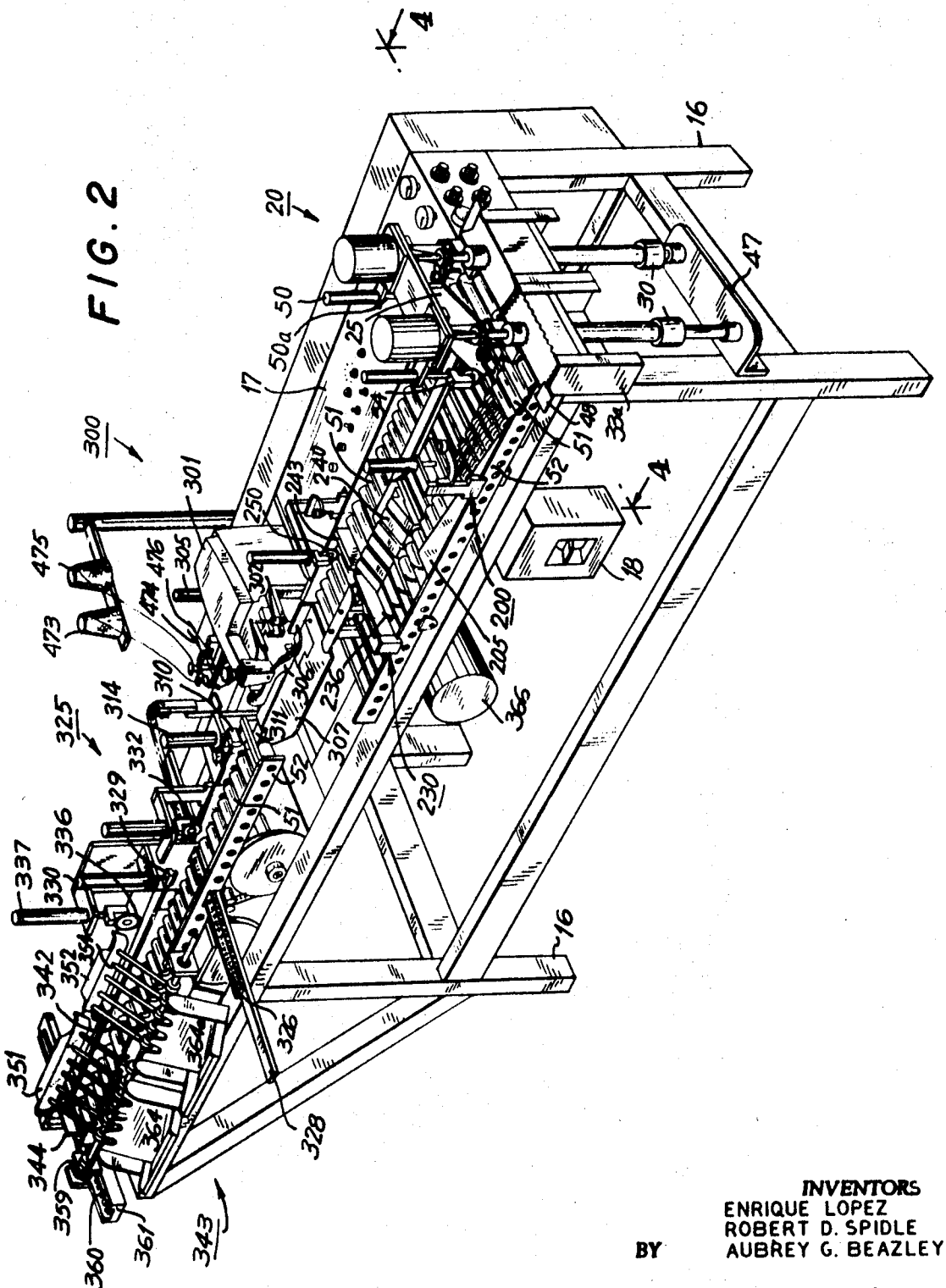

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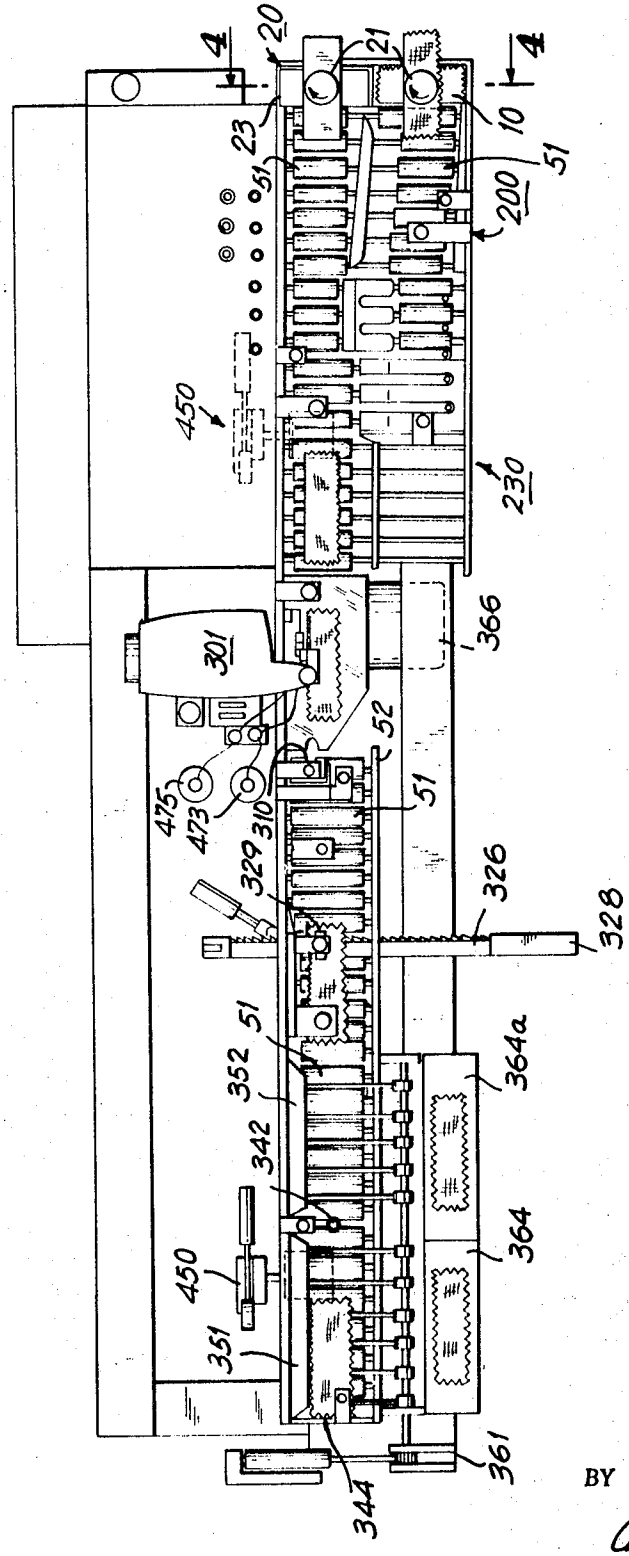
FIG. 3



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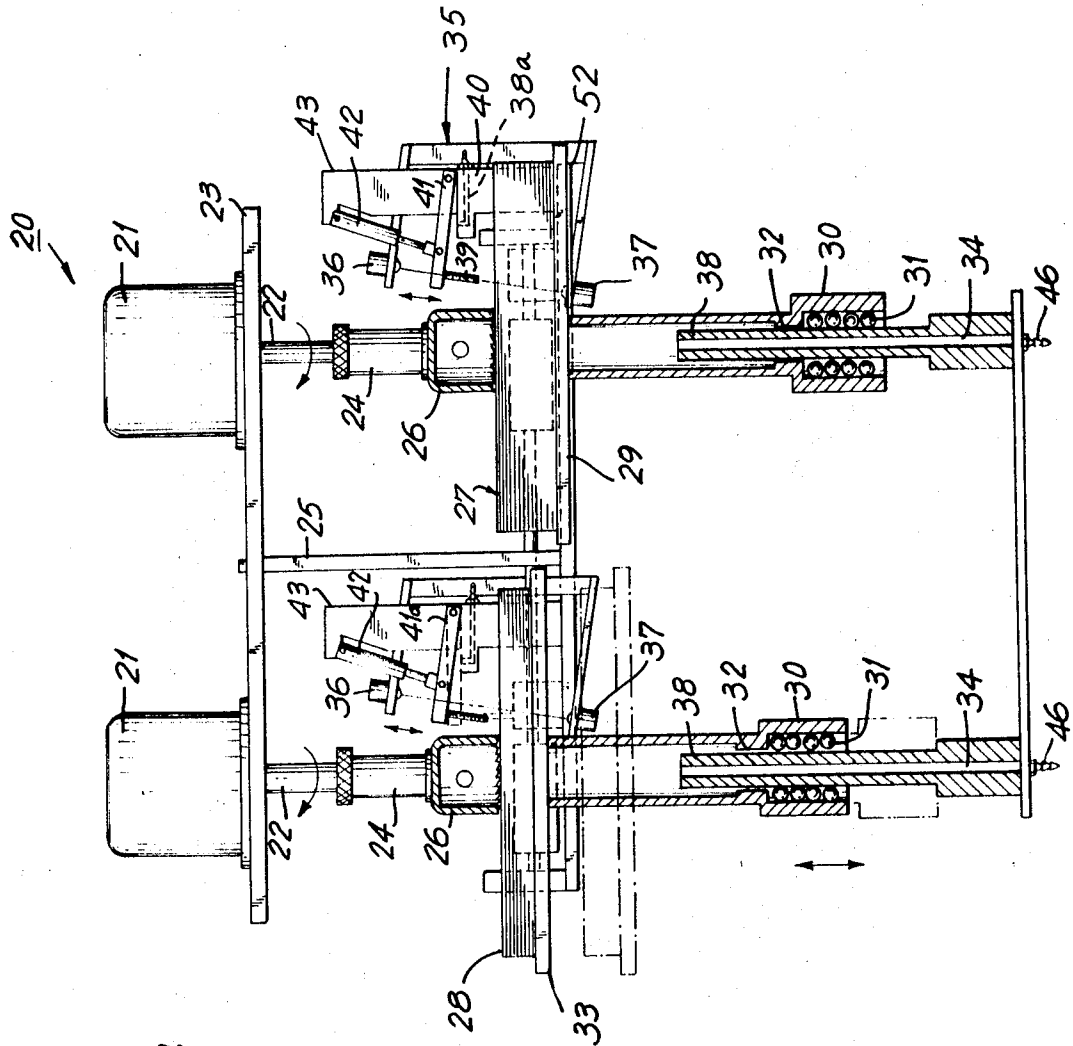

FIG. 4

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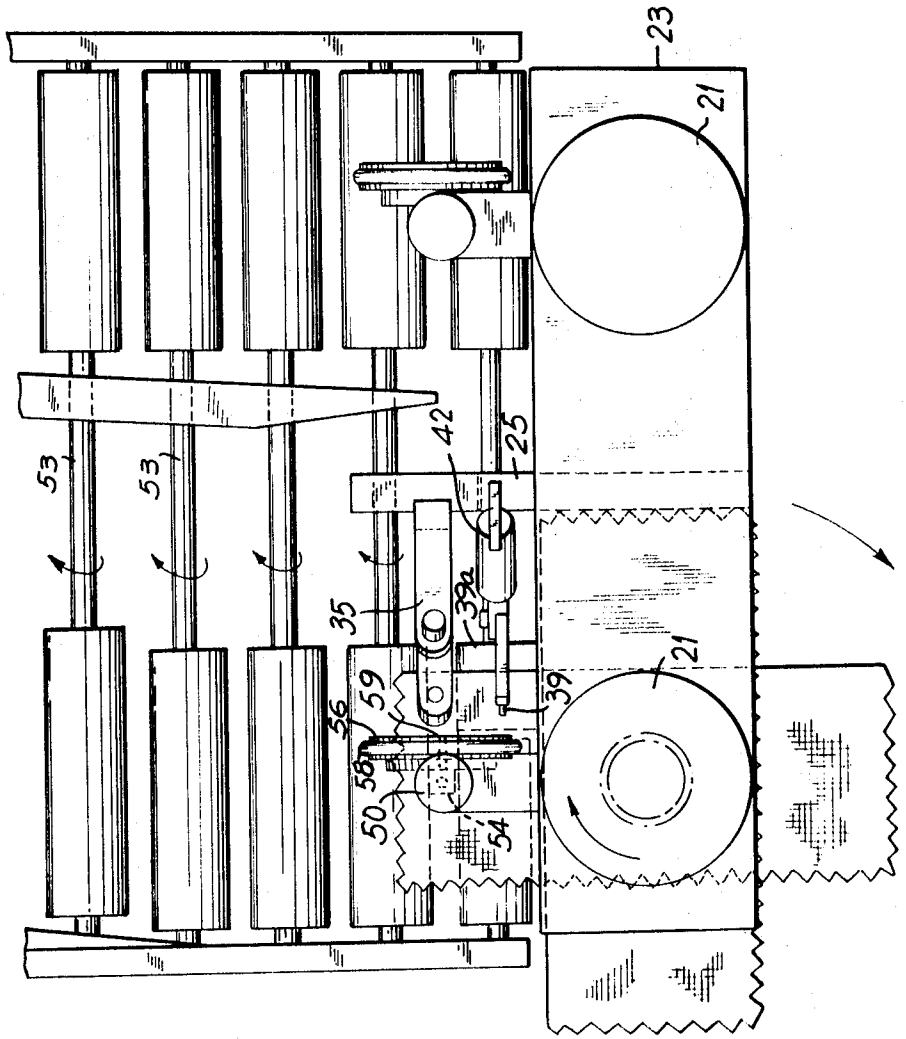
FIG. 5



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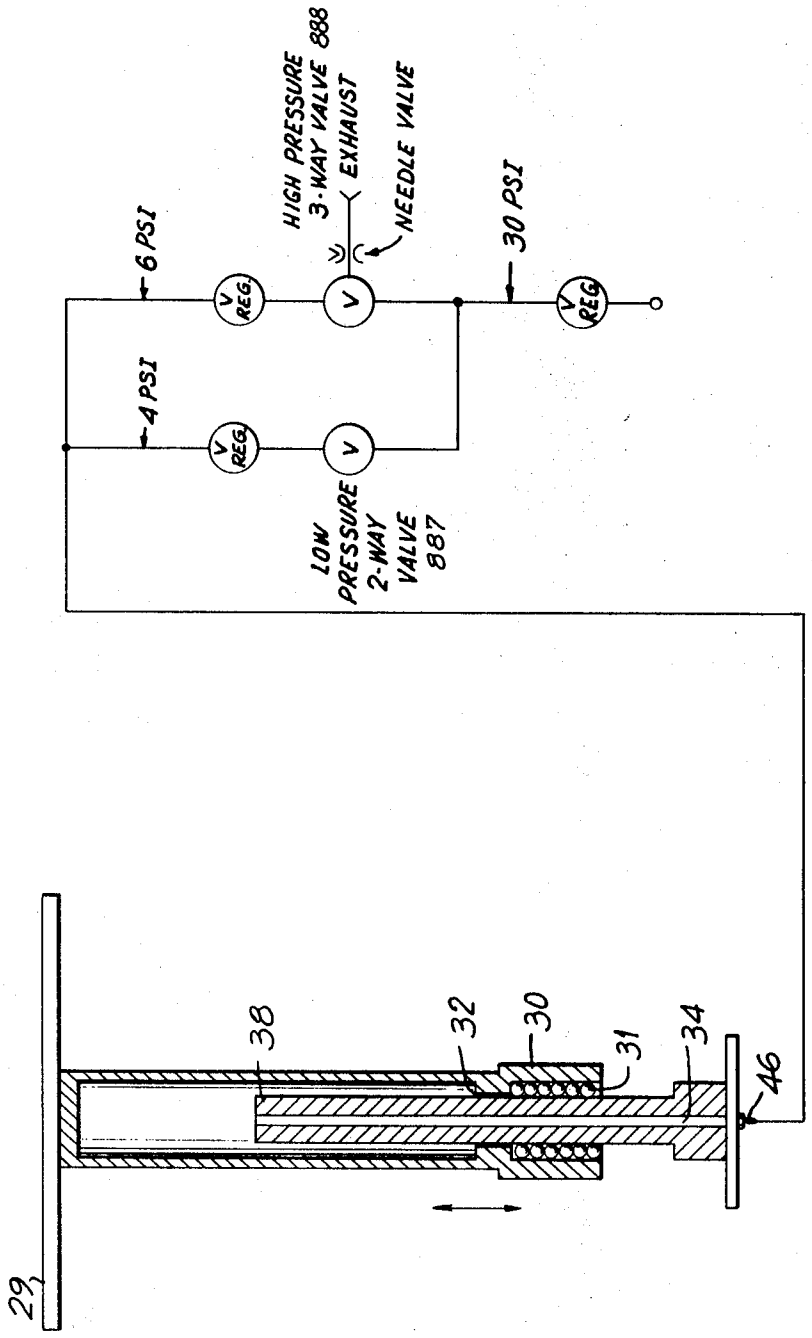

FIG. 6

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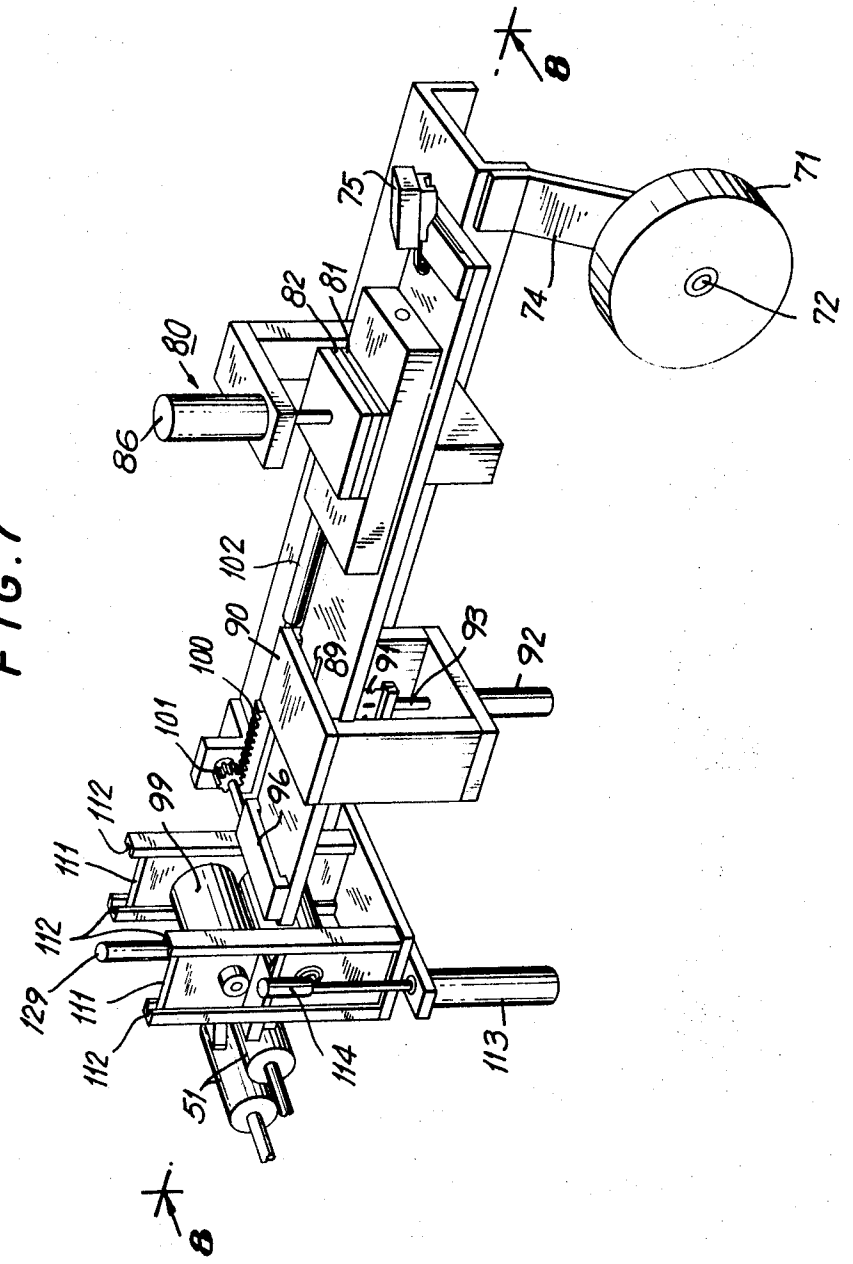
FIG. 7



