Sept. 7, 1965 J. L. ROCKERATH ETAL 3,204,590

CONVEYOR SEAMER SEWING MACHINE

Filed Aug. 8, 1962 5 Sheets-Sheet 1

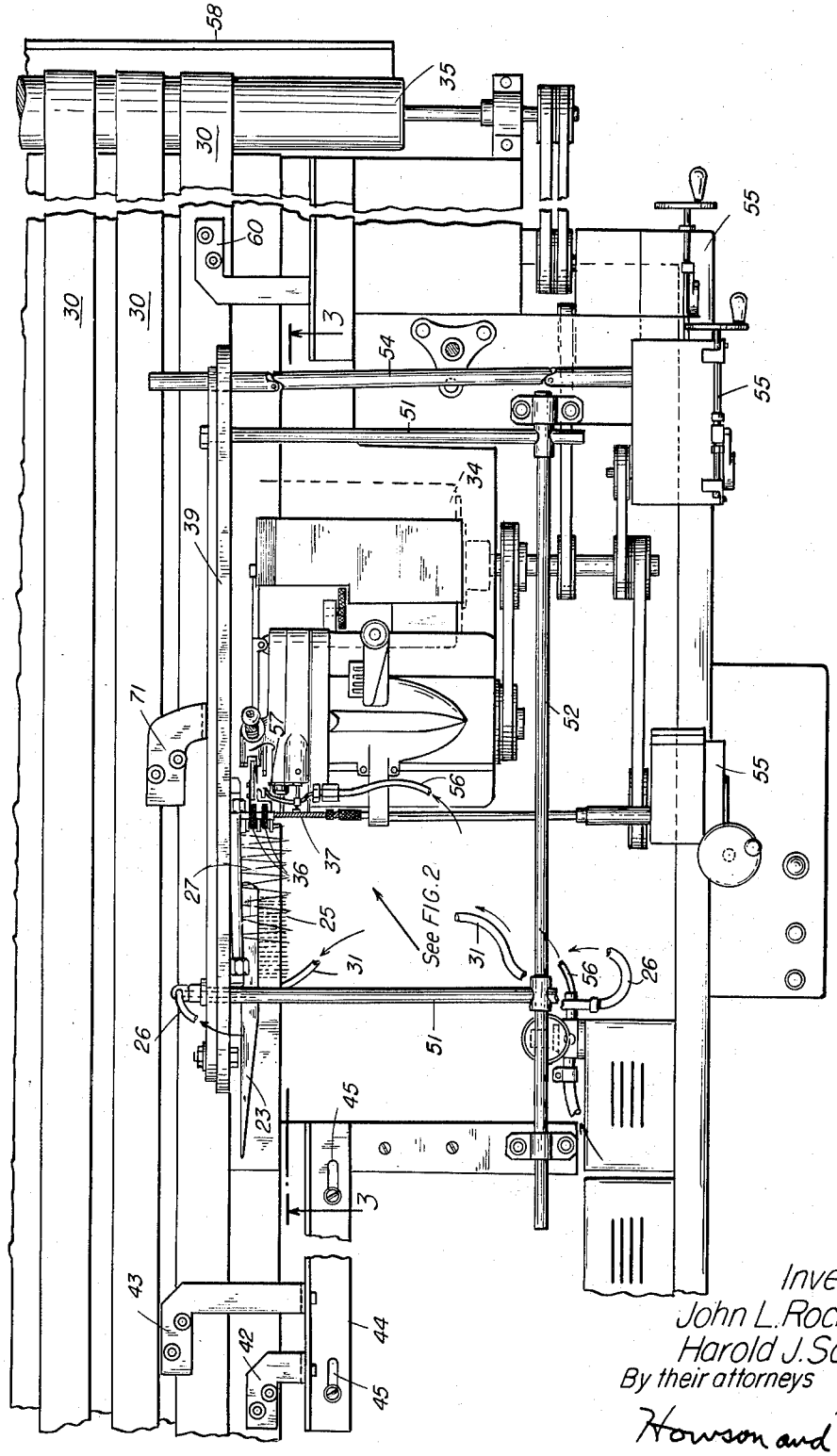

FIG. 1

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Filed Aug. 8, 1962 5 Sheets-Sheet 2