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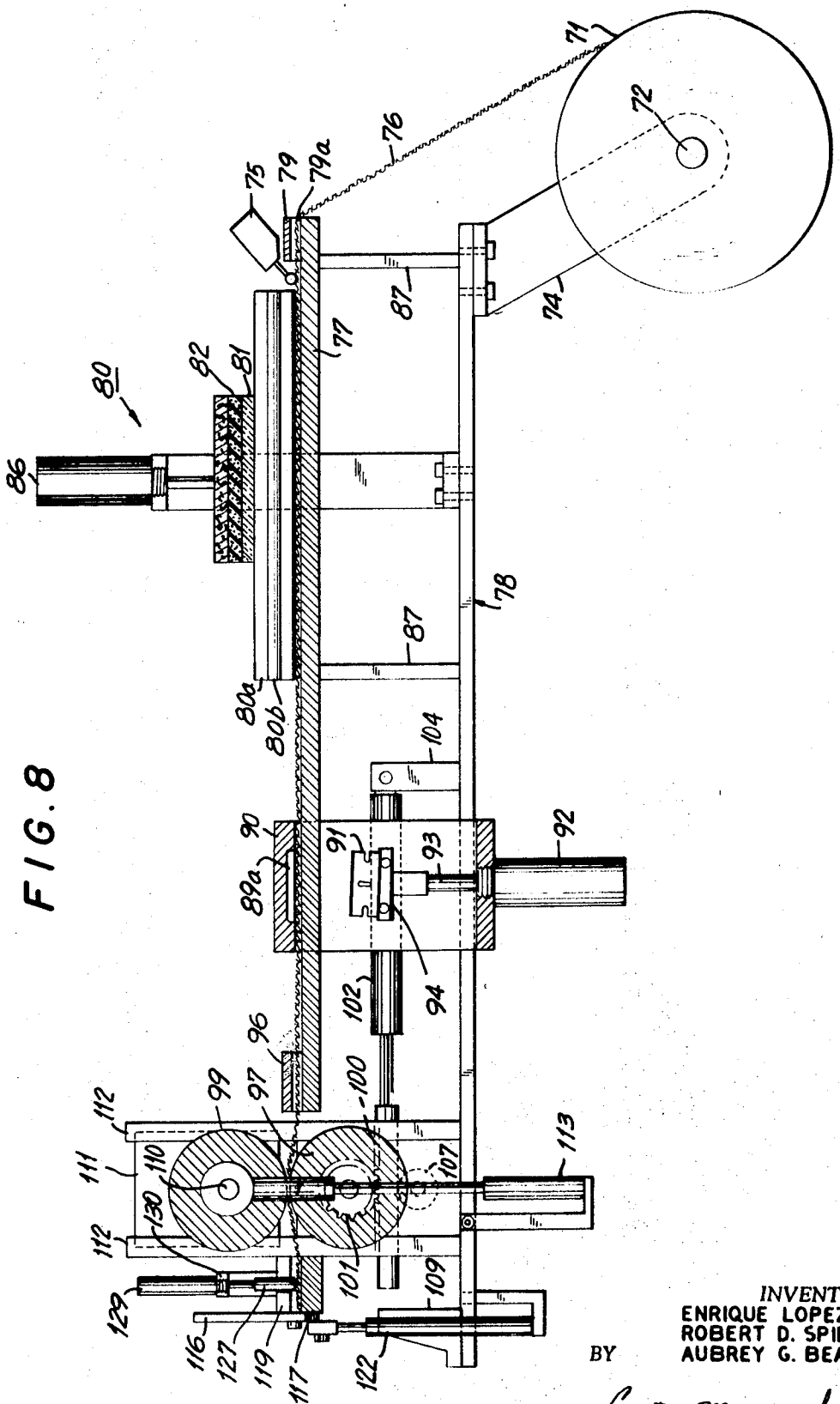

FIG. 8

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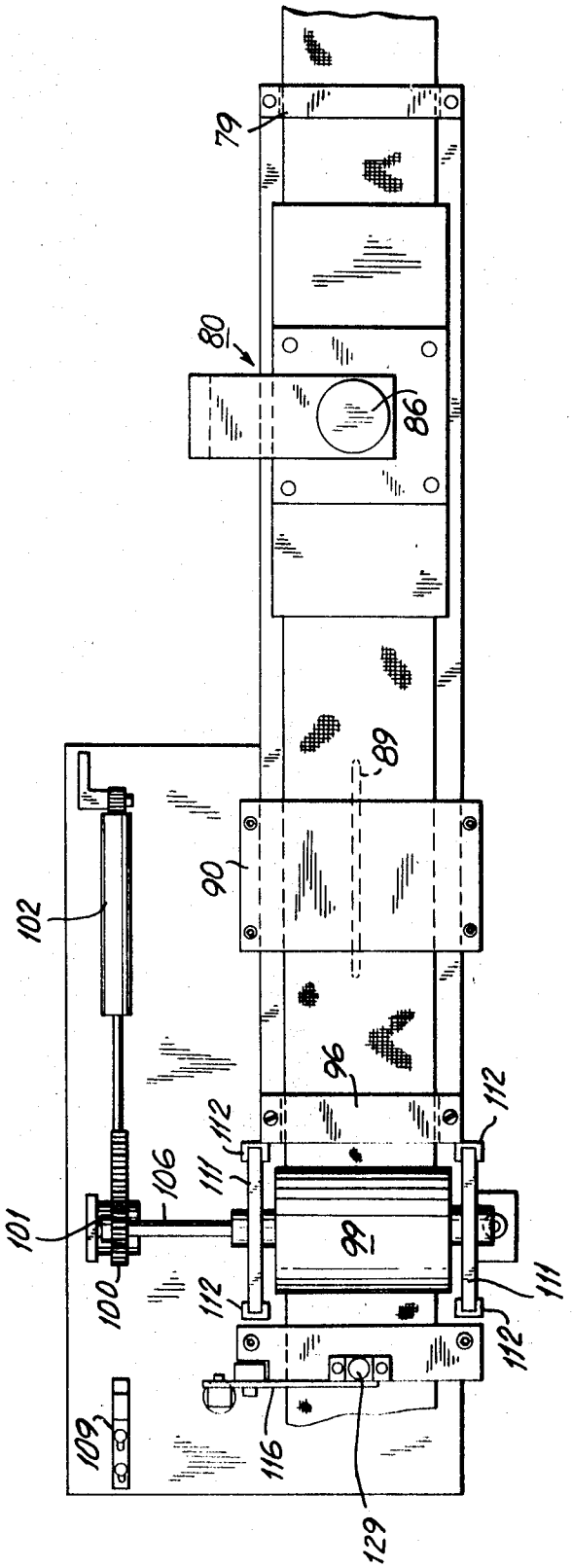
FIG. 9



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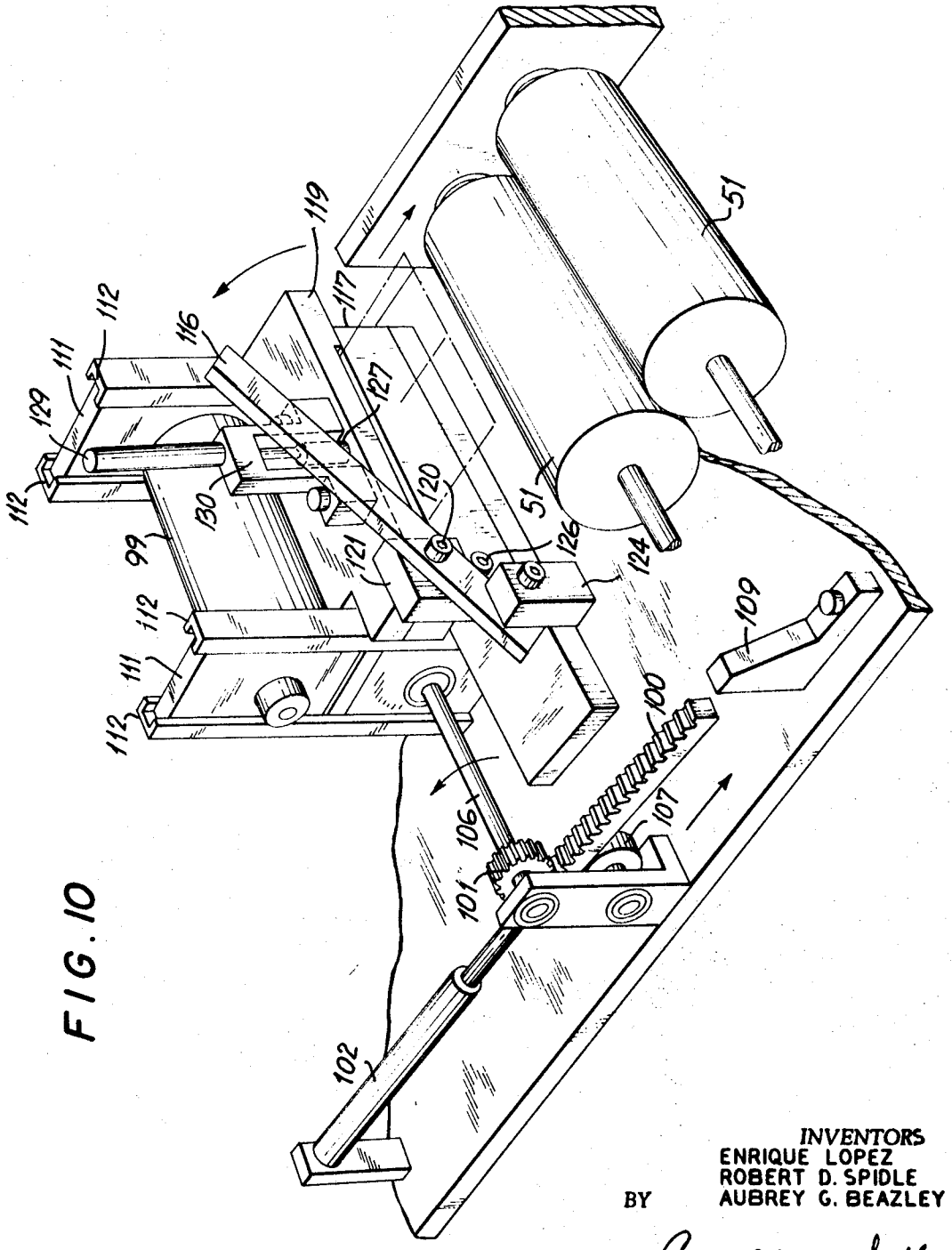

FIG. 10

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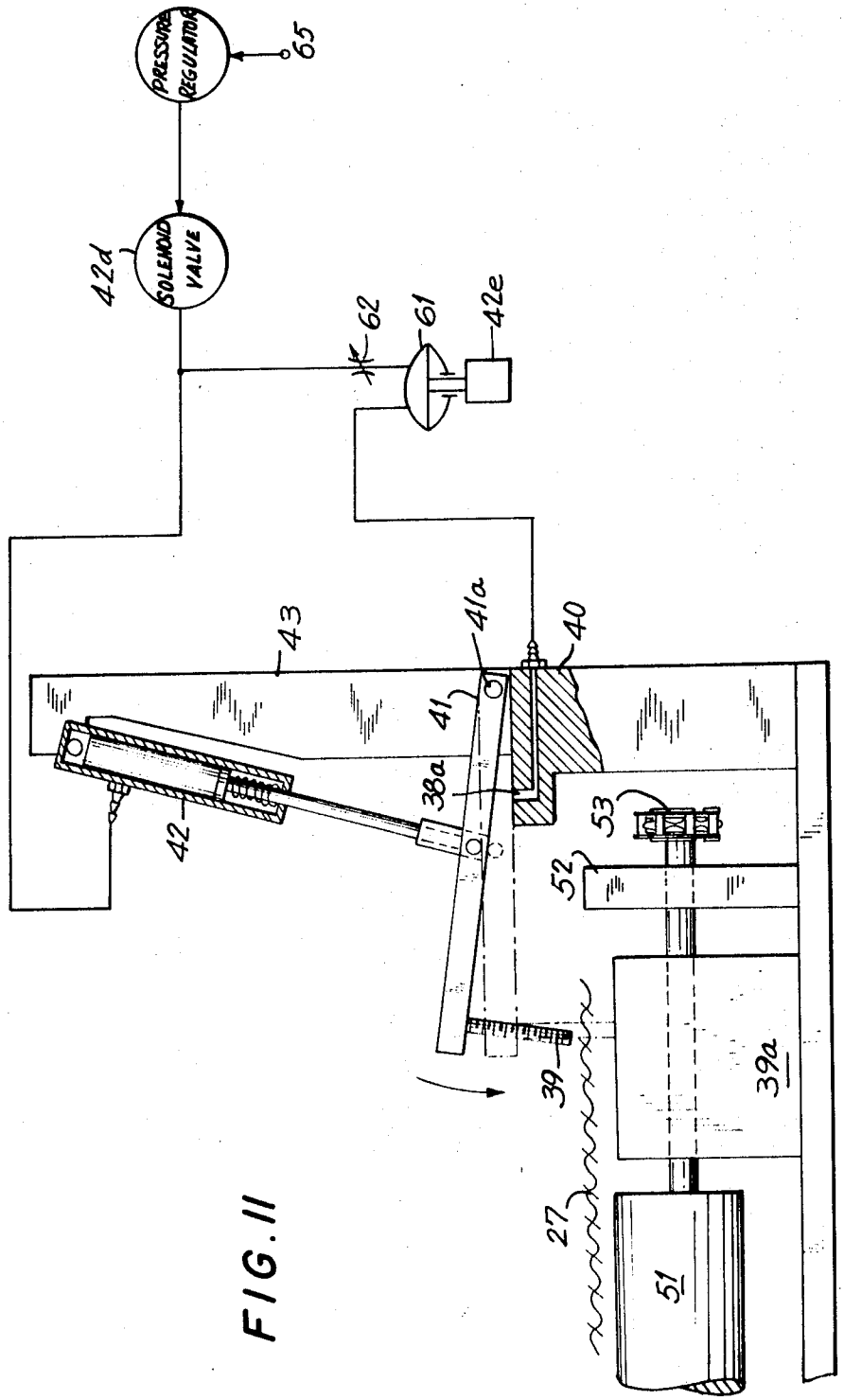

FIG. 11

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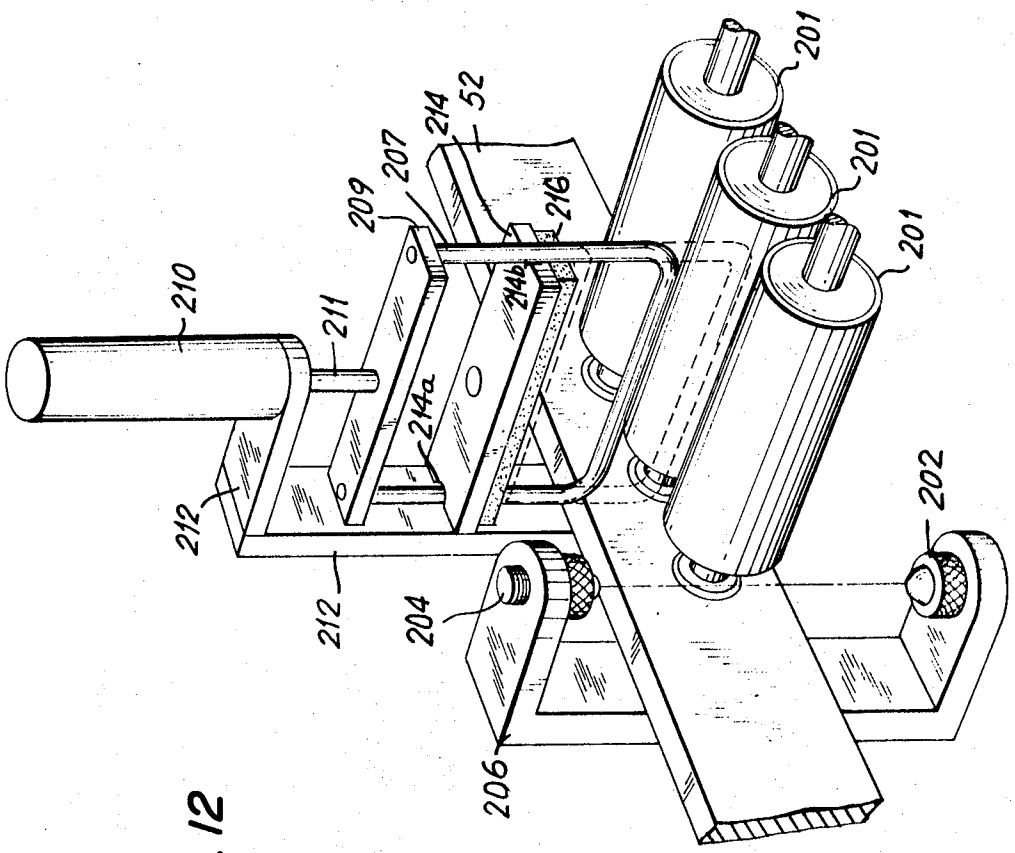

FIG. 12

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FIG. 12c

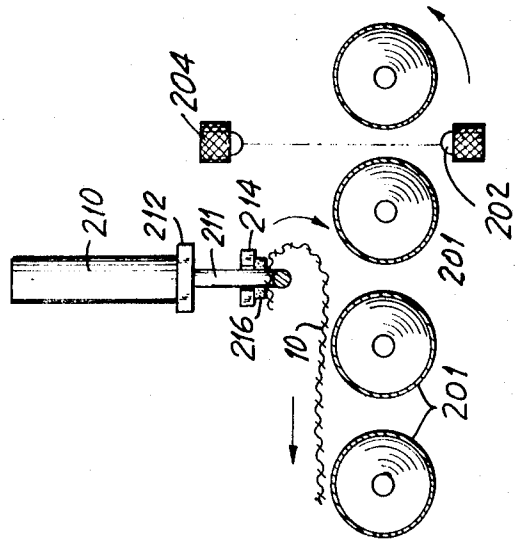


FIG. 12b

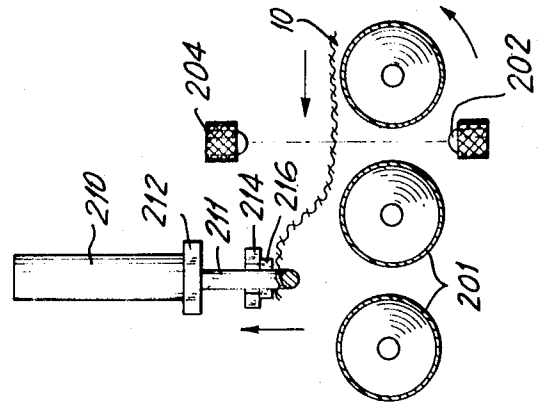
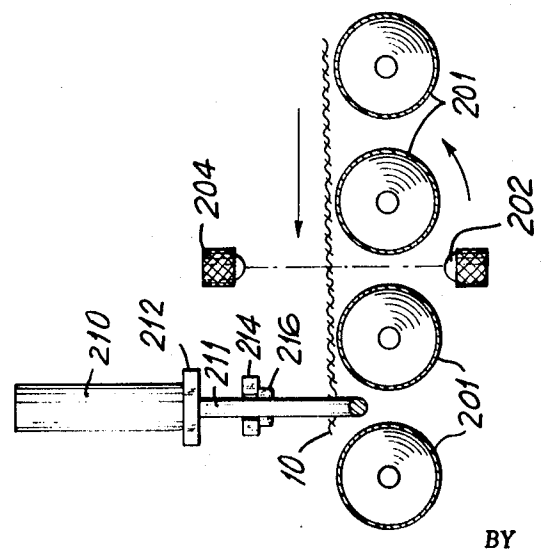


FIG. 12a



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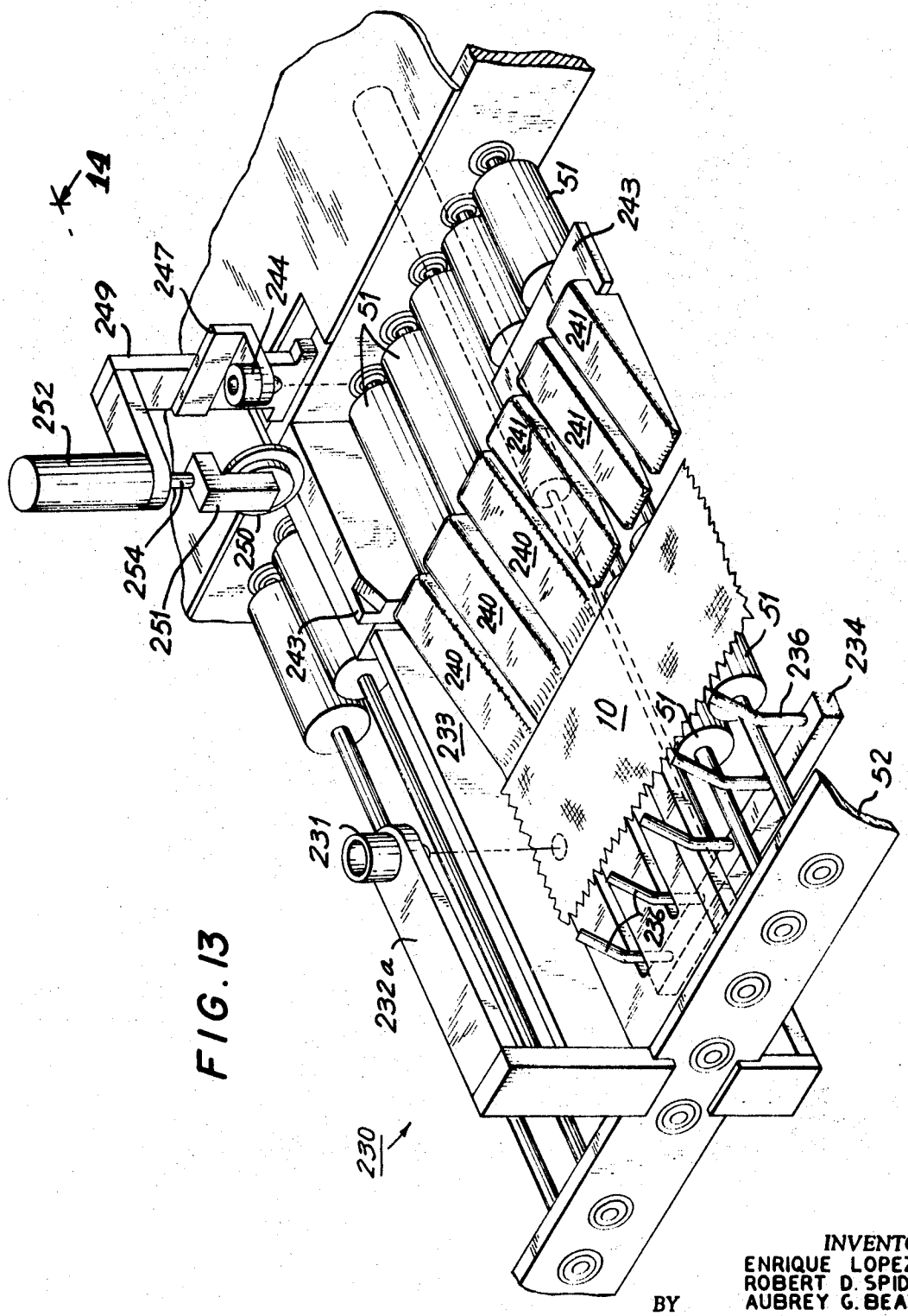

FIG. 13

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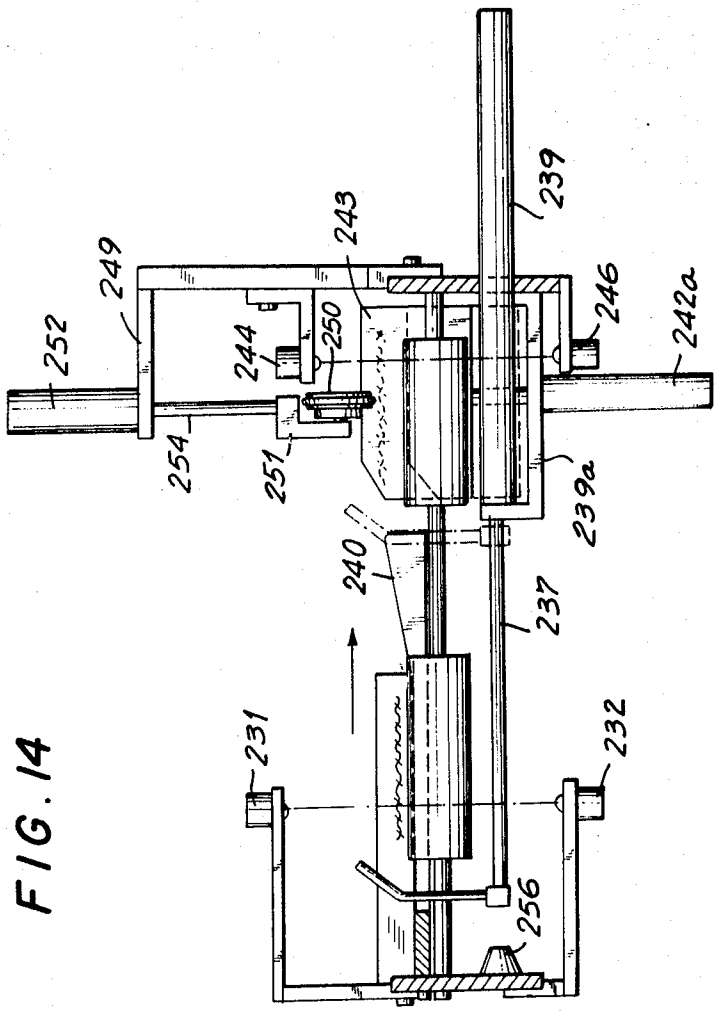

FIG. 14

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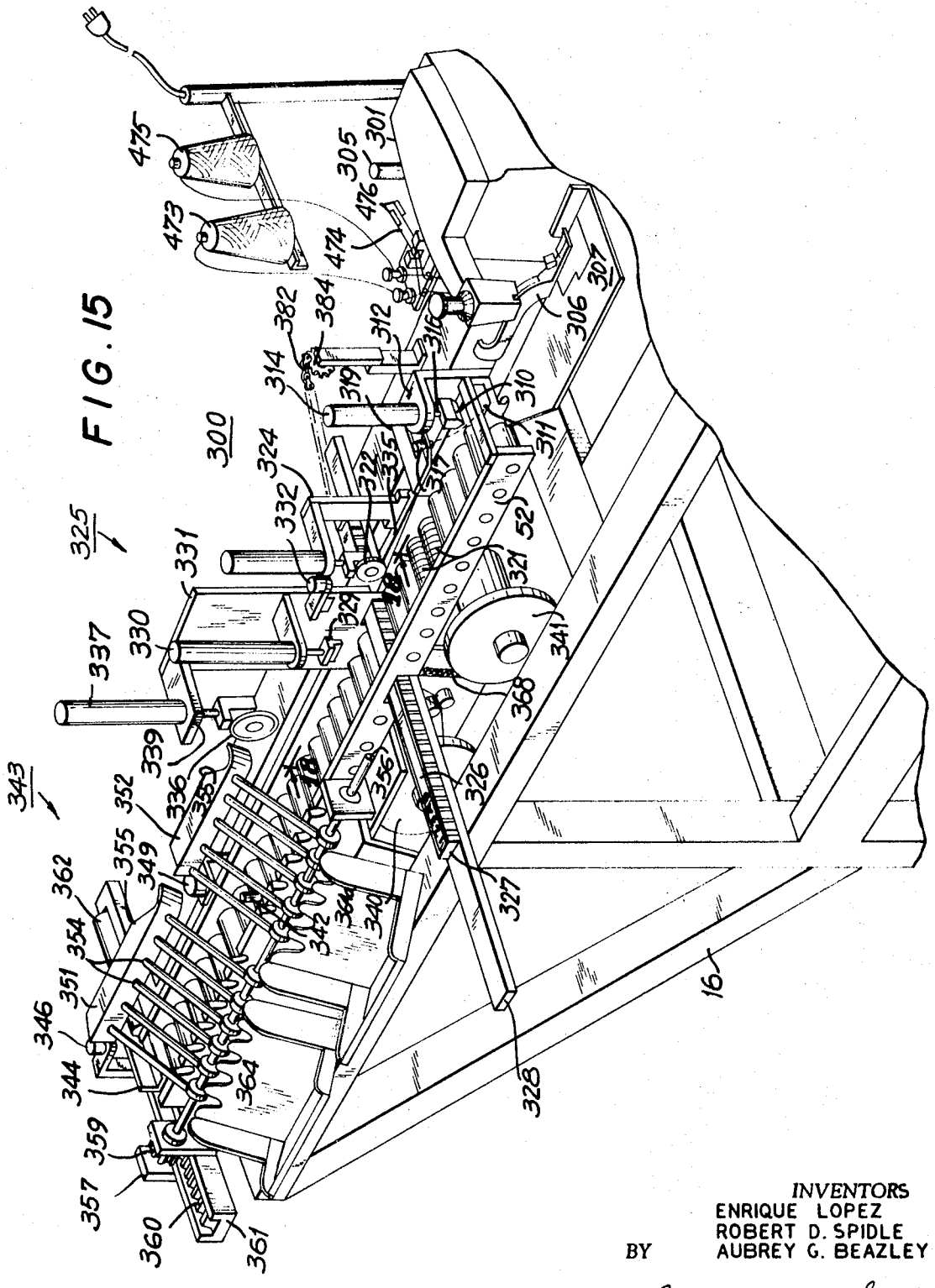

FIG. 15

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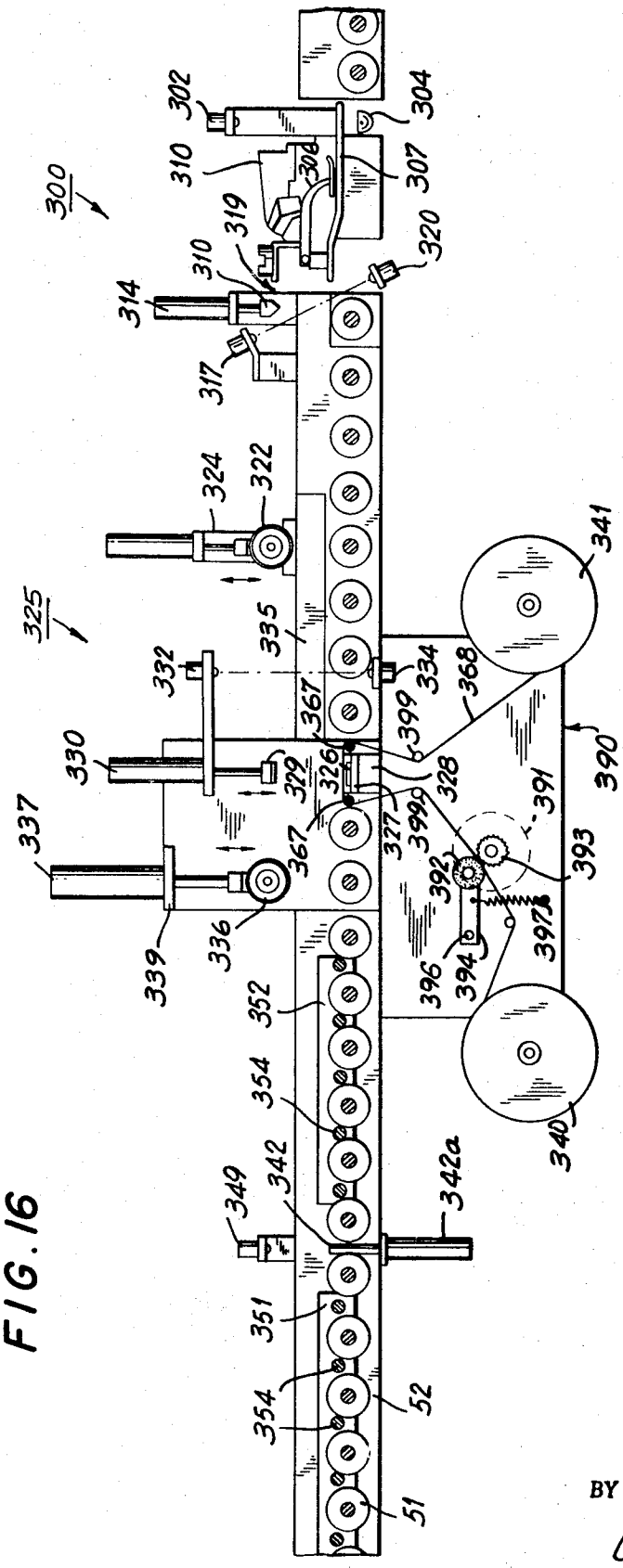

FIG. 16

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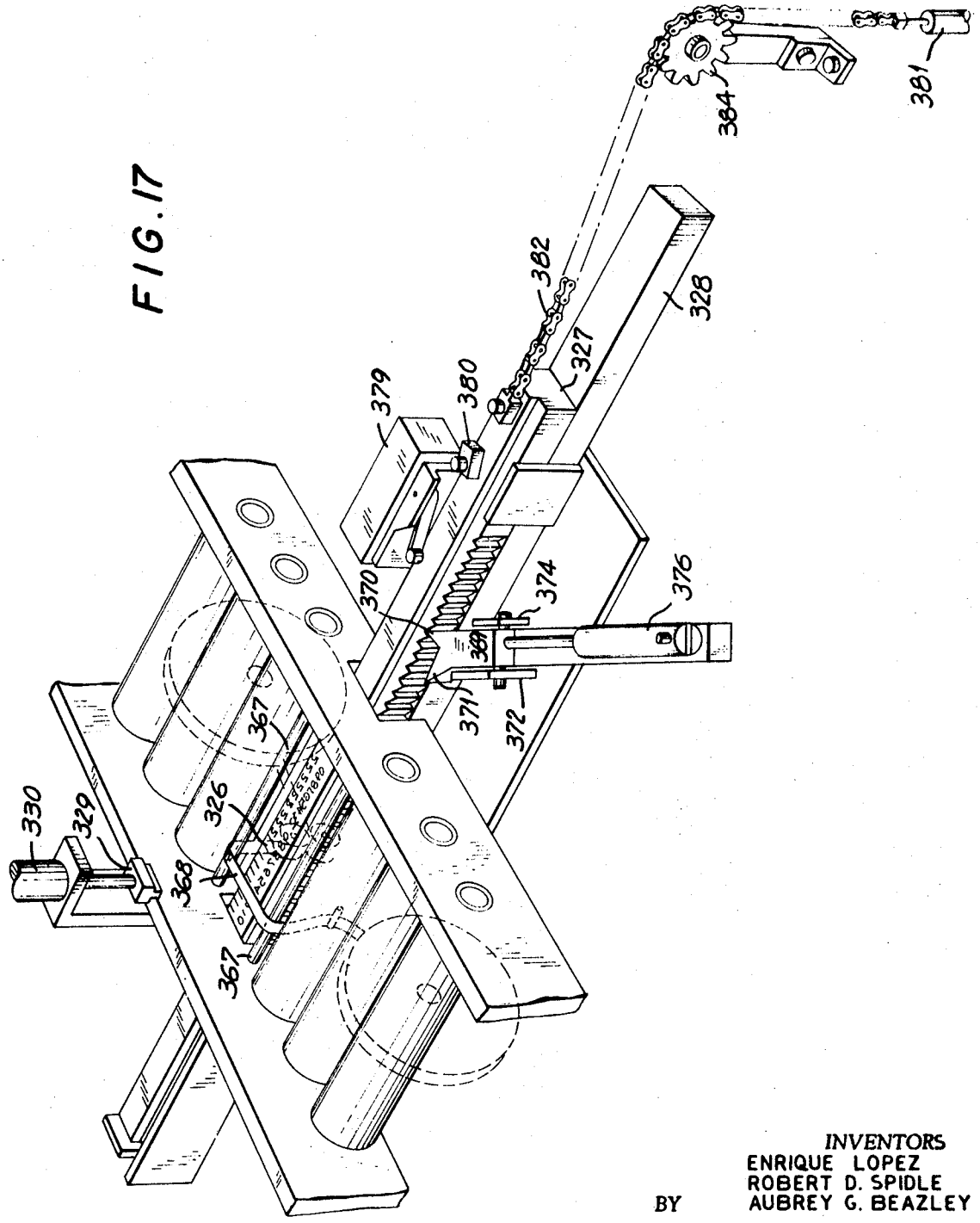
FIG. 17



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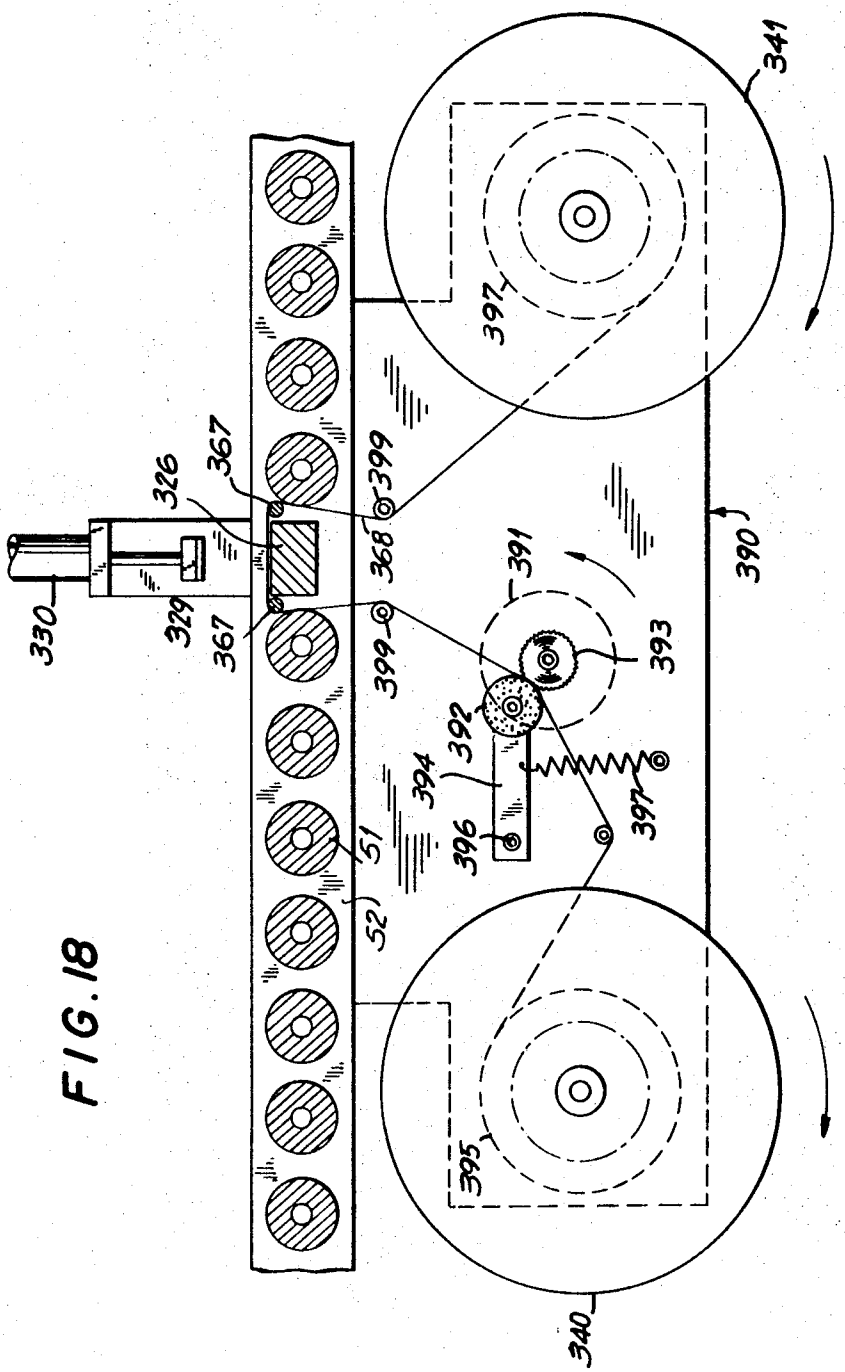