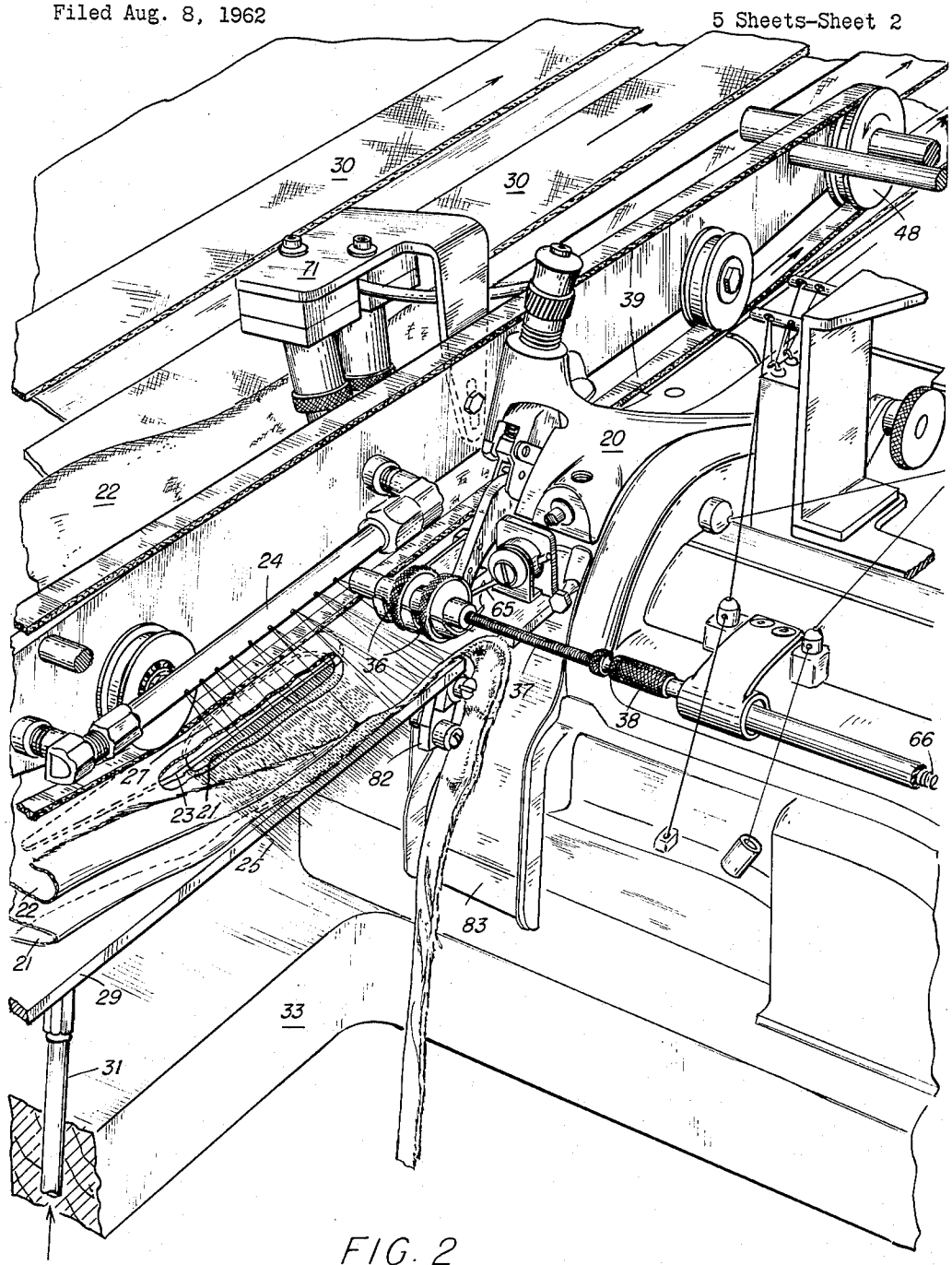

FIG. 2

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CONVEYOR SEAMER SEWING MACHINE

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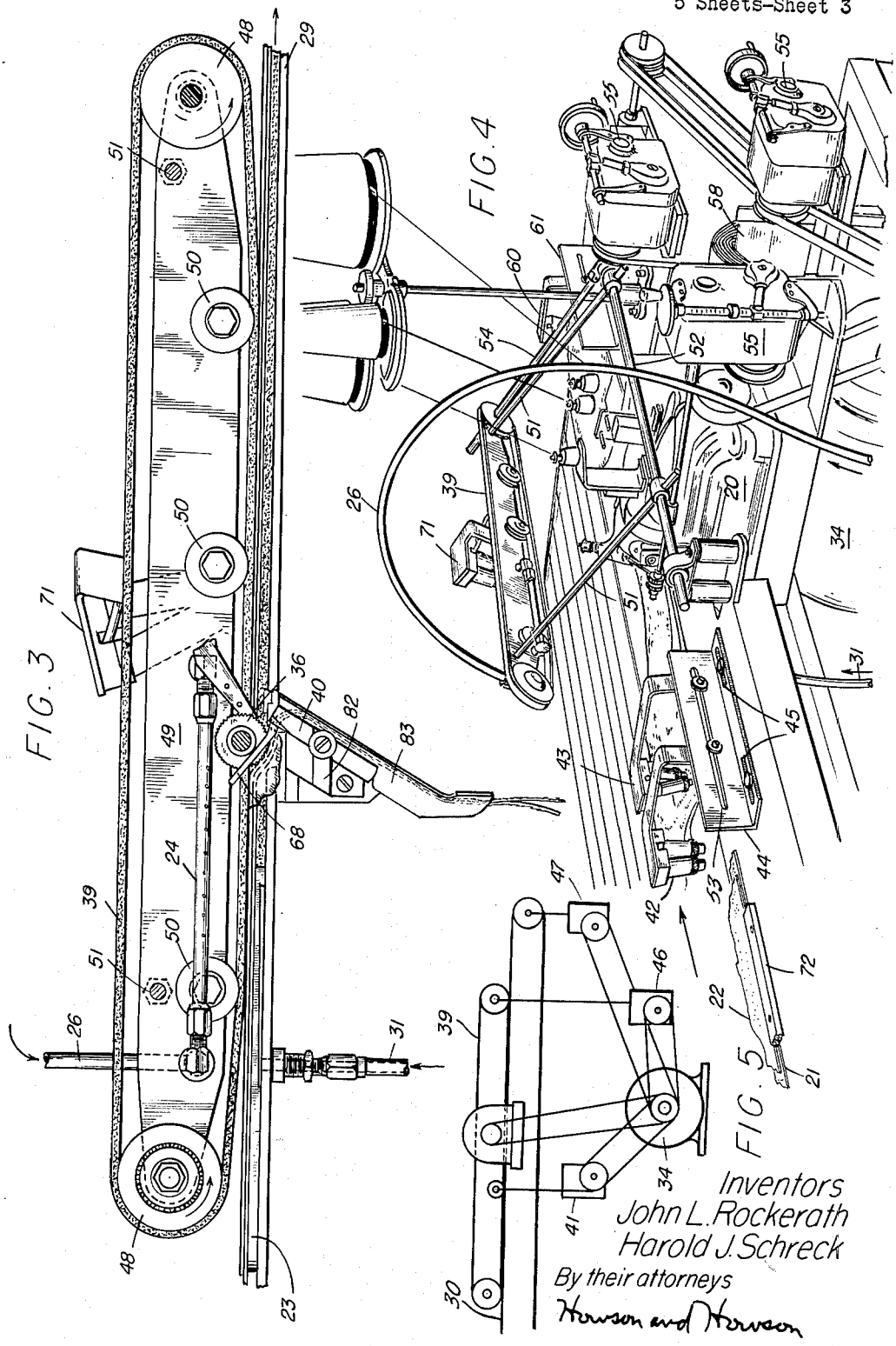

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CONVEYOR SEAMER SEWING MACHINE