FIG. 18

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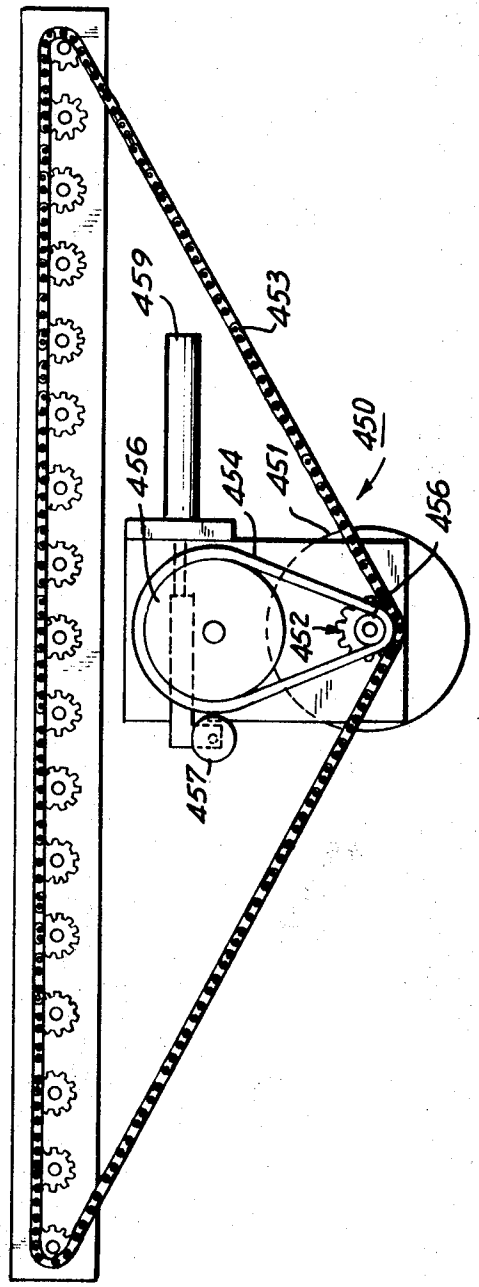

FIG. 19

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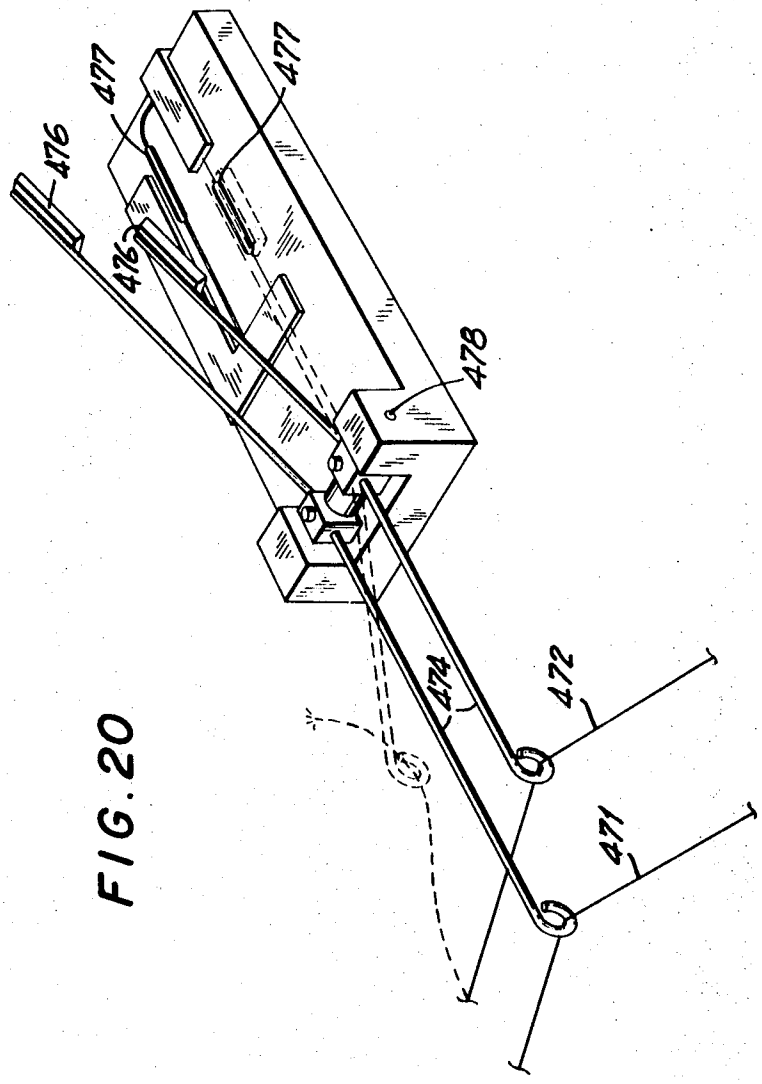

FIG. 20

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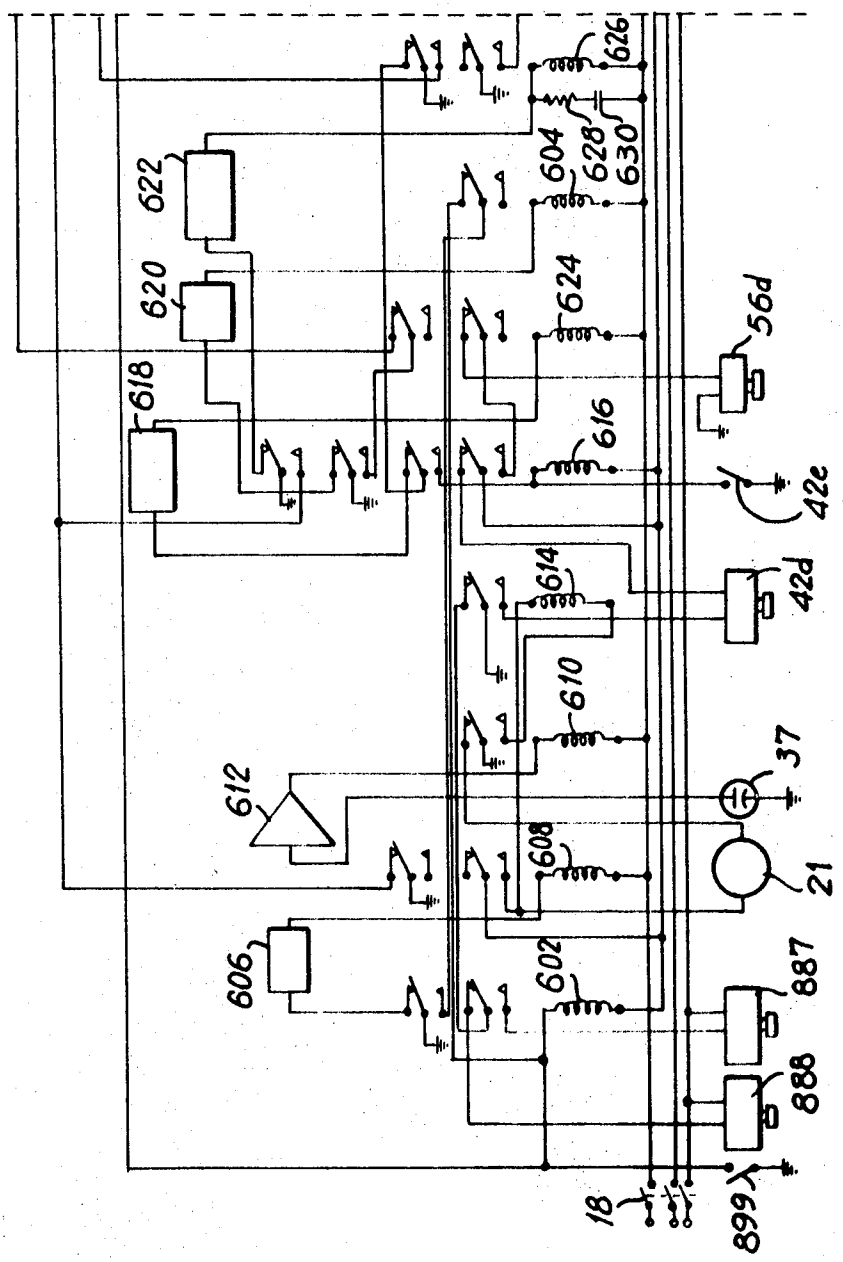
FIG. 21

FIG. 21 a	FIG. 21 b	FIG. 21 c	FIG. 21 d	FIG. 21 e

FIG. 21a



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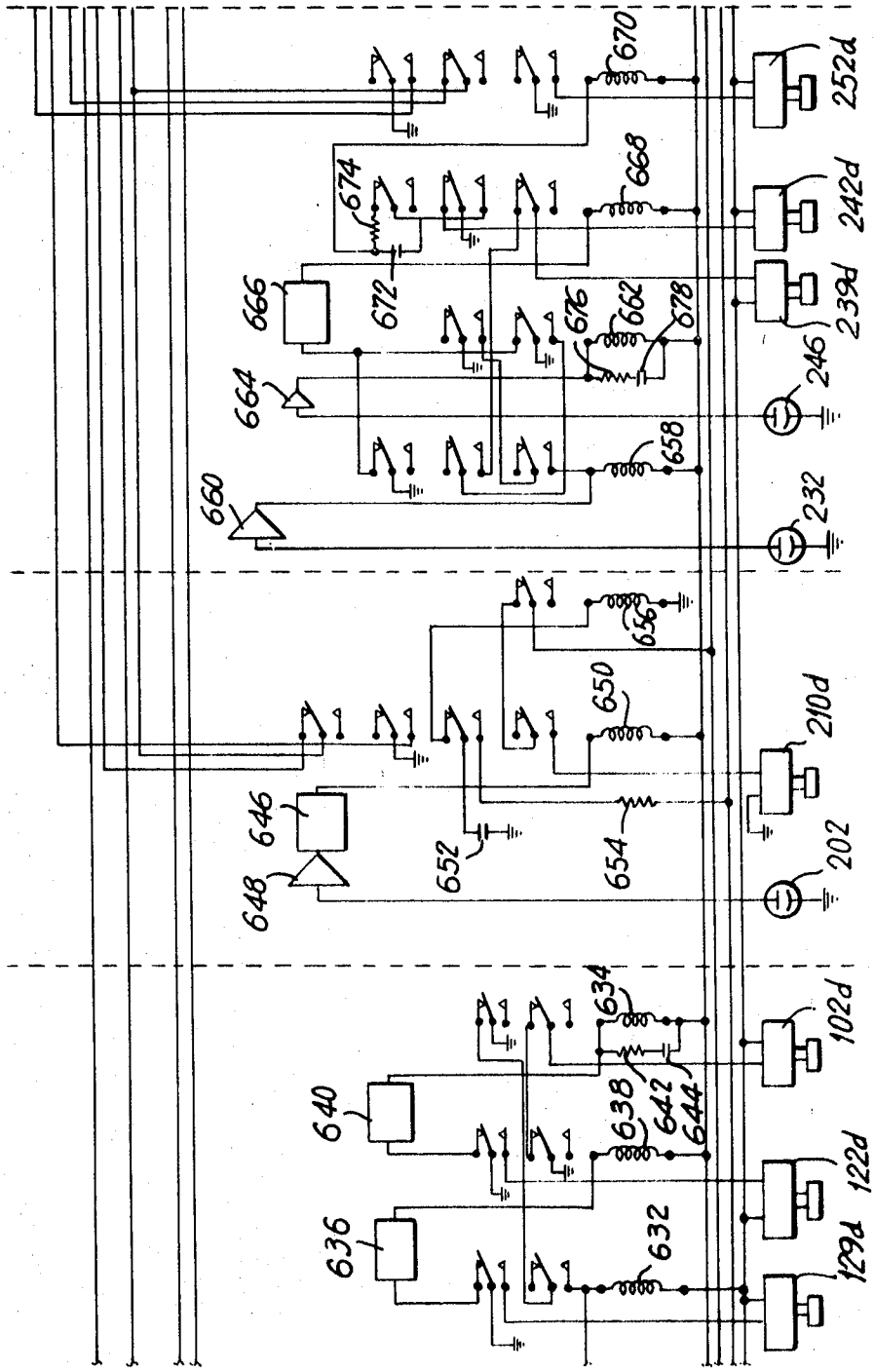

FIG. 21b

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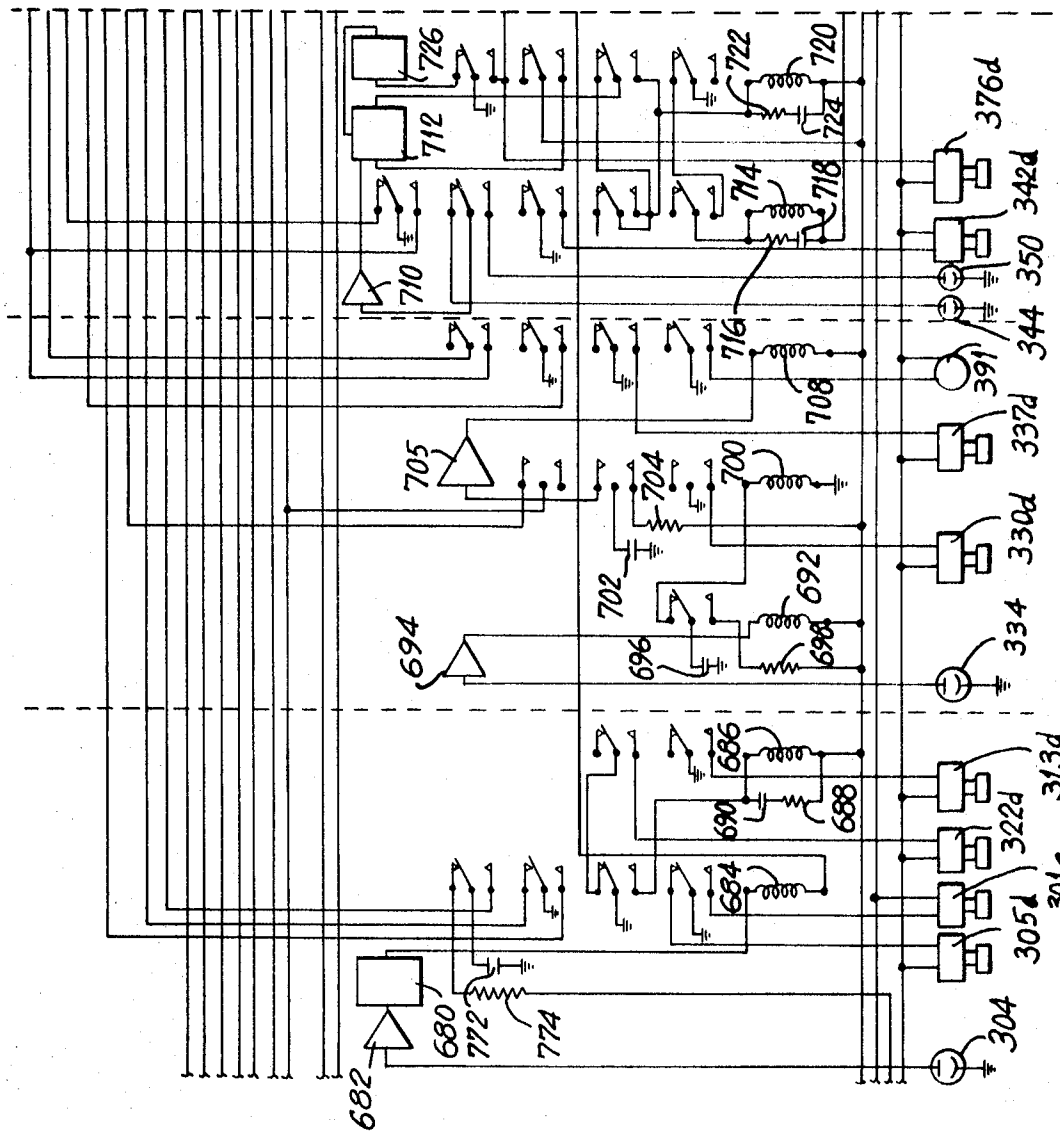

FIG. 21c

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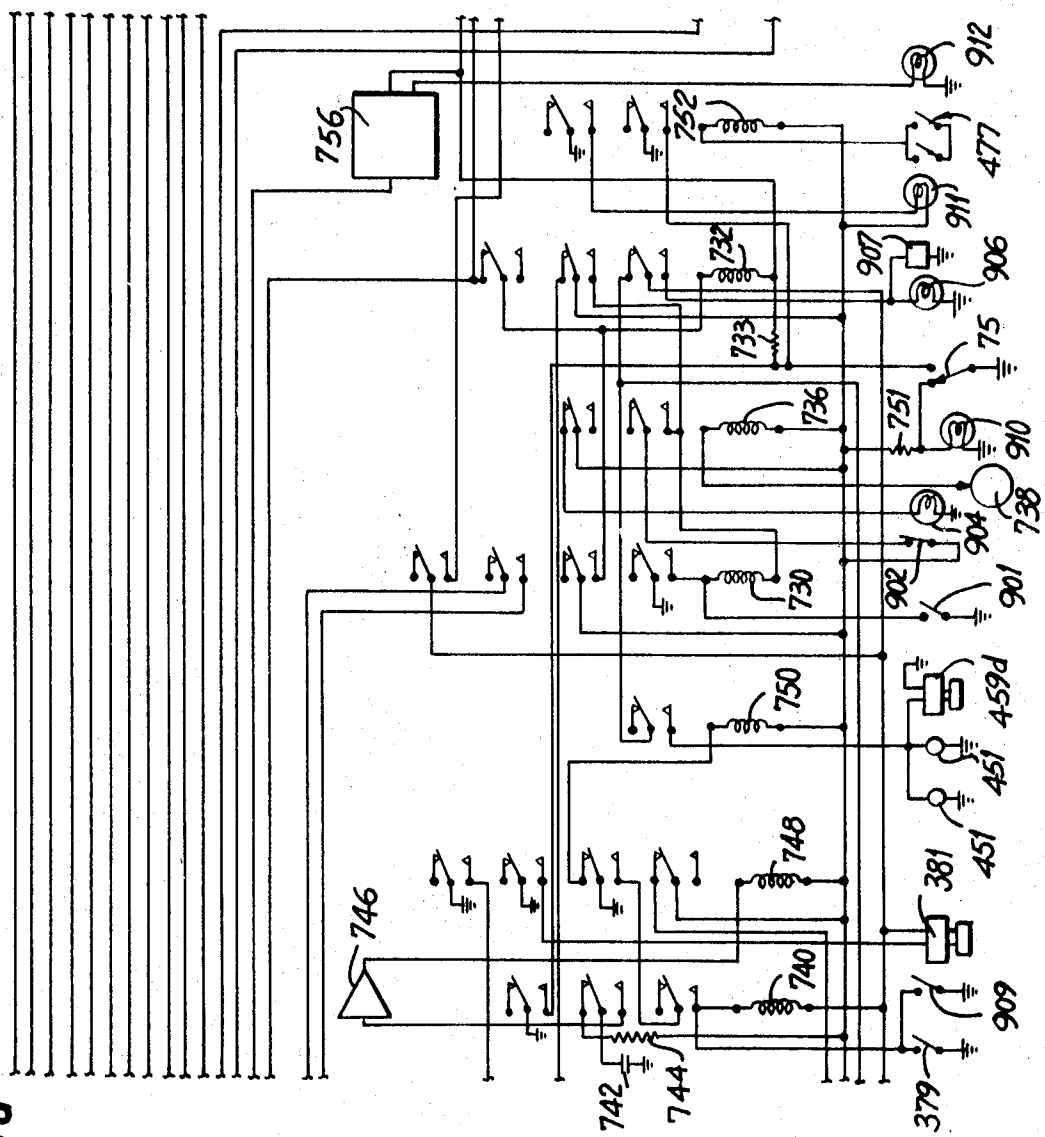

FIG. 21d

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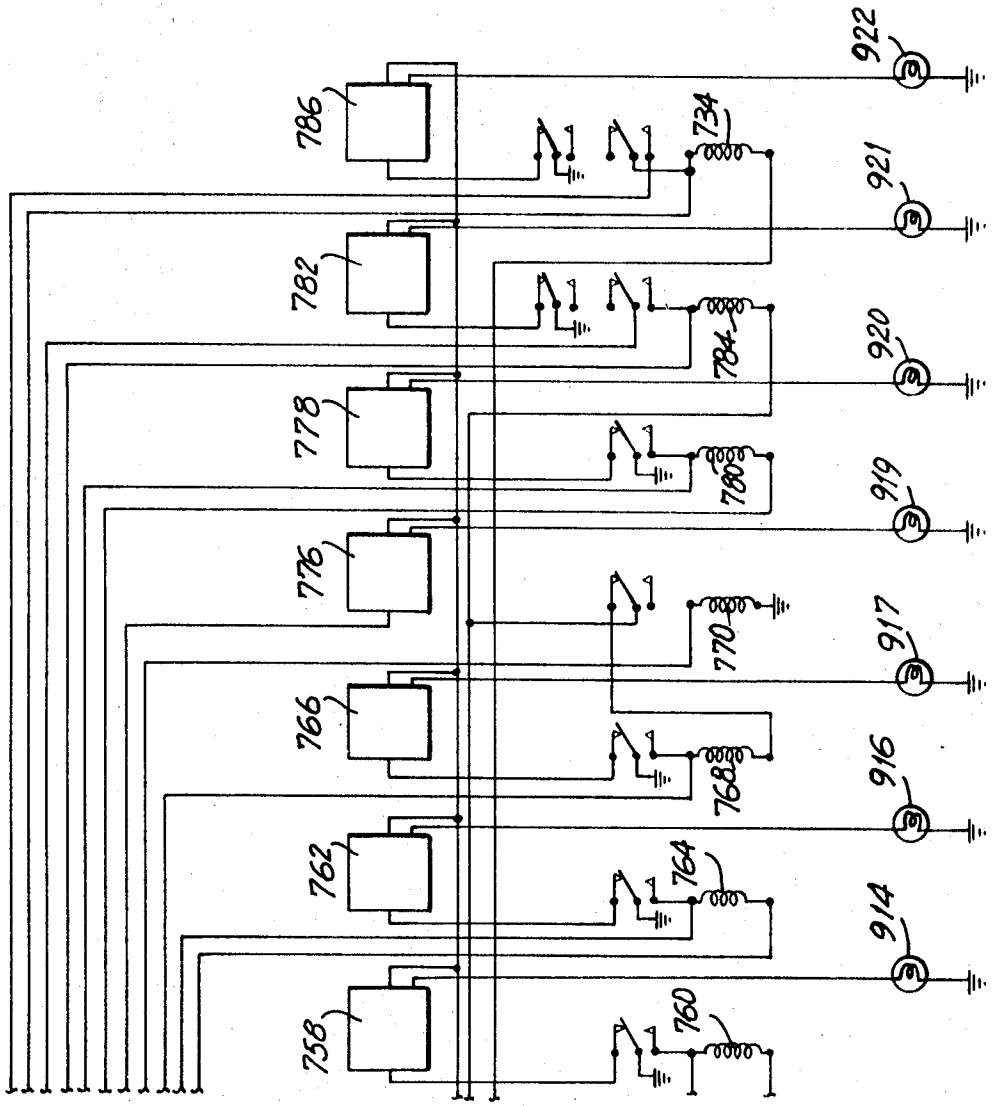

FIG. 21e

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AUTOMATIC WELTING PATCH AND LINER ASSEMBLER AND SEWING DEVICE THEREFOR

This invention relates to a machine which assembles and sews items used in producing garments; more particularly, this invention pertains to a machine which assembles a welt or facing patch in a proper "faceup" manner with a stiffener ply, then sews the welting patch and stiffener together, identifies and marks the sewed assembly and removes the same from the machine.

In producing garments having a welting patch used for defining an opening in the garment such as a pocket, for an example a man's pants back pocket, it is necessary to have the welt fabric defining this opening matched as closely as possible to the fabric from which the garment components surrounding the pocket are made. Slight variations in color and shade can easily be discerned by merely looking at the garment and thus, the product obviously cannot be as marketable as one in which these flaws do not stand out. As is well known to those skilled in the art, the variations in color or shade are found in any dyed bolt of fabric, no matter what pains are taken in assuring the correct processing and dyeing of the fabric.

In producing a number of similar garments, it is the accepted practice in the trade to lay out a bolt of cloth on a pattern table about 125 feet in length for a pattern drawing or arranging. This bolt is folded alternatively face side up and face side down for a total of about 120 layers.

Obviously, on laying out this cloth, each of the layers differs from the previous layer in slight degree of shading as it has heretofore been impossible to produce cloth of the same uniform dyeing characteristics or dyed properties. As a consequence, each layer of the cloth or fabric is marked for assembling garments therefrom in as closely related manner as possible. Further, when laying out the patterns, an important consideration is the assembly of garment components from adjacent or similar parts of the fabric. These parts must be incorporated in the garment in a manner such that the closely related, visible components are assembled from the same area of the cloth or fabric.

The fact that the cloth is laid out on these pattern tables face side up and face side down and the component parts of the garment must come from the same vicinity of the cloth has occasioned many problems in assembling the materials. Thus, skilled assemblers have been necessary to lay the cloth and arrange the patterns in each bolt of material. Further, considerable training has been necessary to enable the workmen to tell the difference in shading and color so that the garment components can be assembled in a proper face side up relation in the subsequent use of these garment components.

In assembling the welting patch used for incorporating the same in a garment such as a man's pants back pocket in a manner as understood from U.S. Pat. No. 2,573,359 the welting patch cloth has been die cut in a pinking pattern around three edges thereof. Thereafter, a skilled workman is needed to mark the faceup and facedown layers as follows. A special marking and handheld printer is used by an operator after the first layer has been peeled off and it and the following layer have been impact or punch marked by the handheld printer. These layers are then laid aside and the next two layers are marked again. The handheld marker automatically switches after the last of two punches to the next number. The procedure is repeated until the 120 layers are so marked. Consequently, the numbers will read from 1 to 60.

Thereafter, the operator separates each of the layers by turning over one and stacking it in one stack and keeping the faceup layer in its position and stacking it in another stack. After this operation, the stack, in a rather disarrayed manner, is given to another operator who then sews a stiffening patch to each of the welt facings, each of the patches being joined to the next by a thread chain. Another operator cuts these individually sewn but chained pieces and separates these in a stack.

As a consequence of this operation, numerous problems are encountered in sewing these welting patches of which especially troublesome is the misalignment of the individual pieces with the stiffener, which misalignment causes nonuniform product. Additionally, the work performance of each individual varies and thus the products are often of varying quality. Although the operator which has been used to cut and sever the individual pieces as these come from the machine can be replaced with automatic cutting devices recently made available, still the general operating mode in the industry has been to carry out the assembly of the operation in the manner as outlined before. Further, in sewing these different pieces, the operators, because of the normal fatigue associated with this type work, often can lose the order in which the facing patches are assembled or matched and thus, mistakes are being made in the sequence. Consequently, the product uniformity also suffers as a result of the normal fatigue factor associated or inherent in any operator-attended machine.

It has now been discovered that a novel welt facing patch assembly machine can eliminate a number of quality-reducing operations as well as produce a product which is more uniform, at a higher rate from that possible by manual operation and with a proper assembly sequence interlocked and maintained throughout the production cycle.

Further, the amount of training which is needed before an operator becomes highly proficient is materially reduced from that needed in the manual performance of the same operation. Thus, according to the present invention an automatic welting patch assembly machine has been invented in which the face up and face down stack of patches are being properly separated, a stiffener mated to each of the welt patches, the stiffener and welt patch sewn together, the sewn patch separated each from the other, properly marked for use in subsequent sewing operations, and removed from the machine in two neatly stacked bundles for use in welt-forming machines such as mentioned in U.S. Pat. No. 2,573,359.

Further, a novel subcombination has been formed in which welting patches are fed to the machine whereby one of the patches is sent on for sewing without inverting, the other patch inverted, and this alternative operation is carried out in a continuous manner, while at the same time a welting patch is mated with a stiffener patch. The stiffener patch may be fed simultaneously into this machine. In this connection, it has been discovered that the stiffener layer can be fed into the machine either as an individual piece or it can be formed from a suitable material as it is on a reel, pressed, and slit and cut to sever an individual patch. Thus, the stiffener material is longitudinally cut to the desired length as a last step before the ends of which are automatically slit longitudinally for the necessary length for proper functioning in the welt-forming machine.

Still further, after the welt patch and stiffener have been sewed together by a conventional serging sewing machine such as Union Special Sewing Machine No. 39500GP the chained together welt patches are separated by a guillotine cutter in which the timing of the patch is made in such a manner as to allow a chain of the threads to be cut by means of this cutter. Thus, novel guillotine cutter allows, in combination with other means, the controlled severing of the welting patches as these are being chained off the serging machine.

As the previous operation is being carried out, the individually advanced welt patch and stiffener assembly or garment component is also marked in predetermined, consistent location with a marking unit which carries out this operation automatically, resets itself automatically and which achieves the marking operation by a novel, especially driven marking tape device. Additionally, disclosed herein is a device in which the individually sewn, severed, and marked patches are being stacked in two different bundles in a stacking unit which insures the proper relationship of the properly marked welting patches.

With reference to the foregoing and the FIGS. herein, the invention will be described in more detail in which the various items in the FIGS. will be marked with the same identifying numbers or the items which function substantially similarly

will be identified by the same identifying numbers, and wherein:

FIGS. 1*a* to 1 *d* show the work product of the machine in certain stages of production;

FIG. 2 shows an isometric view of the novel machine;

FIG. 3 shows the top view of the machine energized in FIG. 2;

FIG. 4 illustrates the twist pickup head of the machine shown in section 4—4 in FIG. 3;

FIG. 5 illustrates the top view of a single twist pickup head illustrated in the vicinity of section line 4—4 in FIG. 3 but in more detail from that shown in FIG. 3;

FIG. 6 illustrates a pneumatic system for automatic two-step engaging for each of the first pickup head for a facing patch and the second pickup head for the stiffener patch;

FIG. 7 illustrates an isometric view of a modification in the feed device used for feeding and producing the stiffener patch from a tape;

FIG. 8 further illustrates the stiffener-patch-producing device shown in FIG. 7 in a cross section along lines 8—8 of FIG. 7;

FIG. 9 illustrates the top view of the stiffener-patch-producing device shown in FIG. 8;

FIG. 10 shows the scissor device employed with the stiffener-patch-producing device shown in FIGS. 7 to 9.

FIG. 11 illustrates a thickness sensor and a schematic pneumatic circuit therefor used with the welting or stiffener patch pickup device shown in FIG. 4 depicting schematically also the principle of the thickness sensor operation;

FIG. 12 illustrates the welt patch turnover or face inversion device;

FIG. 12*a* to 12*c* illustrate schematically how the turnover device accomplishes the welt patch inversion;

FIG. 13 illustrates isometrically the welt patch rake which mates the welt patch with the stiffener;

FIG. 14 illustrates a cross section along lines 14—14 of the rake device shown in FIG. 13;

FIG. 15 illustrates isometrically the welting-patch-serging machine, a guillotine cutter, a printing device and a welt-patch-stacking device shown in FIG. 2;

FIG. 16 illustrates a side view of the sewing machine, cutter printing and stacking devices recited in FIG. 15;

FIG. 17 illustrates isometrically the printing plate and its drive and return means;

FIG. 18 illustrates a partial cross section of the printing tape drive means and tape takeup and supply reel arrangement;

FIG. 19 illustrates the conveyor roller control unit; and

FIG. 20 illustrates the thread breakage detector device employed with the sewing machine described herein;

FIG. 21 illustrates the presentation of the electrical control circuit composed of FIGS. 21*a* to 21*e*;

FIG. 21*a* illustrates the electrical control circuit for the facing patch pickup and transfer device;

FIG. 21*b* illustrates the electrical control circuits for the modified facing patch stiffener forming and cutting device, for the facing-patch-inverting device, and for the facing patch and facing-patch-stiffener-mating device;

FIG. 21*c* illustrates the electrical control circuits for the sewing machine used for serging the facing patch and stiffener, for the facing patch marker device and for the stacker device; and,

FIG. 21*d* and *e* illustrate the electrical alarm system which keeps in interlocked order the previously described circuits and thus assures the correct sequential production of the welting patch.

The invention herein will now be described in general terms first and in more detail for ready understanding of the same as disclosed in the various figures.

OPERATION SEQUENCE OF THE MACHINE

Thus, to explain the operation of the machine shown in FIG. 2 and in reference to the product produced by it in FIGS. 1*a* to 1*d*, the welt patch **10** with the pinked edges **13** is fed into the machine by means of a twist and separation device **20** simultaneously with the feeding of the stiffener patch **11** which has in each of its ends a longitudinal slit **12** for the ready inversion of the patch in the subsequent incorporation of this garment component in a garment as previously explained. As shown in FIG. 1*d*, patch **10** and stiffener **11** are sewn together with a serging seam **14**.

A thickness sensor, further illustrated in FIG. **11**, detects whether or not a single ply or multiple plies of the welting patch or the stiffener are being fed onto the conveyor rollers **51**. If multiple plies are being fed, the machine will be stopped by appropriate electrical means further described in the specification. A puller wheel **50** assists the conveying and separation of the welting patch and the stiffener for their conveyance along the conveyor rollers **51**.

Next, as every other welt patch must be turned over so that it is in its proper faceup relationship for sewing together with the stiffener, it must be accomplished by means of the welt patch turnover device. This device is shown in FIG. **12** and designated as **200**. The turnover is accomplished by capturing the welt patch by means of a turnover trap gate **207** resting between two rollers in a row of specially covered conveyor rollers **201**. The front end of the welt patch is engaged by the trap gate **207** at a predetermined distance and the elastometrically covered conveyor rollers accomplish the inversion of the welt patch by sweeping the other end of the patch underneath the trapped edge.

Thereafter, the trapped edge is disengaged and the welt patch is guided along the conveyors as urged by a side guide **205** onto a rake-and-patch-mating device shown in FIG. **13** and designated as **230** wherein the welt patch arrival is detected by a photocell which activates a rake bar **234** holding rake **236** urging or sweeping the welt patch over the welt patch ramps **240** which are smoothly buffed metal surfaces. By this raking or sweeping action the properly positioned welt patch is mated with the stiffener patch which is held on the conveyor by the stiffener stop or drop gate **243** until the welt patch is placed on top of the stiffener patch. Thereafter, the stiffener stop gate **243** drops, a puller wheel **250** aids the conveyor rollers **51** to forward the welting patch and stiffener onto the sewing table for sewing by machine **301** which is a conventional serging machine such as Union Special Machine Co. Sewing Machine No. 39500GP, which is well known in the art.

After the presser foot **306** engages the welt patch and its stiffener and sews along the edge thereof, a previously sewn welting patch is severed from the patch being sewn by means of the guillotine cutter **310**. The severed patch is urged onto the conveyor by means of a puller wheel **322** over the marking plate **326** for impact printing with a proper numeral by means of a print hammer **329**. Two welt patches are marked with the same number before the marking plate **326** is advanced another number for marking the next two welt patches. After the printing, the puller wheel **336** engages the printed and marked welting patch and urges it along conveyor rollers **51** until the patch strikes the end gate **344** and interrupts the path between the photocell lamp **346** and its photocell **347**. This also signals that the next patch must be stopped for its stacking by the second stacking grid iron **352**. The second welt patch is stopped by an upwardly extending stop rod **342** acting as an end gate for the second patch.

The arrival of the second patch is detected by the photocell and photocell lamp **350** and **349**, respectively. This also activates the gridiron stackers **351** and **352** which deposit the two patches by means of a rack **360** driving a pinion **359** on a common axis or common shaft **356**. The two facing patches are deposited in stacking receptacles or traps, **364** and **364***a*, respectively.

The machine will now be explained by reference to the specific FIGS., by describing the same in the order as outlined above in the operating sequence.

DOUBLE TWIST PICKUP DEVICE—20

Returning now to the feed device which supplies to the sewing machine **301** with the welting patch **10** as well as the stiffener **11**, reference is made to FIG. **2**, **3**, **4**, **5**, and **6** and in particular FIG. **4** and **5** which illustrate a cross section and a top view, respectively, of the pickup device **20**. Thus, number **21** designates the motors which are identical and have substantially no coasting characteristics. This motor drives through a shaft **22** having an adjustable shaft extension **24**, the serrated twist head **26** which is a large-diameter hole cutter commonly available for home workshop use.

Upon activation of a pneumatic control valve as explained further herein, pneumatic fluid such as shop air is admitted through an opening **46** and passage **34** into a piston **30** which piston is connected to a table or platform **29** holding in this case the stiffening patches in a stack illustrated as **27**. The facing patch stack **28** is held on table **33**. The various electrical circuits used with the machine herein as well as the pneumatic fluid valves or solenoid valves controlling the admission of the fluid to the various pneumatically operated devices are housed in console **17** shown in FIG. **2**.

As the pneumatic fluid is admitted through port **46**, it drives upwardly the table **29** by means of the piston **30** and as the stack **27** engages the serrated twist head **26** the originally supplied pneumatic fluid is switched to a pneumatic fluid at a lower pressure which momentarily relieves the pressure on stack **27** against the head **26** and allows the separation of one ply from the other by twisting the head **26** for 90° in a clockwise direction until the stiffening patch **11** (or the welting patch **10**) interrupts the beam from lamp **36** to photocell **37** at which time a signal is sent to motor **21** stopping the clockwise rotation. Also, during this twisting operation and shortly thereafter, the pneumatic fluid is vented through port **46** allowing the table to drop.

In order to maintain a reasonable constant stack **27** pressure against the twist head **26** during the operation, a bleed port **32** is provided in the piston **30** which provides a constant, upwardly urging force on the table to maintain the stack **27** under a reasonable uniform pressure against the head **26**. The table **33**, with the stack **28** is indicated in FIG. **4** by dashed lines on the left-hand side of this figure. This illustrates the upward and downward movement of the piston **30** on the shaft **38** and thus, stacks such as stack **28** or **27**.

In reference to FIG. **6**, it shows the two-stage pneumatic system which engages a stack.

All pressures shown in this figure are typical and may be varied for optimum operation. When the high-pressure three-way valve identified by a legend in FIG. **6** is energized such as by a solenoid valve, the facing stack is held against the twist head **26** by 6 p.s.i. The force of the facing stack against the twist head **26** is reduced by simultaneously turning off the three-way valve and turning on the two-way valve also identified by a legend in FIG. **6** which supplies 4 p.s.i. The higher pressure (6 p.s.i.) then bleeds to the atmosphere through the exhaust port of the three-way valve until 4 p.s.i. is reached and maintained. The output of the 4 p.s.i. regulator will also feed through the exhaust port to the atmosphere but this air loss is minimized by inserting a needle valve to restrict the airflow from the three-way valve exhaust port.