Filed Aug. 8, 1962 5 Sheets-Sheet 4

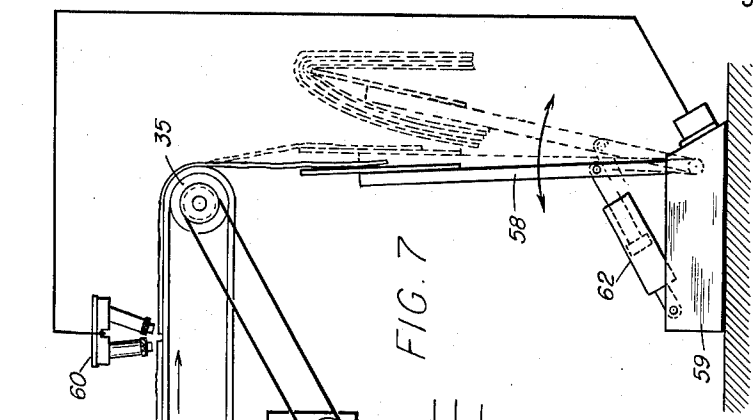

FIG. 7

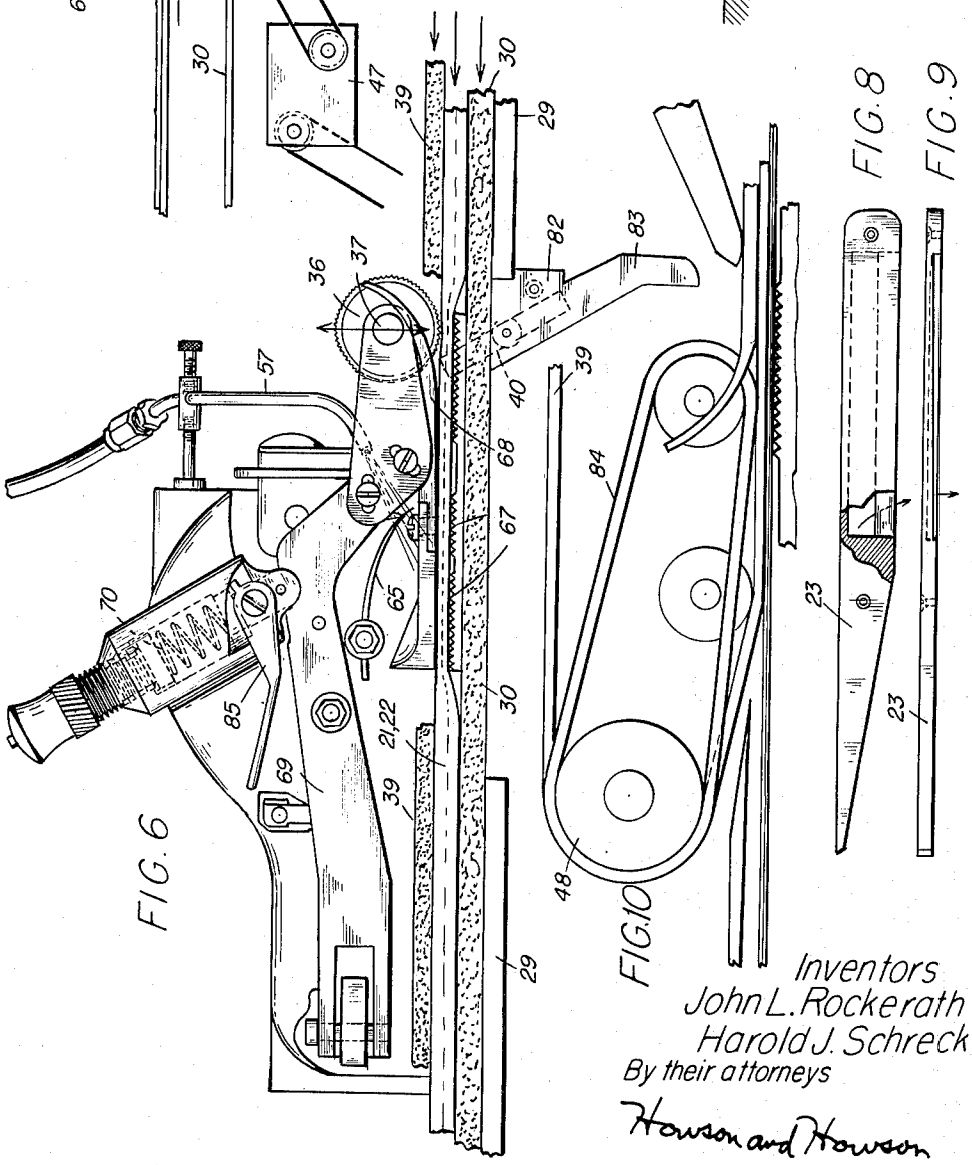

FIG. 6

FIG. 10

FIG. 8

FIG. 9

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CONVEYOR SEAMER SEWING MACHINE

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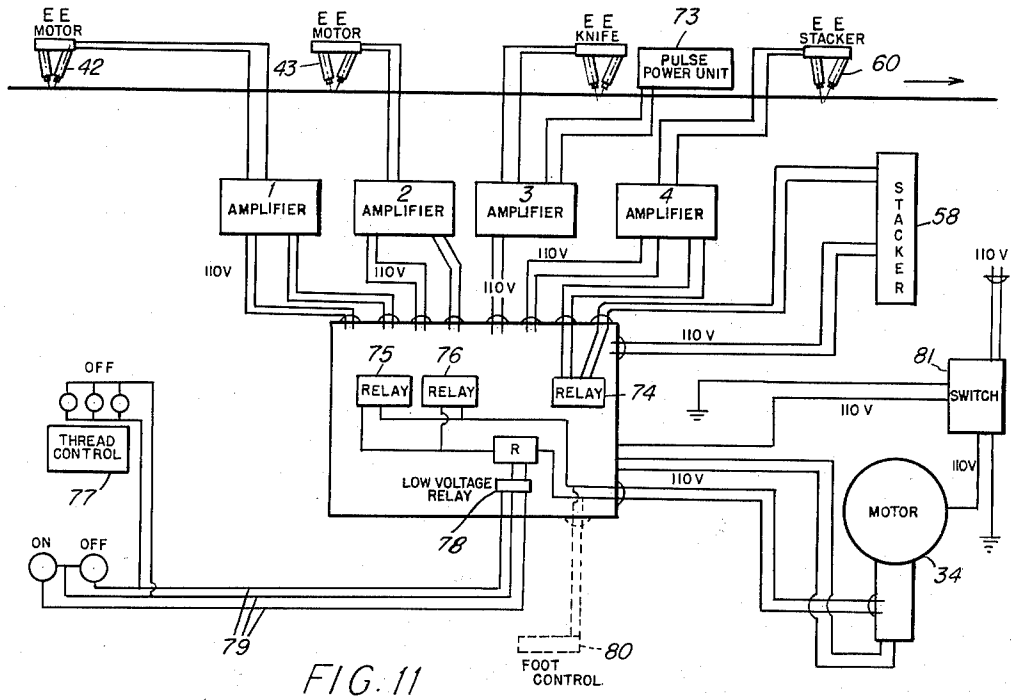