When the individually separated patch has been twisted the full 90°, a thickness sensor shown in FIG. **11** determines if a single or a multiple ply has been picked up. This sensor consists of a sensing head or finger **39**, which is adjustable to accommodate the various thicknesses of fabrics encountered in garment manufacture between the head **39** and sensing anvil **39***a*. The finger **39** is activated by the thickness sensor pneumatic cylinder **42** depressing the lever **41** pivoted at point **41***a* thereby closing and opening port **38***a* located in a block **40** connected to a back pressure sensor. The thickness sensor **39** is pivoted from frame **43** from which the acticulated cylinder **42** moves the lever arm **41**. By closing the port **38***a*, from which air escapes in normally open position, the pressure is built up in the supply line. The buildup of pressure is detected when a single ply is between finger **39** and anvil **39***a* and not detected when two or more plies are interposed between finger and anvil **39** and **39***a* respectively.

The sensing device represents a simple and efficient means for determining the thickness of one or two plies. If one ply **27** is present, then the sensing finger or tap **39**, when appropriately adjusted for the thickness of ply **27**, when striking anvil **39***a* will give either a "yes" or a "no" signal depending on the circuit design. This signal is obtained as follows:

When a proper timing mechanism or circuit causes solenoid valve **42***d* to admit working fluid such as shop air from a source **65** to cylinder **42**, the cylinder **42** pivots the machine element **41**, in this case the thickness-sensing finger or tap lever **41**. At the same time as the solenoid valve **42***d* admits the working fluid under pressure to cylinder **42**, the solenoid valve **42***d* also admits working fluid to a pneumatic activator **61**, appropriately throttled down, if necessary, by means of a valve such as a needle valve **62**. The fluid escapes from the pneumatic activator **61** through a port such as **38***a* on which accurately rests lever **41** if a single ply or a ply of a correct thickness is present.

Almost simultaneously, the pressure builds up in pneumatic activator **61** which then triggers appropriate means to signal the presence of a single ply. Obviously, if two plies are present, port **38***a* will not be blocked by lever **41** and the signal will not be forthcoming. The pneumatic activator **61** is a reasonably fast-acting valve such as a diaphragm valve which may be interfaced with means such as a relay drive means, a microswitch, a fluidic flip-flop device or means to activate a fluid circuit, other valves or an electrical circuit. The interfacing of the illustrated thickness-sensing device with the electrical control circuit for the twist pickup device and the alarm circuit is disclosed further herein.

The twist pickup motors **21** are supported on a crosspiece **23** which in turn is supported from a member **25** projecting upwardly from the conveyor support frame **52**. This frame also carries crossmember **23** to which is attached puller wheels **56** one for each twist head and only one of which is illustrated in FIG. **5**. These wheels consist of a puller wheel **56** driven downwardly by the cylinder **50** and engaging the constantly rotating conveyor rollers **51**. To provide a better engagement, an elastomeric O-ring type of rib **58** is provided on the puller wheel **56**. The wheel is rotating around axis **59** during the engagement with a ply. The puller wheel axis in turn is carried by shaft post **54** connected to the puller wheel through a hexagonal rod **50***a* which is thus internally guided to prevent the puller wheel **56** from rotating and sending the welt patch or stiffener, respectively, in a misaligned direction.

To prevent more than one welt patch ply **10** or stiffener ply **11** from being picked up, a corner-securing device **49** in the form of a plate is affixed to the twist pickup table corner frame **33***a* as illustrated in FIG. **2**.

In order to provide a smooth travel of the tables **29** and **33**, respectively, a vertical bearing **31** has been provided on the shaft **30** which surrounds shaft **38**. Further, in order to allow the proper positioning of photocell and its lamp **37** and **36** respectively these have been aligned to project askewingly through the conveyor rollers and are carried on support frame **35**.

After the puller wheel **56** has engaged the welting patch **10** or stiffener **11**, these are sent onto conveyor rollers **51** which are supported by conveyor roller side frame **52**. These rollers are rotatably driven through shafts **53** at the end of which a sprocket wheel or a gear may be carried. Thus, a chain, not shown, may drive the conveyor rollers **51** in an interconnected manner. A separate, but operatively interconnected drive, is provided for the conveyor rollers on the left-hand and right-hand side of the machine. These rollers **51** are similarly driven by chain or other appropriate means such as interlinked gearing to accomplish substantially the same purpose. These rollers rotate at approximately the same speed for the right-hand as well as the left-hand conveyor sections.

STIFFENER PATCH FEED MODIFICATION

Another aspect of this invention is illustrated in a modification pertaining to the stiffener-patch-forming device **11** shown in FIGS. **7** to **10** used to feed a stiffener patch when it is supplied as a tape **76** from a reel **71**. The tape **76** is fed onto a tape travel rail **77** and guided by a guide channel or guide shroud **79** which forms a rectangular aperture **79***a*, the stiffener tape **76**, properly guided into a press section **80** is pressed therein. This press section **80** consists of a heated plate **80***a* insulated by a plastic insulation **81** such as a silicone rubber layer and supported by, if needed, an additional cushioning layer **82**. The cushioning layer **82**, in turn, is attached to the stiffener press head cylinder **86** which when appropriately activated removes the inherent curl from the stiffener tape **76**, developed when the stiffener is unwound from reel **71**. A conventional resistance heating unit, not shown, is introduced in apertures **80***b* in the press head **80***a*. The press head as well as the supply reel is affixed to the feed support channel **78**, the reel being dependent therefrom by arm **74** carrying on it a shaft **72** on which the reel **71** is mounted. The stiffener tape travel rail **77** is supported under the press head section by support members **87** mounted on the channel member **78**, this member in turn is rigidly affixed to the machine frame **16** shown in FIG. **2**.

As a stiffener patch **11** must have on each end thereof a longitudinal slit **12**, in the middle of it, a cutting section has been provided which allows cutting adjacent ends of two stiffener patches. Thus, the stiffener tape travel rail **77** has a cutout or slit for blade **91** and a blade shroud **90** having a corresponding slit **89***a* in the latter. The cutting is effected by means of a conventional single-edge razor blade **91** driven upwardly by a pneumatically activated piston **92** driving a rod **93** holding the end of the cutting blade **91** in a blade-securing fixture designated as **94**. The upward travel of the blade is arrested by internal means in piston **92** although external stop means may also be provided by merely extending the blade-securing fixture **94** such that it engages the tape travel rail **77**.

The stiffener tape thereafter proceeds under the feed shroud **96** between feed roller **97** and idler roller **99**. The length of the stiffener patch designed for a specific purpose can be adjusted by the feed stroke of cylinder **102** driving rack **100** and pinion **101** which is mounted on shaft **106** connected to the feed roller **97** as shown in more detail in FIG. **9**.

The feed is effected when the rack **100** is being retracted by cylinder **102**. The rack is also supported by a rack support roller **107** which prevents the rack being disengaged from pinion **101**. As illustrated in FIGS. **8**, **9**, and **10** the rack cylinder **102** is supported by support **104** projecting upwardly from channel member **78**.

As mentioned before, the stiffener patch of a predetermined length is fed when the cylinder **102** is being retracted. During the feed cycle, idler roller **99** which is weighted for engaging properly with the stiffener tape, also helps in guiding the stiffener tape during the feed cycle.

When the stiffener feed stroke has been achieved, a scissors blade **116** shown in FIG. **10** is activated by a cylinder **122** shown in FIG. **8**. The blade **116** is attached to the cylinder by means of a cylinder-rod-holding block **124**. The cutting is effected when the cylinder moves on an upward stroke and pivots the scissor blade **116** on shaft **120** which shaft is held by block **121**. The scissors block, i.e. the other blade of the scissors is labeled as item **117** in FIG. **10**. The block **121** in turn has been affixed to scissor aperture shroud **119**. At the same time as the scissors cut the facing patch, a return of the feed roller **97** is effected by lifting the idler roller **99** which is mounted through shaft **110** in an idler shaft travel frame **111**. This travel frame in turn is positioned between two U-shaped channels **112** in which the travel frame **111** moves upwardly when being urged by a cylinder **113** carrying at the end of its rod an extension **114**. A retract aid pin or holder pin **127** illustrated in FIG. **10** simultaneously with the lifting of the idler roller **99** is engaging the stiffener by projecting downwardly through an aperture in shroud **119**. The retract aid pin or holder pin **127** is mounted on the scissor block shroud **119** by the retract-aid-pin-holding frame **130** which carries the retract-pin-activating cylinder **129**. This pin has been found useful in that it prevents the stiffener tape from being accidentally retracted backwardly when the rack **100** moves forwardly thus rotating reversibly cylinder **97**. In the ready-to-feed position the rack **100** comes to rest against an adjustable rack stop **109**.

After the scissor blade **116** has been urged downwardly and completed its cutting cycle, the cylinder **112** retracts the same until the blade comes to a rest against the scissor stop pin **126**. This operation then completes the feed stroke of a single stiffener patch which is aided along the roller conveyor by being momentarily engaged with a puller wheel which in its operation is the same as previously described in connection with the double twist head device and labeled as item **50**.

As it can be appreciated, the present machine allows the feeding of the stiffener patch which is either preprepared with its ends having a longitudinal cut or which can be prepared in a continuous manner such as illustrated by the devices in FIGS. **7**, **8**, **9**, and **10**. As motor **21** and the thickness sensor frame **43** can be readily disconnected along with the photocell **36** and **37** all as shown in FIG. **4**, the interchange of the modified feed device with a twist pickup head is readily apparent to those skilled in the art.

TURNOVER DEVICE 200

As it was mentioned before, every other welting patch **10** must be inverted so that it presents its face up position for sewing to the stiffening patch. This inversion is accomplished by the facing turnover device illustrated in FIGS. **12** and **12***a* to **12***c*. As the welting patch travels along the conveyors **51**, it interrupts the path between the photocell **202** and its lamp **204** which may be conveniently attached to the conveyor frame **52** as shown in FIG. **11** or attached to a welting patch turnover device frame **212** as shown in FIG. **2**. The rollers both preceding the welting patch turnover gate **207** have been labeled as **201**. These are covered with an elastomeric material which provides the necessary frictional engagement with the welting patch for its inversion and subsequent advancement along the conveyor rollers **51** to the next work station. A suitable elastomeric material has been found to be silicon rubber. Furthermore, the number of rollers covered with this material may vary. The presently disclosed device has been operated with six rollers covered with elastomeric material, three preceding and three following the turnover gate **207**. Of course, the number of rollers **201** covered with the elastomeric material may be varied such as dictated by the fabric material, its frictional characteristics and the turnover behavior of the fabric based on its thickness and stiffness. Thus, an appropriate number may be chosen such as five rollers preceding the turnover device and four following.

The turnover gate **207** is a round rod bent in a U-shape with the legs affixed to a frame **209** which in turn is affixed to a pneumatic cylinder rod **211** and activated by the pneumatic piston **210**. The gate is urged against an elastomeric cushioning pad **216** on an upstroke of the rod **211**. The cushioning pad **216** is held rigidly in a position parallel to the rollers by a support bar **214** affixed to the turnover gate support frame **212**. This bar has two notches **214***a* and **214***b* to guide gate **207** in its work stroke.

A schematic operational sequence of gate **207** is illustrated in FIGS. **12***a* to **12***c*. An approximate position of the welting patch **10** in FIG. **12***a* is shown shortly before the piston rod **211** retracts upwardly the turnover gate **207** for capturing the welting patch against the elastomeric material **216**. Thereafter, as soon as the appropriate period of time has elapsed, the welting patch is released by moving downwardly rod gate **207** in one continuous motion. As the down travel is not unduly fast, the welting patch is pulled away by the rollers clad with the elastomeric material and the turnover gate **207** then assumes its downward rest position ready for the next

welting patch to pass undisturbed between the U-shaped upturned legs of gate **207**. The rod **211** is conveniently in the form of a hexagon guided within the cylinder **210**. A side guide shown in FIG. **2** as **205** urges the welt patch onto the next work station thereby properly positioning the same.

RAKE-AND-PATCH-MATING DEVICE—230

As the welting patch is being urged along the conveyor rollers **51** with a side guide **205** being attached to the conveyor roller frame **52**, a beam from a rake photocell lamp **231** to photocell **232** is interrupted by an arriving welting patch **10**. The photocell lamp **231** is mounted in a frame **232***a* extending over the flat portion of the welting patch ramp **240** and before a patch stop plate **233**.

The welting patch proceeds onto the flat part of the welting patch ramp **240** being urged thereon by the conveyor rollers **51**. The ramp consists of highly polished metal plate in which slots have been cut to accommodate the rake fingers **236**. The edges of this ramp between rake fingers **236** are highly polished in order to prevent the welting patch from striking by the edges and being held up thereby. A convenient number of rake fingers **236** are provided. It has been found that about five are sufficient, two of which are in slots in the facing patch ramp **240** and the rest of which are between the conveyor rollers in the ready position on the leftmost side of the conveyor as shown in FIG. **2** and FIG. **13**. In order to allow the tail end of the welting patch to be swept uniformly over onto a stiffening patch, a welting patch tail end ramp **241** has been provided.

The welting patch tail end ramp **241** consisting of fingers, three being shown in FIG. **13**, each having slots between adjacent finger to fit the rake fingers **236** therebetween. The ramp **241** is attached to a securing ledge **243** which is in turn affixed to the conveyor roller frame **52** by appropriate means not shown.

The conveyor rollers **51** on both sides of the conveyor are mounted in the frame **52** having two outside and one inside support also labeled as **52**, with each conveyor roller being on a common shaft or axis **51***a*. Thus, the conveyor rollers **51** on the right-hand side of the machine as shown in FIG. **2** all have common shafts even though a welting patch is moved along one side thereof and the stiffener along the other side thereof.

The rake fingers **236** which are carried by the bar **234** shown also in FIG. **14** urge leftwardly the welting patch onto ramps **240** and **241** thus effectively placing the welting patch onto a stiffener patch which has been advanced by the conveyor rollers **51** and stopped by drop gate **242**.

When drop gate **242** moves downwardly, a puller wheel **250** urges the mated welting patch and stiffener onto the sewing machine **301**. Stop or drop gate **242** is dropped when photocell **246** is not receiving a light beam from lamp **244**, while uncovering photocell **246** after the tail end of the patch assembly has passed causes the gate **242** to be uplifted by cylinder **242***a*.

An appropriate delay time is provided for the drop gate **242** activation so that the assembled welting patch and stiffener can be moved towards the sewing machine.

The rake is activated when the photocell **232** as well as the photocell **246** are covered. If one is not covered the rake is inoperative and will not urge a welting patch over on the right-hand side of the conveyor as shown in FIG. **13**.

The electrical control devices which are employed herein, will be described in more detail following the mechanical description of this invention.

Referring to FIG. **14**, which is a cross section view along line **14—14** of FIG. **13**, the rake bar rod **237** is affixed to rake bar cylinder **239**. The puller wheel **250** is suspended from puller-wheel-holding frame **249** and activated by the puller wheel cylinder **252** driving downwardly rod **254** which carries at the end thereof a puller wheel shaft frame **251**.

Further, in reference to FIG. **14**, the rake bar is stopped, on its return stroke, by rake bar stop **256** attached to the conveyor frame **52**. On the other side of the conveyor frame, rake cylinder **239** is held to conveyor frame **52** by bracket **2392**.

SEWING MACHINE AND CHAINED WELTING PATCH SEPARATOR—300

The welting or facing patch and its stiffener patch are sewed together and chained off from a sewing machine **301** of a type previously identified and which operates in a manner well known to those skilled in the art. The modifications employed with the sewing machine **301** to make it operative for the present purpose will be explained in greater detail in connection with the actual sewing operation.

Thus, when the mated welting patch and the stiffener patch are advanced from the roller conveyors **51** as aided by the puller wheel **250**, a photocell and photocell lamp combination **304** and **302**, respectively, signal the approach of the welting patch and cause presser foot **306** to be lifted by means of pneumatically operated presser foot lift cylinder **305** which activates the linkages normally manually operated by a foot-pedal-operated presser foot. The pneumatically operated cylinder **305** which accomplishes this has not been shown.

In a similar manner, the electrical circuit means further explained herein also cause the "transmitter" **366** (i.e. the sewing machine motor) to be operated and the sewing machine **301** thus commences sewing the welting patch **10** and the stiffener patch **11** together and moves the sewn assembly across the table **307** in the conventional fashion by means of feed dogs, not shown.

As the welting patch is being sewed, it is still chained together to the previous patch by a thread chain formed by the sewing machine **301**.

In order to separate the connected welting patches, a cutting means have been provided in which a guillotine blade **310** is driven by a pneumatically operated cylinder **314** onto a guillotine anvil **311** on which the thread chain rests. The cutting operation is indicated when a beam from the guillotine blade photocell lamp **317** strikes the guillotine blade photocell lamp **320**, i.e. when the previous workpiece has advanced sufficiently far on the conveyor rollers **51** such that these hold the welting patch sufficiently taut across the anvil **311**. This makes it certain that the following facing patch has been arrested in its forward movement by the stoppage of sewing machine **301**. Thus, the guillotine blade then severs the chained together welting patches and permits the marking to be carried out in the next work station. The guillotine blade **310** and is pneumatically operated downstroking cylinder **314** is fixed to the roller conveyor frame **52** by its holding frame **319** which also carries the photocell lamp **317**.

In order to initiate the movement of the welting patch along the conveyors, a puller wheel **322** has been provided, with the thread-cutting operation. This puller wheel is mounted on a puller wheel frame **324** which also carries an appropriately located photocell **332** activating the next work cycle at the next work station.

The puller wheel **322** operates in a manner similar to the previously described puller wheels and consequently, is not described at this juncture.

For this purpose of holding taut during the cutting operation the workpiece being severed from the following workpiece, the conveyor rollers **51** both preceding and following the guillotine anvil **311** may also be covered with an elastomeric material and in a manner similar to that described in connection with the turnover gate device **200**.

Instead of a guillotine head cutter **310**, a cutting attachment **313** (not shown, but available from Union Special Machinery Co.) may also be employed. This device operates by blowing into a scissors means a jet of air which forces the chain of thread between two facing patches to be captured and cut by the scissors means. Moreover, this device also allows the excess thread to be cut which is formed between the two facing patches. An appropriately sized hose, not shown, captures the thread remnants, forced into the scissors means by a jet, and conducts the remnants into a container.

The stoppage and the start of the sewing machine **301** is effected by the previously mentioned "transmitter" which is well known to those skilled in the art and available from commercial sources such as Singer Sewing Machine Co. This transmitter has been identified in FIG. **2** as **366**.

Further, in order to assure the proper operation of the machine a thread breakage detector has been employed with the present machine. This thread breakage detector is illustrated in FIG. **20** and will be described later.

In respect to the sewing machine **301**, it is well that it does not run during the period when the preceding workpiece has been sewed and the following workpiece has not reached the sewing machine. Thus, the sewing machine is started when the photocell **302** senses the approaching edge of the welting patch with an appropriate delay time provided as further explained in connection with electrical control circuit.

In turn, the machine is stopped when the trailing edge uncovers the photocell **304** and again after appropriate delay time, allowing for the welting patch to be sewn or walked through the machine, the sewing machine is stopped. As this is an automatically operated machine, the presser foot raising is accomplished by means of the previously mentioned pneumatically operated cylinder **305** which normally replaces a pedal which the operator depresses. Further, the "transmitter" which is a brake and a clutch combination is operated by a two-way pneumatically driven cylinder **301***a* (not shown) which in one position is assuming the "clutch-engaged" position and in another is assuming the "clutch-disenaged" position. Normally, an operator will operate the clutch by one and the brake and presser foot by another pedal.

In respect to the thread breakage detector, illustrated in FIG. **20**, the top thread in the respective thread holder rods **474** has been identified as **471** and is obtained from spool **473** while the bottom thread as **472** which in turn has been obtained from spool **475**. At the other end of the rods **474** a magnet **476** has been attached. When there is no tension, (normally present in both the top and the bottom threads) the magnet **476** activates a reed switch **477**, i.e. the reed is drawn up by means of this magnet and completes a relay contact which operates a relay which in turn operates an alarm system and turns off the machine. These two magnet-holding rods **474** are pivotally affixed to a shaft **478** and balanced in such a manner as to render the reed switch operative only upon failure of the thread tension.