FIG. 11

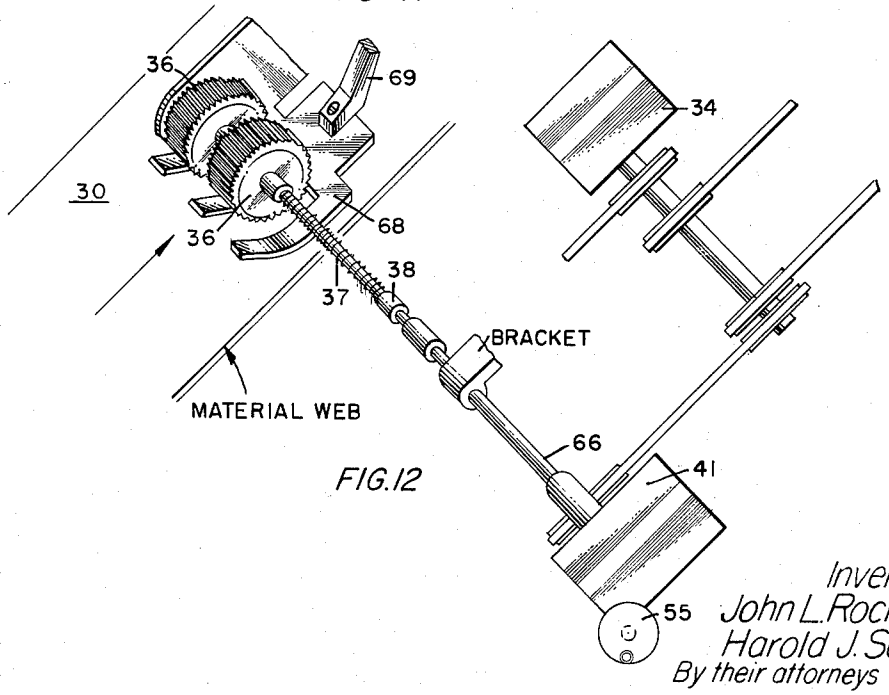

FIG. 12

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United States Patent Office 3,204,590 Patented Sept. 7, 1965

3,204,590

CONVEYOR SEAMER SEWING MACHINE

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Filed Aug. 8, 1962, Ser. No. 215,593
8 Claims. (Cl. 112—2)

This invention relates to a conveyor seamer for a sewing machine and more particularly to apparatus for conveying to a sewing machine two or more pieces of material which are to be seamed together. Except for laying the pieces of fabric on the conveyor this apparatus dispenses entirely with the necessity for an operator. The machine introduces the fabrics to the sewing machine without distortion and in proper alignment and also stacks the same in a neat pile. The machine operates in an economic manner stopping entirely when pieces of fabric are no longer being fed to the conveyor. It also controls the distance between adjacent sets of sewn material so as to have a very short chain. The machine is capable of being used for operations other than seaming and is adapted to perform practically any operation involving a fabric edge. This is true regardless of whether or not it is desired to do the seaming, etc., in a straight line or in a curved line. The machine can also be adapted with a control that senses fabric edges and guides the sewing machine.

Difficulties have heretofore been encountered in starting two or more plies of material at the same time through a sewing machine and to do so without distortion of the material. Another difficulty in transporting material through the sewing machine has been the necessity of uncurling each of the plies prior to joining them together and having them properly held as they enter the sewing machine. There also has been no satisfactory way of controlling the length of chain or thread between successive sets of joined material. The present invention cures all these difficulties. Other advantages of the present invention are the ability to synchronize the conveyor and the apparatus which stacks the sewn pieces after passing through the machine, and the ability to adjust the belt drive automatically to various thicknesses of material. It is characteristic of the present invention that owing to increased inertia or dead weight in the presser bar system the fabrics pass with less friction between the presser foot and the feed dog. This may be called an impositive drive. Further details and advantages of the machine will become apparent as the description proceeds.

In the drawings, FIG. 1 is a plan view of the conveyor seamer and associated sewing machine, the material to be sewn entering at the upper left corner, and sewn and stacked at the right.

FIG. 2 is a perspective view of the portion of the conveyor where the edges of a set of two or more assembled plies are uncurled and subjected to increased inertia of presser bar system just prior to entering the sewing machine. The location of this part of the machine in FIG. 1 is indicated by an arrow marked "see FIG. 2."

FIG. 3 is a view in elevation of the floating driven top belt under which the materials being worked on are traveling from left to right. The view also shows the uncurling and trimming mechanism. The view is taken on the line 3—3 of FIG. 1.

FIG. 4 is a general perspective view of the portion of the machine where the top belt of FIG. 3 is located, the belt being shown lifted out of action in FIG. 4.

FIG. 5 is a diagram showing the relation of the three speed regulating controls to the motor and the main parts of the conveyor seamer.

FIG. 6 is a view in elevation of the feed roll for the fabric mounted on the presser foot.

FIG. 7 is a diagram in elevation of the stacker and its electric eye, and the main belt of the conveyor.

FIG. 8 is a plan view of the plate for the first blower which operates on the lower of the two plies of material.

FIG. 9 is a view of the plate of FIG. 8 in elevation.

FIG. 10 is a view in elevation of a modified form of inertial drive.

FIG. 11 is a diagram of the electrical wiring of the conveyor seamer.

FIG. 12 is a diagram showing the relationship between the feed roll drive means, the feed roll, and the presser foot.

One of the great difficulties in sewing seams in fabrics to be joined on a sewing machine has been the necessity of having practically all of the steps of the operation done by an experienced operator. After the material was cut it was looked over by the inspectors, pieces matched, bundled and then sent to the sewing machine. In accordance with the present invention the inspector now merely loads the conveyor. Instead of laying the material on the table he lays it on the conveyor and parts of the whole sewing operation are performed before the work is bundled and taken to subsequent stations. In accordance with our invention we have added both motion and inertia to the presser mechanism to allow the presser foot to "float." Heretofore, an operator seaming two plies together had to place the two plies under the presser foot by raising the presser foot.