MARKER DEVICE—325

As the sewn and severed welting patch is urged by the conveyor roller **51** along the conveyor towards the next work station, it has been found convenient to introduce a wedge **335** affixed to the conveyor frame **52** which urges the workpiece over marker plate **326**. The arrival of the welting patch is detected by the marker photocell lamp **332** and marker photocell **334** acting in combination. As the space between the conveyor frame **52** is narrowed by wedge **335** in the vicinity in which the marker plate **326**, a marker support frame **331** can be readily affixed to the conveyor frame **52**. The marker frame **331** holds the marker hammer **329** (which can be placed on either side of conveyor frame **52**) and its marker hammer cylinder **330** as well as the marker station puller wheel **336**. The puller wheel cylinder **337** is attached to the frame **331** by means of holding arm **339**. This wedge **335** narrowed location on the conveyor assures a reasonably consistent position for marking each of the welting patches with the appropriate number.

The marking is accomplished by the marking hammer **329**, driven by the pneumatically operated cylinder **330** striking a tape or ribbon **368** and marker plate **326**. The marker plate **326** after being struck twice to mark the correctly aligned welting patches is moved on the marker plate slide **328**. The marker plate in turn is carried on the marker plate rack labeled in FIGS. **15** and **17** as **327**.

In order to prevent the marker rack **327** from being unduly long, numbers above nine are placed in a vertically aligned position.

The struck or marked welting patch is removed by means of a puller wheel **336** in a manner as previously explained in conjunction with the twist pickup device. After striking two successive welting patches with the correct number, the market plate **326** is advanced by an in line ratchet **369** carrying a ratchet tooth **370** and a ratchet-positioning surface or "ratchet cam" surface **371** which upon the return stroke of cylinder **376** causes the ratchet tooth **370** to assume the correct position when the ratchet tooth surface **371** is pulled against the ratchet-positioning stop or "cam" surface **372**. In order to assure proper marking position, the rack **327** is held in the appropriate position by means of ratchet tooth **370** when urged against the marker plate rack **327**.

After the **120** patches have been marked, a properly positioned retract microswitch **379** activated by stop trip **380** causes a pneumatically operated cylinder **381** to retract the marker plate **326** to its starting position. The cylinder **381** retracts the rack **327** by means of chain **382** driven over a sprocket wheel **384** which sprocket wheel is affixed to the housing frame **16**.

As shown in FIG. **18**, the marking ribbon or belt **368** is lead from reel **341** guided by guide rollers **399** over ribbon guide rods **367**, the marking ribbon being advanced on each impact of the marking hammer **329**. The takeup of the ribbon is effected by motor **391** driving a serrated drive wheel **393**, i.e. a driven wheel **393**, which drives the ribbon by urging the same against an idler roller **392**, which is held engaged with the driven wheel **393** by means of a lever **394** pulling a spring **397** the lever being pivoted at pivot point **396**. In FIG. **18** the tape takeup reel is depicted as **340** and the tape supply reel as **341**. Each of these reels **340** and **341** is driven by a low-torque motor **395** and **397** which exert enough tension on the tape to keep it taut but does not advance or retract the tape, i.e. these motors drive in opposite directions reel **340** and **341** in order to keep the marking ribbon taut. These motors are freely available in the trade.

As the stiffener is generally a white material, it is marked in preference to the welting patch. The stiffener is a nonwoven material commonly available in the trade and known as Perlon. In FIG. **18** the serrated roller is **393** engaged to the idler wheel **392**. The last is covered with an elastomeric material.

STACKER DEVICE—343

After the respective welting patches have been marked on the underside thereof by the appropriate number the faceup patch or the first patch is forwarded onto the first stacking gridiron **351** and the facing patch, which has been inverted, to gridiron **352** for its stacking the patches in tray **364** and **364***a*, respectively.

The stacking is accomplished when the first welting patch hits the end stop **344** and activates the photocell **344** which then causes to project upwardly, by an appropriately transmitted signal, the gate rod **342** driven by cylinder **342***a* stopping the second welting patch marked with the same number.

The gridirons are caused to stack the patches when the second welting patch interrupts the light beam from light **349** striking photocell **350**. At this moment a rack **360** driving a pinion **359** on a shaft **356** which is common to the first and second stacking gridiron **351** and **352**, respectively, causes the patches to be pivoted through approximately 180° and deposited on tray **364** and **364***a*. The pinion **359** is housed in a shaft housing **357**. The stacking gridiron consists of an end guide **355** which is in form of an angle iron to which are affixed the stacking rods **354**. The other end of these rods is affixed to the common shaft **356**.

A U-shaped rack guide channel **361** is provided to confine the rack **360** in its work position. The rack is driven by cylinder **362** which is a two-way pneumatically activated cylinder.

CONVEYOR DRIVE MECHANISM—450

One of the aspects of this invention is the interlocking relationship of the facing patches as these are being assembled and sewn. It is essential that the left-hand and right-hand conveyor are stopped in the position where a machine malfunction may occur; hence, when malfunctions occur, it is well that both the left-hand conveyor and right-hand conveyor are synchronized. This is accomplished by providing the conveyor drive motor **451** with a sprocket wheel **452** which drives the chain **453** which sprocket wheel also carries a sprocket brake band **454** trained around brake wheels **456**. When an appropriate malfunction signal has been received from the machine, as further explained herein, a pneumatically operated brake device in the form an elastomeric material covered roller **457** is urged against the brake band **454** by the cylinder **459** stopping the motor **451** as well as any advance by the conveyor chain **453**. The left-hand side and the right-hand side brake of the conveyor are operated in the same manner.

ELECTRICAL CONTROL CIRCUIT

Referring to FIG. **21** which represents the organization of FIGS. **21***a* to **21***e*, these figures depict in their totality a schematic diagram of the electrical control circuit of the welt facing machine. The operation of the control circuit will now be explained by describing, in sequence, the manner in which the electrical circuit controls the operation of the welt facing machine.

ELECTRICAL CONTROL CIRCUIT FOR FACING PICKUP AND TRANSFER DEVICE 20

Operation of the facing pickup and transfer device **20** is initiated by momentarily depressing the start switch **899**, in the manual mode of operation, causing relay **602** to energize, In the automatic mode of operation, relay **602** is energized in an alternative manner as will be described hereinafter. The energization of relay **602** is results in the following:

1. Relay **602** latches in its energized condition through the contacts of relay **604**.

2. High-pressure release valve **888** is deenergized and low-pressure release valve **887** is energized causing the stack to relax under the twister head **26**.

3. The input to delay circuit **606** is ungrounded causing delay circuit **606** to commence its delay interval.

After a time interval sufficient to ensure that the stack has sufficiently relaxed beneath the twister head **26**, so as to permit rotation of twister head **26**, the output of delay circuit **606** is grounded, causing relay **608** to energize. This causes twister motor **21** to be energized, resulting in the rotation of the facing which adheres to the twister head **26**.

When the twister head **26** has rotated so that the facing adhering thereto interrupts the path of the light beam from lamp **36** to facing twister photocell **37**, relay **610** is energized by photocell amplifier **612**, with the following results:

1. Twister motor **21** is deenergized, thereby stopping the rotation of the twister head.

2. Relay **614** is energized, with the following results:

a. Low-pressure release valve **887** is deenergized.

b. Ply monitor valve **42***d* admitting working fluid to cylinder **42** is energized.

If the ply thickness is correct, namely, if a single ply of facing is present, ply monitor microswitch **42***e* is actuated into its closed position, causing relay **616** to energize, with the following results:

1. Relay **616** latches in its energized condition.

2. Ply monitor valve **42***d* is deenergized.

3. The inputs of delay circuits **618**, **620** and **622** are ungrounded, causing these delay circuits to commence their delay intervals.

4. Puller valve **56***d* admitting pressure to cylinder **50** is energized causing the facing to be pulled onto the conveyor.

After a time interval sufficient to ensure that the facing is on the conveyor, the output of delay circuit **618** is grounded, causing relay **624** to energize. This causes puller valve **56***d* to deenergize.

Shortly thereafter, the output of delay circuit **620** is grounded, causing relay **604** to energize, with the following results:

1. Relays **602**, **608** and **614** are deenergized.

2. High-pressure release valve **888** is energized causing the stack to move up into high-pressure contact with twister head **26**.

As the facing proceeds down the conveyor, the trailing edge of the facing uncovers the facing patch twister photocell **37**, permitting the light beam from lamp **36** to impinge thereon, causing relay **610** to be deenergized by photocell amplifier **612**.

After a time interval corresponding to the desired time between repetitive operations of the facing pickup and transfer unit, the output of delay circuit **622** is grounded, causing relay **626** to momentarily energize. The time interval for which relay **626** is energized is determined by a resistor **628** and a capacitor **630** connected across the coil of relay **626**. The momentary energization of relay **626** causes relays **616**, **604** and **626** to deenergize.

All circuits have thus been restored to their initial conditions, marking the end of the facing pickup and transfer operation. In addition, relay **626** may be used to generate an automatic start signal for the facing pickup and transfer unit, in a manner to be described hereinafter.

ELECTRICAL CONTROL CIRCUIT FOR STIFFENER PATCH PREPARING AND FEEDING MECHANISM

If a stiffener-patch- or lining-patch-feeding mechanism of the same type as the facing twister mechanism is employed, electrical control circuitry similar to that already described may be employed. The following is a detailed description of the electrical control circuitry for the alternative embodiment in which the lining material is supplied in roll form.

The momentary energization of relay **626** causes relay **632** to energize and latch through relay **634**, marking the start of the lining-feeding operation. The energization of relay **632** results in the following:

1. Holder pin, idler roller and press valve **129***d* activating the corresponding and following cylinders **129**, **113**, and **86** is energized. This single valve causes the press **80** to go down, the idler **99** to release, and the holder pin **127** to clamp the lining.

2. Feeder advance valve **102***d* is deenergized.

3. The input of delay circuit **636** is ungrounded, causing delay circuit **636** to commence its delay interval.

After a time interval sufficient to assure that these mechanical functions have occurred, the output of delay circuit **636** is grounded, causing relay **638** to energize, with the following results:

1. Scissors, feeder reset, slitter and puller valve **122***d* activating the corresponding and following cylinders **116**, **102**, **92** and **50** is energized, causing the scissors **116** to cut the lining, the puller wheel **56** to send the cut lining down the conveyor rollers **51**, the slitter **91** to cut the longitudinal slit **12** in the lining and the feeder cylinder rack **100** to reset.

2. The input of delay circuit **640** is ungrounded, causing delay circuit **640** to commence its timing interval.

After a time interval sufficient to assure that these mechanical functions have occurred, the output of delay circuit **640** is grounded, causing relay **634** to be momentarily energized. Relay **634** remains energized for a time interval determined by a resistor **642** and a capacitor **644** connected across the coil of relay **634**. The momentary energization of relay **634** results in the following:

1. Relays **632** and **638** are deenergized.

2. Holder, idler and press valve **129***d* and scissors, feeder reset, slitter, and puller valve **122***d* are deenergized.

When relay **634** deenergizes, the feeder advance valve **102***d* is energized, causing the next lining to be advanced in place, All circuitry has thus returned to its initial condition, marking the end of the lining feed operation.

ELECTRICAL CONTROL CIRCUIT FOR TURNOVER DEVICE **200**

As the facing proceeds down the conveyor rollers **51**, the leading edge thereof interrupts the path of the light beam from lamp **204** to turnover photocell **202**. This causes the input to a delay-on and delay-off circuit **646** (or delayed stop and start circuit as it is also known) to be grounded by photocell amplifier **648**.

After a time interval sufficient to assure that the leading edge of the facing is aligned properly beneath the turnover mechanism, this time interval corresponding to the "on-time" delay of delay circuit **646**, the output of delay circuit **646** is grounded, causing relay **650** to energize with the following results:

1. Capacitor **652** is charged to 150 volts DC through resistor **654**.

2. Assuming that the stepper relay **656** (which causes the turnover gate **207** to be inoperative in respect to every other facing patch) is in the position as shown, turnover valve **210***d* is energized, causing the leading edge of the facing to be captured by the turnover mechanism.

When the trailing edge of the facing uncovers turnover photocell **202**, permitting the light beam from lamp **204** to impinge thereon, the input to delay circuit **646** is ungrounded by photocell amplifier **648**.

After a time interval sufficient to assure that the turnover operation is complete, this time interval corresponding to the "off-time" delay of delay circuit **646**, relay **650** is deenergized with the following results:

1. Turnover valve **210***d* is deenergized, causing the facing to be released.

2. Stepper relay **656** is momentarily energized by charged capacitor **652**, causing stepper relay **665** to change state. Stepping relay **656** will remain in its new state until the next time it is energized. This causes the turnover gate **207** to be inoperative for alternate facing patches.

All circuits have thus returned to their initial condition marking the end of the turnover operation.

ELECTRICAL CONTROL CIRCUIT FOR PATCH-MATING OPERATION

When the facing patch arrives at the rake device **230**, it interrupts the path of the light beam from lamp **231** to facing photocell **232**, causing relay **658** to be energized by photocell amplifier **660**. Soon thereafter, the lining arrives at the stop gate **243** interrupting the path of the light beam from lamp **244** to lining photocell **246**. This causes relay **662** to be energized by photocell amplifier **664**, with the following results:

1. Relay **658** is latched through relay **662**, so that relay **658** will not deenergize when facing patch photocell **232** is uncovered.

2. Rake valve **239***d* is energized causing the facing to be moved in the manner described before.

3. The input of delay circuit **66** is ungrounded, causing delay circuit **666** to commence its delay interval.

After a time interval sufficient to assure that the facing patch has been transferred onto the lining, the output of delay **666** is grounded, causing relay **668** to energize, with the following results:

1. Rake valve **239***d* is deenergized.

2. Stop gate valve **242***d*, which is normally energized, is deenergized, causing the gate to retract so that it does not obstruct the conveying path of the mated patches.

3. Relay **670** is momentarily energized by capacitor **672**, causing puller valve **252***d* to be momentarily energized. This causes the mated material to be conveyed away from the mating mechanism.

When the trailing edge of the mated patches uncovers lining photocell **264**, permitting the light beam from lamp **244** to impinge thereon, the coil of relay **662** is ungrounded. After a short time interval, to permit the trailing edge of the mated material to be conveyed past the gate, relay **662** deenergizes. This time interval is determined by a resistor **676** and a capacitor **678** connected across the coil of relay **662**. The deenergization of relay **662** results in the following:

1. Relays **658** and **668** are deenergized.

2. Stop gate valve **242***d* is energized returning the stop gate **242** to its initial position.

3. Capacitor **672** is discharged by resistor **674**, returning the capacitor **672** to its initial condition.

All circuitry has thus been restored to its initial condition marking the end of the mating operation.

ELECTRICAL CONTROL CIRCUIT FOR SEWING machining AND THREAD CUTTER MECHANISM

As the mated patches proceed down the conveyor **51**, the leading edge thereof will interrupt the path of the light beam from lamp **302** to sewing machine photocell **304**. This causes the input to a delay-on and delay-off circuit **680** to be grounded by photocell amplifier **682**.

After a time interval sufficient to assure that the leading edge of the mated material is underneath the pressor foot **306**, this time interval corresponding to the "on-time" delay of delay circuit **680**, relays **684** is energized by delay circuit **680**, with the following results:

1. Sewing machine brake and presser foot valve **305***d* are deenergized, and sewing machine clutch valve **301***e* is energized, causing the sewing machine to commence operation.

2. Relay **686** is energized causing air trim valve **313***d* to energize so as to blow the thread into the thread cutter **313**.

When the trailing edge of the mated material uncovers sewing machine photocell **304**, permitting the light beam from lamp **302** to impinge thereon, the input to delay circuit **680** is ungrounded by photocell amplifier **682**. After a time interval sufficient to assure that the sewing operation is complete, this time interval corresponding to the "off-time" delay of delay circuit **680**, relay **684** is deenergized with the following results:

1. Sewing machine brake and presser foot valve **305***d* are energized.

2. Sewing machine clutch valve **301***e* is deenergized.

3. Puller valve **322***d* is energized causing the sewn material to be accelerated down the conveyor.

4. The coil of relay **686** is ungrounded.

It is noted that if the guillotine cutter **310** is used, instead of the scissor means **313**, then the timing circuit is equivalent in operation to that associated with the "start-sew" operation of the sewing machine **301**, as initiated by the photocell **302** detecting the approaching edge of mated patches.

After a time interval determined by a resistor **688** and a capacitor **690** connected across the coil of relay **686**, relay **686** deenergizes. This time delay is provided to maintain the airblast after the sewing operation is finished so as to aid the thread cutter **313** in cutting the thread as close as possible to the edge of the sewn material. The deenergization of relay **686** results in the following:

1. Air trim valve **313***d* is deenergized.

2. Puller valve **322***d* is deenergized.

All circuitry is thus restored to its initial condition marking the end of the sewing and thread cutting operation.

ELECTRICAL CIRCUIT FOR MARKER DEVICE **325**

As the sewn material proceeds down the conveyor, the leading edge thereof interrupts the path of the light beam from lamp **332** to photocell **334**. This causes relay **692** to be ener-

gized by photocell amplifier **694**, resulting in a capacitor **696** being charged to 150 volts DC through a resistor **698**.

When the trailing edge of the sewn material uncovers the marker photocell **334**, permitting the light beam from lamp **332** to impinge thereon, relay **692** is deenergized by photocell amplifier **694**, causing relay **700** to be momentarily energized by charged capacitor **696** with the following results:

1. Marker valve **330***d* is momentarily energized, causing the marker to mark the sewn material.

2. Capacitor **702** is charged to 150 volts DC through resistor **704**.

When relay **700** deenergizes, charged capacitor **702** is connected to the input of relay driver amplifier **706**, causing a pulse to appear at the output thereof. This causes relay **708** to be energized for a time interval determined by capacitor **702** and the input impedance of relay driver amplifier **706**, with the following results:

1. Tape motor **391** is momentarily energized causing the marking tape to be advanced.

2. Puller valve **337***d* is momentarily energized causing the material to be accelerated down the conveyor.

All circuitry has thus returned to its initial condition marking the end of the marking operation.

ELECTRICAL CONTROL CIRCUIT FOR STACKER MECHANISM 343

When the marked material arrives at the end of the conveyor, it interrupts the path of the light beam from lamp **346** to second stacker photocell **344**. The input to relay driver amplifier circuit **712** is grounded by photocell amplifier **710**, causing the output of relay driver amplifier circuit **712** to be conductive. This causes relay **714** to energize with the following results:

1. Second stacker photocell **344** is disconnected from the input of photocell amplifier **710**, and first stacker photocell **350** is connected thereto.

2. The input to relay driver amplifier **712** is ungrounded, causing the output of relay driver amplifier **712** to be nonconductive.

3. Relay **714** latches through the contacts of relay **720**. A resistor **716** and a capacitor **718** are connected across the coil of relay **714** to prevent relay **714** from deenergizing during its switching operation.

4. The output of relay driver amplifier **712** is connected to the coil of relay **720**.

5. Stacker gate rod valve **342***d* is energized causing the gate rod **342** to rise so as to provide a stop for the next marked material.

As the next marked material proceeds down the conveyor, it is stopped by gate rod **342**, so that is interrupts the path of the light beam from lamp **349** to first stacker photocell **350**. The input to relay driver amplifier circuit **712** is grounded by photocell amplifier **710**, causing the output of relay driver amplifier **712** to conduct. This in turn causes relay **720** to energize. A resistor **722** and a capacitor **724** are connected across the coil of relay **720** to ensure that relay **724** remains energized during its switching. The energization of relay **720** has the following results:

1. +26 volts DC is supplied to a second input of relay driver amplifier **712** so as to ensure that the output of relay driver amplifier **712** remains conductive when the stacker photocells **344** and **350** are uncovered.