As already intimated one of the principal uses of our new invention is when seaming together two separate edges of material. In accordance with our invention the two plies of material are laid one on top of the other, uncurled by a novel use of compressed air after which the pieces are held and trimmed by the machine immediately before entering the sewing machine. As shown in FIG. 2 this preparation of the two or more plies of material involves a laying of the plies **21, 22** one on top of each other which does not involve any distortion of the material. As shown in FIG. 2 there are two uncurlers **23, 24** each run by compressed air. There is a plate **23** adapted to blow an air stream **25** horizontally across the underneath side of the lower of the two plies **21, 22** of material (see FIG. 2). This uncurls the bottom layer. Shortly thereafter, as the plies move from the left to the right in this figure, a plastic tube which constitutes the top uncurler **24**, containing a series of holes, blows a row of air streams **27** across the top of the second ply of material thereby straightening out or uncurling that top ply. This row of air streams **27** must be aimed downward slightly in order to hold the two plies together and before the air operation is complete the two pieces of fabric are engaged by other elements of the machine in time to hold them. However, this row of air streams **27** has to be directed with a downward component in order to hold the two fabrics together in proper relation to each other until the fabrics are gripped by other parts of the machine.

As shown in FIG. 2 the compressed air jets for the lower piece of fabric are obtained from a horizontal uncurler plate **23** resting on the base plate **29** of the conveyor. This horizontal uncurler plate, therefore, directs its air stream **25** across and underneath the lower piece of material ensuring maintenance of the uncurled condition of the edge of that lower piece of material. The compressed air to supply this horizontal lower uncurler plate or blower comes from any convenient supply of compressed air.

In FIG. 1 the air supply is obtained from a pipe **31** which can be seen again in the lower left hand corner of FIG. 2. It will be observed that the bottom uncurler plate **23** is tapered and calculated to supply an increasing amount of air as the fabric moves nearer to the sewing

machine (see FIG. 9). As shown in FIG. 3 the upper blower which directs its jet with a downward component is actually the top uncurler **24**. It takes the form of a plastic tube mounted on the bracket **49** of an upper conveyor belt **39** and located above the top ply **22** of material. This upper uncurler or blower performs two functions. It not only uncurls the upper piece of material but holds the upper ply in a fixed position with relation to the lower ply. The bottom uncurler **23** begins to blow on the lower piece of material before the fabrics reach the top uncurler **24**. Therefore the lower ply can be straightened out before the upper ply is pinned to it by the air from the top uncurler **24**. The air supply for the top uncurler **24** can be obtained from any convenient source. In FIG. 1 the air supply is shown obtained from a supply pipe **26** near the top of the frame. It will be observed that the two air streams **25** and **27** therefore serve to uncurl the pieces of fabric and pin them to each other without distortion and hold them together until the two pieces of fabric reach a feed roll **36** located toward the end of the uncurlers and which serve to take over control from the air before the fabric has a chance to become displaced or distorted. In this way, a floating non-distorted positioning of the fabrics is obtained and the uncurling retained until the feed roll **36** takes over control and the edges of both pieces of fabric have been trimmed as hereinafter described. It might be noted at this point that the machine can be used for over edging, pinking, or any other sewing operation where an edge is involved. However, the invention will be described in connection with a seaming operation.

The machine is also calculated to do away with the necessity for a highly skilled operator and it can be pointed out that whether the two pieces of fabric are placed on the conveyor a little crooked or not is immaterial because the machine can trim the edge and seam it.

The conveyor has conveyor belt means driven from the main motor **34** of the apparatus through the intermediary of various control mechanisms. In the two examples shown the conveyor belt means comprise one or more main or lower conveyor belts **30** turned by rollers **35**, one roller located at the stacker or exit end of the conveyor and a similar roller at the beginning of the machine where the pieces of fabric are laid on the belt.

The effectiveness of the apparatus revolves largely around the floating relation between the pieces of fabric and the apparatus. This general floating relation is obtained by the mechanism hereinafter described and enables the machine to be automatic in practicing all its functions.

Heretofore, in normal operations of loading a sewing machine where it was necessary to place two plies of fabric together under the presser foot the operator had to raise the presser foot to insert the material. In accordance with the present invention both motion and inertia have been added to the presser foot mechanism which allows the presser foot to float. The addition of inertia is made through the feed roll **36** which receives the plies of fabric as they come along the conveyor **30** from the air streams **25, 27**, these being shown in FIG. 2.

It will be seen in this figure that feed roll **36** is a single roll with two feed surfaces located just prior to the sewing machine on a flexible shaft **37** lying horizontally at right angles to the direction of travel of the material to be sewn. This knurled roll **36** is operated by one of three variable speed regulating controls **41, 46, 47**, the flexible shaft **37** of the roll being connected to the control **41**. This control is calculated to control the speed from zero to maximum. Variable speed controls such as that disclosed in U.S. Patent No. 2,691,896, Oct. 19, 1954 (filed Oct. 14, 1949) to S. O. Stageberg, Minneapolis, Minn., for Variable Speed Power Transmission, may be used with the invention, by way of example. The flexible shaft **37** on which the feed roll **36** is mounted frees the presser foot **68** to lift up and down and provides whip-like, inertial pressure downward for the presser foot on the work. The operator does not have to feed the material into the sewing machine. The fabric pieces under the said roll can be seen assembled in FIG. 3, as well as in FIG. 2.

At the same time that the two fabrics are passing through the feed roll **36** they are trimmed by a knife **40**, thus ensuring that the edges of the two pieces of fabric are properly lined up with the sewing machine **20** to produce a seam which is sewn at the proper point in relation to the edges.

As shown in FIGS. 2 and 3 the stationary trimming knife **40** just referred to is carried on a bracket **82** located below the base plate of the machine. The upper end of the knife is adjacent the presser foot. Also carried by the knife bracket **82** is a chute **83** to receive the material trimmed off the two plies of fabric coming to the sewing machine on top of each other.

In order to increase the amount of inertia the following mechanism has been devised. It has the effect of making the presser foot **68** float more easily. By virtue of the mechanism the feed roll **36** and the driving shaft **37** therefor cooperate to act as apparatus which is laden with inertia at the feed roll. This apparatus is raised by fabric passing under said feed roll. This allows the material to move through the machine with less friction between the presser foot and the feed dogs **67** and at the same time causes less distortion of the material than would normally occur. The feed roll is carried on the shaft **37** extending at right angles to the direction of movement of the fabrics to be sewn. The end of the flexible shaft **37** away from the feed roll is held by a collar **38**. It will be seen that the adjusted position of the collar determines the effect of the feed roll on the work passing under it. At the far end of the collar there is a twist-transmitting element **66** fastened to the collar which twist-transmitting element is supported by a bracket and extends to the variable speed control **41** for the feed roll. The variable speed control just controls the speed of the feed roll. Whenever the presser foot meets an obstacle it rises up quickly and rides lightly over it, because of the added inertia or dead weight of the foregoing arrangement of apparatus. The inertia is transmitted by the shaft **37** to the presser foot mechansm rather than through the feed roll.

As shown in FIGS. 4 and 6, particularly, the feed roll **36** is carried in an adjustable manner on a lever **69** pivoted on the sewing machine in both the vertical and horizontal dimensions. The presser foot **68** underlies the lever **69** and the upcurled end of the foot engages the lever. The horizontal swing of the lever **69** is normally restricted by a latch. Because the feed roll can leave the work pieces due to the aforesaid inertial arrangement of apparatus, the work pieces feed themselves directly under the presser foot without the need for lifting of the presser foot by hand.

Attached to the upper edge of the lever **69** is a spring **70** adapted to exert downward pressure on the lever. There is a cam **85** on the spring casing adapted to retract the spring so it cannot press downwardly on the lever. In any case the pressure of the spring is weak and very slight. It is only supplementary in its action. The supplementary pressure of spring **70** is considerably less than that used in conventional spring-loaded presser bar means. The effect of the present arrangement of apparatus is, therefor, that of reducing the weight of the entire presser bar system upon fabric thereunder. As has been described above, the invention also provides additional, impositive or inertial weight. This provides a floating pressure, not the fixed pressure, which has been common in the art. The inertial mass, in turn, alters the balance of apparatus in such a manner that the presser foot does not have time to return to contact the feed dog. A consequence of this shift of balance and of the heavier weight provided is that the presser foot is enabled to ride lightly over each ob-

stacle. It does not tend to retard fabric being conveyed thereunder.

The change in speed is due to the speed regulating control **41** which varies the speed through the feed roll **36**. We have found that by having the hold-down mechanism for the fabric, and arranging the means as already described, it is possible for the sewing machine **20** to be satisfactorily operated with two plies of fabric whether of similar or dissimilar character or thickness and whether the edges of the plies **21, 22** are to be sewn together or otherwise operated on.

The operator in laying the fabrics on the main or lower conveyor belts of the machine at the beginning of the conveyor can either use one of the belts as a guide in placing the fabric on the correct line or a stationary guide wall **72** can be provided on the top of the table formed by the base plate **29** of the machine (see FIG. 4).

Automatic stop

When no fabric is about to pass through the sewing machine **20** it obviously is wasteful to have either the conveyor or the sewing machine continue to run. For this purpose electric eyes **42, 43** are provided at adjustable spaced points near the beginning of the lower belt **30** shortly after the point at which fabrics are placed on the belt. These detect at two separately different points whether any fabric is being conveyed in the direction of the sewing machine. If none is being conveyed these two electric eyes will detect the absence of material to be worked on and by the electric circuitry shown in FIG. 11 both the conveyor and the sewing machine will be stopped.

The two electric eyes **42** and **43** are mounted on the angle iron **44** bolted to the surface of the base plate **29** of the machine at some point previous to the air blast. As shown in FIG. 1 these eyes overlie points on the belts of the main conveyor belts **30**. As shown in FIG. 1 the first electric eye **42** overlies the belt near the beginning of the belt and the second eye **43** overlies the belt at a fractionally later point on the conveyor. These eyes are adapted to detect when fabric is passing beneath them. As long as there is any fabric below either of the two eyes **42, 43** no action or effect on the conveyor is obtained. Thus, even if there is no fabric below the first electric eye **42** the conveyor continues to move the fabric into the sewing machine. If, however, there also is no fabric beneath the second electric eye **43** by which time, of course, the fabric just past has gone into the sewing machine, the electric eyes will cut off power to the motor **34** of the apparatus and the conveyor will stop. It will be noted that the angle iron **44** carrying the two electric eyes has slots **53** for the eyes which enables them to be accurately placed to start the main motor at the proper time when a piece of fabric is just coming into the conveyor belts **30** and yet have the conveyor stopped immediately when the sewing of a piece of fabric has been completed. Slots **45** adjust the angle iron on the base plate.

It should be noted from FIG. 5 that there is a second speed regulating control **46** which drives the upper or floating belt **39**.

By means of the speed regulating control **41** for the feed roll **36**, this second speed regulating control **46** for the upper or floating belt **39** and a third speed regulating control **47** controlling the main conveyor belts **30**, it is possible for the operator to alter the relative speed of the various elements of the apparatus at will and to accomplish a unique end product which is a feature of the invention.

Upper floating belt

Perhaps the principal element in obtaining the unique floating effect in the apparatus is the so-called upper or floating belt means and the manner in which it is controlled. This upper or floating belt means is represented in the drawings as a belt **39** and appears particularly in FIGS. 2, 3, 4 and 5. As shown, in FIG. 3 the upper

belt **39** runs around two end pulleys **48** carried on a frame **49**. There are three intermediate rollers **50** on the frame **49** ensuring that the entire length of the lower run of the belt is supported in a downward direction.

This frame **49**, which also may be considered as a holding plate or bracket, is carried by two supporting or swing rods **51** extending laterally away from the conveyor belt to a horizontal rod **52** parallel to the conveyor belt but located to one side thereof as can be seen in FIG. 1. This horizontal rod **52** parallel to the conveyor length acts as a pivotal base for the floating belt **39**. It is pivotally fastened to the frame of the machine as shown in FIG. 1. The bracket or frame **49** which supports the floating belt also supports the upper uncurler **24** and on the opposite side of the bracket **49** from the uncurler is the flexible compressed air connection **26** for that uncurler.

This floating belt **39** is driven through the second speed regulating control **46** by means of a universal coupling **54** connecting the control **46** to one of the two end pulleys **48**. In the drawings in FIGS. 2 and 3 it is the right hand pulley **48** which is used to drive the floating belt. It will be noted that this floating driven belt can be swung out of the way if it is desired (see FIG. 4). It is also able to adjust itself to all thicknesses of material. It will be seen that the machine thus has a floating contact with the fabric instead of a firm contact as in the prior art. An impositive contact.

It will also be seen that the sewing machine and the conveyor are synchronized by the speed regulating controls **41, 46, 47**. In fact when desired to join the two or more plies in a straight line the synchronization of the top and bottom belts will achieve this objective but if it is desired to join the plies by some line other than a straight line this synchronized control preferably is not used. Thus there are adjustment means for the upper belt as well as for the lower belt.

With this floating upper belt or floating overdrive it is possible to get a differential feed of two pieces of fabric which are to be sewn together. This is used when the fabrics are made of different material or finish by running the upper and lower belts at different speeds.