2. Stacker and number change valve **376***d* is energized causing the stacker device **343** to stack the marked patches and the marker plate **326** to advance to the next number.

3. The input of delay circuit **726** is ungrounded causing the delay circuit **726** to commence its delay interval.

After a time interval sufficient to ensure that the stacker mechanical operation is complete, this time interval corresponding to the time delay of delay circuit **726**, the output of delay circuit **726** is grounded, causing the output of relay driver amplifier **712** to be nonconducting. This in turn causes relay **714** and **720** to deenergize, thus returning all circuitry to its initial condition and marking the end of the stacking operation.

AUTOMATIC MODE AND ALARM CIRCUITRY

AUTOMATIC MODE CIRCUITRY

The welt-facing machine is placed in the automatic or repetitive made of operation by momentarily closing automatic switch **901**, (located on top of electrical circuit console **17**, the later is shown in FIG. 2) which causes relay **730** to energize with the following results:

1. Relay **730** latches in its energized condition.

2. Contacts of relay **626** are connected to the coil of relay **602** so that relay **602** will energize when relay **626** is momentarily energized. This causes the facing pickup and transfer mechanism to restart at the end of each of its operating intervals.

3. +26 volts DC is applied to the coil of relay **732** and 120 volts AC is applied to the coil of relay **734**, to energize the alarm system.

The welt facing machine may be taken out of automatic mode by momentarily opening manual switch **902**, (on top of console **17**) which causes relay **730** to deenergize thereby restoring the automatic mode circuit to its initial condition.

TEMPERATURE ALARM

If the temperature of the press head of the lining feed mechanism is within operating limits, relay **736** is energized by the ground signal at terminal **738**, which originates from the temperature controller for the lining press head. Should the temperature be outside of operating limits, the temperature controller will unground terminal **738** causing relay **736** to deenergize, with the following results:

1. Temperature out light **904** (located on top of console **17**) will be illuminated, indicating to the operator that the temperature of the press head is not within operating limits.

2. Relay **730** is deenergized, causing the welt-facing machine to return to its manual mode of operation.

ALARM CONDITION

Should other alarm conditions occur, these alarm conditions to be described hereinafter, relay **732** will be energized, with the following results:

1. Alarm lamp **906** and alarm buzzer **907** are energized indicating to the operator that an alarm condition is present.

2. Conveyor motors **451** and conveyor brake valve **459***d* are deenergized, so as to simultaneously stop both conveyors. This assures that the proper relationship between workpieces will not be distributed.

3. The facing pickup and transfer mechanism is deenergized by deenergizing relays **602**, **614** and **616**, ply monitor valve **42***d* and motor(s) **21**.

4. The turnover mechanism is deenergized by deenergizing turnover valve **210***d*.

5. The sewing machine is deenergized by deenergizing sewing machine clutch valve **301***d* and relay **684**.

The following alarm circuits associated with various devices previously described are provided to energize relay **732** in the event of various malfunctions.

MARKER RESET ALARM

When the marker reaches the count of **60**, the count microswitch **379** is actuated causing relay **740** to be energized. A reset marker switch **909** is also provided to energize relay **740** so as to reset the marker at any time desired by the operator. The energization of relay **740** results in the following:

1. Relay **732** is energized through resistor **733**, placing the welt-facing machine in alarm mode as hereinbefore described.

2. A capacitor **742** which has been previously charged to +26 volts DC through resistor **744**, is connected to the input of relay driver amplifier **746**.

Relay driver amplifier **746** produces an output pulse of a duration determined by capacitor **742** and the input impedance of relay driver amplifier **746**, corresponding to the time required to reset marker plate **326**. This causes relay **748** to be momentarily energized with the following results:

1. Marker reset valve **381***d* is energized so as to reset the marker.
2. The stacker and number change valve **376***d* activating both cylinders **362** and **376** is energized.
3. Relay **750** is momentarily deenergized, causing conveyor motors **451** and conveyor brake valve **459***d* to deenergize, so as to stop the conveyors during the marker reset operation.

LINING MATERIAL RUNOUT ALARM

Should the lining material be exhausted or should it break, the lining material runout microswitch **75** shown in FIG. 7 would be actuated, with the following results:

1. Relay **732** would be energized through resistor **733**, placing the welt-facing machine in alarm mode as hereinbefore described.
2. Lining material runout light **910** (located on top of console **17**) would be ungrounded, causing it to energize through resistor **751**, indicating to the operator that the malfunction causing the alarm condition is the lining material's being exhausted or broken.

THREAD BREAKAGE ALARM

Should the sewing machine thread break or run out, thread detector microswitch also designated as reed switch **477** would close, causing relay **742** to energize with the following results:

1. Relay **732** would be energized through resistor **733**, placing the welt-facing machine in alarm mode as hereinbefore described.
2. Thread breakage light **911** (located on top of console **17**) would be energized indicating to the operator that the malfunction causing the alarm condition is a thread breakage or runout.

TIMER ALARMS

The following timer alarms are provided to indicate malfunctions in various stages of the welt-facing machine. This is accomplished by timing the interval between certain events in the operating cycle of the machine. If the time interval between these events exceeds a predetermined time interval, relay **732** will be energized, placing the welt-facing machine in alarm mode as hereinbefore described. The following timer alarms are provided.

PICKUP TIMER ALARM

The pickup timer **756** is started when relay **608** is energized. This corresponds to the time when the twister head **26** starts to rotate.

Timer **756** is reset when relay **616** energizes. This time corresponds to the completion of the ply thickness test.

If the time interval between these two occurrences is too long, timer **756** will energize relay **732** causing an alarm condition as hereinbefore described and a pickup timer light **912** will be illuminated indicating to the operator that a malfunction has occurred in the pickup mechanism.

PICKUP TO TURNOVER TIMER ALARM

The pickup to turnover timer alarm **758** is started when relay **616** energizes, corresponding to the completion of the ply thickness test. This causes relay **760** to energize and latch.

Timer **758** is reset when relay **650** energizes, causing relay **760** to deenergize. This corresponds to the arrival of the facing at the turnover mechanism.

If the time interval between these two occurrences is too long, timer **758** will energize relay **732** causing an alarm condition as hereinbefore described and a pickup to turnover timer light **914** (located on top of console **17**) will be illuminated, indicating to the operator that a malfunction has occurred between the pickup and turnover mechanisms and the mating mechanism.

TURNOVER TO MATING TIMER ALARM

The turnover mating timer **762** is started when relay **650** is energized, causing relay **764** to energize and latch. This corresponds to the arrival of the facing at the turnover station.

Timer **762** is reset when relay **670** is energized, causing relay **764** to deenergize. This time corresponds to the removal of the mated material from the mating mechanism.

If the time interval between those two occurrences is too long, timer **762** will energize relay **732** causing an alarm condition as hereinbefore described, and a turnover to mating timer light **916** (located on top of console **17**) will be illuminated, indicating to the operator that a malfunction has occurred between the turnover mechanism and the mating mechanism.

MATING TO SEWING MACHINE TIMER ALARM

The mating to sewing machine timer **766** is started when relay **670** is energized, causing relay **768** to energize and latch. This time corresponds to the removal of the mated material from the mating mechanism.

Timer **766** is reset when relay **684** is energized, causing relay **770** to be momentarily energized by capacitor **772**, which has previously been charged to 150 volts DC through resistor **774**. The momentary energization of relay **770** causes relay **768** to deenergize. This time corresponds to the arrival of the mated material at the presser foot.

If the time interval between these two occurrences is too long, timer **766** will energize relay **732** causing an alarm condition as hereinbefore described, and a mating to sewing machine timer light **917** will be illuminated indicating to the operator that a malfunction has occurred between the mating mechanism and the sewing machine.

SEWING MACHINE TIMER ALARM

Sewing machine timer **776** is started when relay **684** is energized. This corresponds to the arrival of the mater material at the presser foot.

Timer **776** is reset when relay **684** deenergizes, corresponding to the completion of the sewing operation.

If the time interval between these two occurrences is too long, timer **776** will energize relay **732** causing an alarm condition as hereinbefore described and a sewing machine timer light **919** (located on top of console **17**) will be illuminated, indicating to the operator that a malfunction has occurred in the sewing machine mechanism.

SEWING MACHINE TO MARKER TIMER ALARM

The sewing machine to marker timer **778** is started when relay **684** deenergizes, causing relay **780** to energize and latch. This corresponds to the completion of the sewing operation.

Timer **778** is reset when relay **700** is energized causing relay **780** to deenergize. This corresponds to the passage of the trailing edge of the sewn material over marker photocell **334**.

If the time interval between these two occurrences is too long, timer **778** will energize relay **732** causing an alarm condition as hereinbefore described, and a sewing machine to marker timer light **920** (located on top of console **17**) will be illuminated, indicating to the operator that a malfunction has occurred between the sewing machine and the marker mechanism.

FIRST MARKER TO STACKER TIMER ALARM

The first marker to stacker timer **782** is started when relay **708** is energized, causing relay **784** to energize and latch. This corresponds to the departure of the marked material from the marker device **325**.

Timer **782** is reset when relay **714** energizes, causing relay **784** to deenergize. This corresponds to the arrival of the marked material at the end of the conveyor.

If the time interval between these two occurrences is too long, timer **782** will energize relay **732** causing an alarm condition as hereinbefore described, and a first marker to stacker timer light **921** will be illuminated, indicating to the operator that a malfunction has occurred between the marker mechanism and stacker mechanism.

SECOND MARKER TO STACKER TIMER ALARM

The second marker to stacker timer **786** is started after relay **714** has been previously energized by the arrival of the first marked material at the stacker and relay **708** is energized. This causes relay **734** to energize and latch. This corresponds to the departure of the subsequent marked material from the marker device **325**.

Timer **786** is reset when relay **714** deenergizes, causing relay **734** to deenergize. This corresponds to the arrival of the second marked material at the stacker mechanism.

If the time interval between these two occurrences is too long, timer **786** will energize relay **732** causing an alarm condition as hereinbefore described, and a second marker to stacker timer light **922** will be illuminated, indicating to the operator that a malfunction has occurred between the marker and the stacker.

We claim:

1. A machine for automatically producing a series of like garment components each of which component is comprised of a plurality of parts comprising:

means for individually feeding into the machine a first part of said garment component said means for feeding including means for monitoring the proper operation of said means for individually feeding said first part;

means for individually feeding into the machine a second part of said garment component said means including means for monitoring the proper operation of said means for individually feeding said second part;

means for turning over an alternative number of said second part of said garment component, operatively interconnected with said means for feeding said second part including means for activating a signal indicating a malfunction and means for arresting said machine in an interlocked sequence;

means for placing said first part of said garment component in a receiving position including means for indicating an operative condition for receiving a garment part from said means for individually feeding a second part;

means for mating said first and second parts of said garment component including means indicating an operative condition for mating said garment components;

means for feeding said mated parts of said garment component for sewing of same, including means for returning said means for placing said first part of said garment component in a receiving position;

means for sewing together said first and second parts of the garment component including means for initiating and terminating by said garment component said means for sewing;

means for severing successive garment components sewed together by said means for sewing, operatively interconnected with said means for sewing whereby said sewing is in a interrelated cycle with said means for severing;

means for marking of each of said garment components in said series;

means for stacking said marked garment components in response to a marked sequence, including means for signaling a stacking sequence operatively interconnected with said means for marking in sequential order; and,

means for automatic operation of said machine including alarm means operatively interconnected therewith.

2. A machine for automatically producing a series of like garment components each of which component is comprised of a plurality of parts comprising:

means for individually feeding into the machine a first part of said garment component said means for feeding including means for monitoring the proper operation of said means for individually feeding said first part;

means for individually feeding into the machine a second part of said garment component said means including means for monitoring the proper operation of said means for individually feeding said second part;

means for turning over an alternative number of said second part of said garment component, operatively interconnected with said means for feeding said second part;

means for placing said first part of said garment component in a receiving position including means for indicating an operative condition for receiving a garment component from said means for individually feeding a second part;

means for mating said first and second part of said garment component;

means for feeding said mated parts of said garment component for sewing of same, including means for returning said means for placing said first part of said garment component in a receiving position;

means for sewing together said first and second parts of the garment component;

means for severing successive garment components sewed together by said means for sewing;

means for marking of each of said garment components in said series;

means for stacking said marked garment components in response to a marked sequence, including means for signaling a stacking sequence operatively interconnected with said means for marking; and,

means for automatic operation of said machine including alarm means operatively interconnected therewith for interlocking the machine whereby said series is maintained.

3. The machine for automatically producing a series of like garment components as defined in claim **1** and wherein the means for feeding the first and second part of said garment component comprises:

a vertically reciprocating first and second receptacle means holding said first and second part of said garment component, respectively;

a first pneumatic means for urging individually said first and second receptacle means upwardly;

a second pneumatic means for urging said first and second receptacle means upwardly, said second pneumatic means being operatively interconnected to said first pneumatic means and operatively superseding said first pneumatic means after an initial engagement period of said first pneumatic means with said receptacle;

means for rotatingly twisting said first and second parts of said garment component onto a conveyor feed means including means for arresting said means for rotatingly twisting, said means for rotatingly twisting being further operatively interconnected with means for deactivating said second pneumatic means, said means for arresting the means for rotatingly twisting being operatively interconnected with means for sensing a single or a plurality of said first or second parts of said garment component; and,

means for assisting a removing of said first and second part for feeding the same onto the conveyor feed means.

4. The machine for automatically producing a series of like garment components as defined in claim **3** and wherein the means for arresting the means for rotatingly twisting said first and second part, respectively, is operatively interconnected with means for determining a malfunctioning delay and means for signaling said delay.

5. The machine for automatically producing a series of like garment components as defined in claim **4** and wherein the means for sensing a single or a plurality of said first or second parts, respectively, of said garment component is operatively

interconnected with means for signaling a malfunctioning event and means for interlockingly arresting an order of like garment components in said machine.

6. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for individually feeding into the machine a first part of said garment component comprises:

means for holding a supply of continuous material for making individual pieces of said first part of said garment component;

means for pressing said continuous material;

means for forming longitudinal slits at an end of each two adjacent pieces of first part of said garment component;

means for feeding an appropriate length of said continuous material;

means for severing an individual piece of said first part from said continuous material, including means for holding said continuous material during the severing operation; and,

means for reactivating said feeding means, said means for reactivating being operatively interconnected with the means for holding said continuous material.

7. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for automatic operation includes means for time-delay monitoring of operative events operatively interconnected with said alarm means whereby said alarm means activate means for interlocking the machine to maintain said parts of garment components and said garment components in a serial order and signal a malfunction to an operator.

8. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for signaling an alarm condition is operatively interconnected with means for signaling a lack of material in said means for feeding said first part;

means for signaling a failure of thread in said means for sewing;

means for signaling a malfunction in a temperature control means in said means for feeding said first part of said garment component;

means for sensing the presence of more than one ply in said means for feeding said second part of the garment component; and,

means for signaling the failure to mark sequentially the series of said garment components by said means for marking said components.

9. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for turning over said second part of said garment component comprise:

means for capturing one end of said second part of the garment component;

means for sweeping underneath said means for capturing one end of said second part the other end of said second part;

means for releasing said captured end;

means for operatively timing said capturing with said releasing including means for returning in a ready-to-capture position said means for capturing; and,

means for alternative activation of said capturing means.

10. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for mating said first and second part of said garment component comprises means for urging sidewise said second part of said garment component operatively interconnected with means for gradual elevation of said second part and positioning said second part on top of said first part; and,

means for returning to a ready position said means for urging sidewise said second part, said means for urging sidewise being operatively interconnected with means indicating an operative condition of said garment components by a conjoint presence of said first part and second part of said garment components in a ready-to-mate position.

11. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for feeding said mated parts of said garment component for sewing of same comprise means for removing a barrier restraining said mater parts;

means for aiding said mated parts for feeding to a sewing machine; and,

means for guiding said mated parts into a sewing machine and wherein the means for returning said means for placing said first part of said garment component in a receiving position is a means for reinserting said barrier and means for reactivating means for detecting the presence of said first part of said garment component in said receiving position.

12. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for sewing together said first and second parts of the garment component including the means for initiating and terminating by said garment component a sewing operation comprise:

a sewing machine in combination with

1. means for detecting the arrival of said mated first and second part of said garment component said means for detecting the arrival initiating:
   a. means for concluding the sewing of a preceding mated garment component in said sewing machine;
   b. means for raising a presser foot of said sewing machine to receive the mated garment component;
   c. means for initiating the sewing of said mated first and second parts of the garment component;
2. means for detecting a passage of a trailing edge of said mated first and second part of the garment component being sewn, said means for detecting the passage initiating;
   a. means for stopping the sewing machine, and
   b. means for keeping the presser foot in a "down" position; and,
3. means for determining a failure in an upper and lower thread of said sewing machine including means operatively interconnected therewith for stopping said sewing machine upon failure of either of the threads.

13. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for severing successive garment components sewed together by said means for sewing, operatively interconnected with said means for sewing comprises:

means for detecting the trailing edge of said sewn garment component to be severed;

means for forcing downwardly a knife to cut a chain of threads joining said sewn garment component to the next garment component;

means to assist the removal of said severed garment component for forwarding onto the means for marking the same, said means for severing and said means for sewing being operatively interconnected with means for detecting the operative condition of said means for terminating by said garment component of said sewing operation, and said means for detecting the trailing edge of said sewn garment component to be severed.

14. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for severing successive garment components sewed together by said means for sewing comprises:

scissor means; a means for forcing a chain of threads into said scissor means; a means for initiating said means for forcing said chain of threads into said scissor means being operatively interconnected with means for initiating by said garment component said sewing operation.

15. The machine for automatically producing a series of like garment components as defined in claim 1 and wherein the means for marking of each of said garment components in said series comprise:

means for transfer marking said garment components;

means for positioning said means for transfer marking in respect to an indicia to be imparted to said garment component in said series;

means for positioning said garment above said means for transfer marking;

means for transferring said indicia on said garment component;

means for removing said garment component from said means for transfer marking;

means for retaining said means for transfer marking said garment in said position for serial marking of a next garment component, said means for retaining being operatively interconnected with means for positioning said means for transfer marking whereby the proper sequential order of marking said garment component is obtained; and,

means for resetting said means for transfer marking after a completion of said series.

16. The machine for automatically producing a series of like garment components as defined in claim **15** and wherein the means for marking of each of said garment components in said series comprises:

a. means for transfer marking said garment component comprising;

a tape for transfer marking said garment components;

a supply reel and a takeup reel, each of said reels interconnected to low-togue drive means whereby said reels are driven in opposite direction;

intermittent drive means for said tape for driving said tape and for aiding the takeup of said tape; and,

a marking plate underneath said tape carrying a series of ordered indicia;

b. means for positioning said means for transfer marking in respect to an ordered indicia comprising:

means for initiating the intermittent drive means whereby the same advance the tape;

means for advancing said marking plate by an in-line-ratchet cooperating with ratchet teeth on said marking plate;

c. conveyor means narrowed by a wedge for positioning said garment component above said marker plate;

d. a driven hammer for transferring said indicia on said garment component;

e. a puller wheel for removing said garment component from said marking plate;

f. electrical control means for retaining said marker plate in said position for successive marking of two garment components with the same indicia; and

g. a switch means activating an electrical control circuit for resetting said marking plate at an end of a series.

17. The machine for automatically producing a series of garment components as defined in claim **1** and wherein the means for stacking said marked garment components comprise:

a first photocell circuit means for determining an arrival of a first marked garment component in a first, ready-for-stacking position;

means for interposing a barrier for stopping a next garment component in a next, ready-for-stacking position, said means for interposing being operatively interconnected to said first photocell circuit means;

a next photocell circuit means for determining an arrival of a next, marked garment component in the next, ready-for-stacking position:

means for stacking said first and next garment component, said means being operatively interconnected with the next photocell circuit means:

said next photocell circuit means being operatively interconnected with the means for marking whereby the means for marking is advanced for marking a next group of garment components.