If desired, a hand gear adjustment device **55** can be introduced into any or all of the three variable speed regulating controls **41, 46** and **47**, between the main motor **34** and the output shaft of each such speed control. For many purposes the basic variable speed controls are entirely satisfactory. The use of one or more hand gear adjustment devices such as **55** which operate somewhat like a micrometer, in conjunction with the basic speed control units enable(s) a machine operator to more finely adjust the speed variables of the equipment than without the hand control(s). By rolling a change into the setting of a hand gear adjustment device, an operator in effect dials a new speed into that particular variable speed control. This is a setting that will be maintained until it is rolled out and another speed is rolled in. To that extent each hand gear adjustment provides a permanent new speed for the conveyor element to which it is attached, and thus a new speed relation between elements.

Stitch chain cut off

In addition to the stationary trimming knife **40** above described there is a moving knife **65** to cut off the chain of stitches close behind each piece of seamed material. This moving knife **65** is a curved pivoted element and can be seen in FIGS. 1, 2 and 6. It is located under the arm supporting the feed roll **36** at a point opposite the presser foot **68**. By a quick movement of the moving knife **65** and return to its position clear of the stitch chain the latter is cut close after the passage of the two pieces sewn together. This is achieved by the pulse lower unit **73** provided in the electric circuitry of FIG. 11 described below.

The electric eye for cutting the chain of stitches is noted on the drawings by the reference character **71**. This eye is shown mounted on the carrying holder or bracket **49** and swing rods **51** for the upper belt **39**. These, it has been noted above, pivot about a horizontal rod **52**. Thus when the upper belt is swung up out of the way the electric eye also is moved away from the sewn materials. This includes the upper uncurler. This design makes a useful arrangement. The drive for these parts is, as has been noted above, through a universal coupling **54** to the variable speed control **47**.

It has occasionally been found that the chain of stitches tends to curl back into the needle of the sewing machine. To blow these ends of the chain away from the presser foot an air outlet **57** has been added as shown in FIG. 6. The blast has a component in the direction of movement of the sewn material. It is supplied by a pipe **56**.

Stacker

Heretofore, as the length of the material being sewn varied, the stacker control eye has either had to be moved forward or backward for that particular piece of fabric. We have simplified this situation and also eliminated the necessity for moving of the stacker control eye. According to our invention, stacker relay control mechanism is adjusted for the particular length of article being worked on and no further attention needs to be paid to it. The stacker is shown in FIG. 7 where the stacker proper **58** is shown at the right pivoted on a base **59** which contains electrically controlled means **62** for swinging the upper end of the stacker **58** back and forth. The stacker proper **58** is located substantially under the end pulley of the lower belt at the discharge end of the conveyor and swings to-and-fro on its pivot to pile fabric pieces thereon as they drop from the conveyor **30**. As can be seen from FIG. 7 this will result in an automatic laying of each sewn article over the top of the stacker in uniform fashion ready to be taken off to whatever the next stage of manufacture may be.

It will be noted that there is an electric eye **60** to activate the electrically controlled means **62**. The eye **60** is located above the upper part of the lower belt **30** and is adapted to be actuated by any interruption in the presence of cloth on the belt. When the electric eye **60** detects such an interruption the means **62** in the base **59** working through a relay **74** (see FIG. 11) is activated and oscillates the stacker one complete two-way, or to-and-fro cycle, to lay the next sewn piece on the stacker in propor position. As shown in FIG. 4 there is an angle iron **61** on the base plate **29** of the conveyor of the machine complex slotted to permit adjustment of the electric eye **60** longitudinally of the belt to ensure that the movement of the stacker occurs at the proper moment for the length of fabric being sewn to drop onto the stacker in uniform alignment with previously sewn lengths. If desired the electric eye can be mounted independently of the main frame **33** of the machine complex.

It will be noted that the speed regulating control **47** drives the pulley **35** at this end of the belt but this does not affect the timing of the stacker proper **58** swinging or to-and-fro movement described above at page 16, lines **10** et seq., because changes in the speed of the belt automatically determine the frequency of the rocking movement of the stacker. In other words, when the speed of conveyor **30** increases, frequency of presentation of fabric pieces to the photocell **60** automatically, necessarily increases. In like manner, if the conveyor speed decreases, so too will the frequency of presentation. Because the photocell **60** causes the stacker to operate only when an interruption occurs in the fabric, frequency of operation of the stacker depends directly upon the speed of the conveyor **30**.

Alternative embodiment of FIG. 10

In this construction an auxiliary belt **84** is used in conjunction with the compressed air to compress and insert the material to be sewn under the presser foot and to add weight to increase the inertia in the presser bar system. In this modified embodiment in addition to the regular floating upper belt **39** the auxiliary belt **84** is driven with the upper belt **39**. In FIGURE 10 the upper belt **39** is shown moving from left to right at the lower part and one of the upper belt end pulleys **48**, namely, the one toward the beginning of the conveyor, is used to transmit the drive of the upper belt **39** to the auxiliary belt **84**. The auxiliary belt also passes around one of the three intermediate rollers **50** of the upper belt. As shown in FIG. 10 it is not the roller nearest the end pulley **48** of the upper belt **39** which is used for the auxiliary belt **84**. A middle intermediate roller position is used for the location of the auxiliary belt lower pulley **50**. In this way the upper belt and the auxiliary belt are both moving at the same speed and serve to compress the material at two points and push it under the presser foot and under the feed roll. It will also be noted that the presser bar system meets the lower pulley of the auxiliary belt as far as lengthwise position is concerned, thereby ensuring further pressure on the material being sewn. There is pivoted lever and cam construction like the pivoted lever and cam **69** and **85**, respectively of the other embodiment pressing downwardly on the presser foot. However, even with this construction, it will be seen that the pressure is a floating pressure and not a fixed pressure as in the prior art.

Electrical circuitry

In FIG. 11 we have shown electric circuitry capable of operation with either the embodiment of FIGS. 1 to 9 or the alternative embodiment of FIG. 10.

The electrical controls receive small voltages from electric eyes, such for example as six volts. Obviously these voltages have to be amplified to 110 volts, to operate the main motor of the machine, etc. For this purpose, as shown in the drawing, there are four amplifier boxes numbered **1**, **2**, **3** and **4**. Boxes numbered **1** and **2** are connected to the electric eyes **42** and **43**, which determine whether or not fabric is being put on the conveyor preparatory to the sewing operation in order to stop the machine if no fabrics are being presented. These two boxes act as switches or relays and the same is true of box **4** connected to the detector **60** which synchronizes the operation of the stacker with the material on the conveyor belt. Box number **3** is associated with the knife that cuts the chain of stitches immediately after each sewing operation, and instead of being a straight relay or switch to the 110 volt circuit is connected with a pulse producing power unit **73** for reasons hereinafter explained. If box number **3** were used as an ordinary switch or relay like the other boxes the knife for cutting the chain of stitches would stay down in the way, after making the cut. By providing only a pulse of current to operate the knife the latter will cut instantaneously and immediately return to its upper or cleared position ready for the next cut ordered by the electric eye **71**. For this purpose the power pulse unit **73** contains a condenser delay circuit. The arrow at the upper right end of FIG. 11 indicates the direction of the movement of the lower belts **30** and the fabric being moved on the conveyor toward the sewing machine.

The relays collected in the center of the figure are connected to the wires from the boxes **1**, **2** and **4**. The relay **74** for the stacker going to the stacker and the relays **75** and **76** for the two initial electric eyes **42** and **43** for stopping and starting the machine are connected in parallel to make or break the 110 volt circuit for the main motor **34** of the conveyor seamer. There is a box **81** shown at the right of the motor **34**. This is merely a switch box through which the power is brought to the motor **34**. At the left of FIG. 11 is shown what is marked as "thread control **77**" which has to do with

broken threads for the sewing machine and is connected for the purpose of stopping the main motor **34** through a 6 volt low voltage relay **78** through a three wire circuit **79**. The three circles at the thread control **77** are for thread O.K., thread absent and thread neutral. The purpose of having a low voltage circuit at this point in the machine is a safety measure for the operator in case she happens to touch the machine. The relay **74**, of course, is in the 110 volt circuit of the relays **75** and **76** of the stop and start electric eyes **42** and **43**.

In FIG. 11 we have also shown, but in dotted line, an element marked "foot control" **80**. This is connected in the same 110 volt circuit which can stop or start the main motor **34**. The only purpose of this foot control **80** is to enable a mechanic who is repairing the machine to move the parts in order to get them in time. During normal operation this foot mechanism is not used.

Where the word "impositive" is used in this patent it should be understood as meaning the opposite of positive. It should also be understood that the apparatus of this invention is not necessarily limited to seaming but can be used in anything related to operating on the fabric edge.

It will be seen that we have invented a machine for seaming or fabric edging which is wholly automatic once the fabrics are laid on the main conveyor belt.

The unique manner of use of air in transporting the work through the sewing machine and the built up inertia in the presser bar system give a unique floating of the presser bar system, which makes an automatic conveyor seamer. However, the stacker can be used without the other features if desired.

What is claimed is:

1. A conveyor seamer sewing machine comprising
a sewing machine having
a presser foot free to move up and down,
lower conveyor belt means on which the work is carried to the sewing machine, and
upper belt means travelling in contact with the work and on top of it,
in combination with a feed roll disposed over and in close association with the presser foot,
means to drive the feed roll,
a bracket-supported twist-transmitting element extending from the drive means toward the feed roll,
and a flexible shaft connecting the twist-transmitting element and the feed roll to cause the feed roll to bear, whip-like, with inertial pressure downward upon the presser foot when urged out of position during sewing.

2. A conveyor seamer sewing machine according to claim **1** in which there are
speed adjustment means for the main conveyor belt means and
one for the upper belt means; whereby the conveyor lower belt means and the upper belt means can be set at slightly different speeds if desired.

3. A conveyor seamer sewing machine comprising
a sewing machine,
a presser foot free to give in an upward direction,
a conveyor to carry the work to and from the sewing machine,
at least one lower conveyor belt on which the work is carried to the presser foot and through the sewing machine, and
an upper belt travelling through the sewing machine in contact with the work and on top of it,
in combination with means providing inertial pressure on the presser foot comprising
a feed roll disposed over and in close cooperation with the presser foot,
apparatus to drive the feed roll,
a bracket-supported twist-transmitting element extending from the drive apparatus toward the feed roll,
and a flexible shaft connecting the twist-transmitting element and the feed roll to cause the feed roll to bear, whip-like, down on the presser foot when urged out of position during sewing; whereby the presser foot can bounce over any obstacle it may meet but is constrained to return promptly to pressing position.

4. A conveyor seamer sewing machine according to claim **3** including
a main motor driving the lower conveyor belt means, the upper conveyor belt means and the feed roll,
in combination with separate variable speed control means for the lower belt means, upper belt means and the feed roll, the motor driving through the three control means; whereby synchronism is maintained through changes in conditions.

5. A conveyor seamer sewing machine adapted to seam two or more fabrics together comprising
a sewing machine,
a conveyor adapted to bring the two or more fabrics to the sewing machine,
in combination with two compressed air uncurlers in the conveyor just prior to the sewing machine adapted to uncurl the edges of the two fabrics,
one uncurler uncurling the lower fabric before the upper fabric uncurler begins,
the air stream from the top uncurler having a downward directional component; whereby the upper uncurler also tends to pin the two fabrics together till the latter reach the sewing machine.

6. A conveyor seamer sewing machine adapted to seam two or more fabrics together as claimed in claim **5** in which
the lower uncurler is so located as to continue its air streams after the upper uncurler has begun its air stream; whereby the lower air stream assists in ensuring that the lower fabric is kept uncurled and the two fabrics are flattened by elimination of the bed of air just prior to the sewing machine.

7. A conveyor seamer sewing machine adapted to seam two or more fabrics together as claimed in claim **5** in which
the opening for the air streams from the uncurler for the lower fabric is progressively widened at points close to the sewing machine; whereby the fabric is kept uncurled and flattened out by the air stream as the fabric enters the sewing machine.

8. A conveyor seamer sewing machine adapted to seam two or more fabrics together comprising
a sewing machine,
a presser foot able to give in an upward direction forming part of the sewing machine,
a conveyor to convey the work to and from the sewing machine, and
a feed roll positioned to exert downward pressure on the fabric,
in combination with means carrying the feed roll adapted to exert downward inertial pressure on the presser foot, thereby causing any bounce of the presser foot to be minimized,
two compressed air uncurlers in the conveyor just prior to the sewing machine adapted to uncurl the edges of the fabrics,
one uncurler uncurling the lower fabric before the upper uncurler begins,
the air stream from the top uncurler having a downward directional component; whereby the two or more fabrics are presented to the sewing machine in proper relation without distortion.

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