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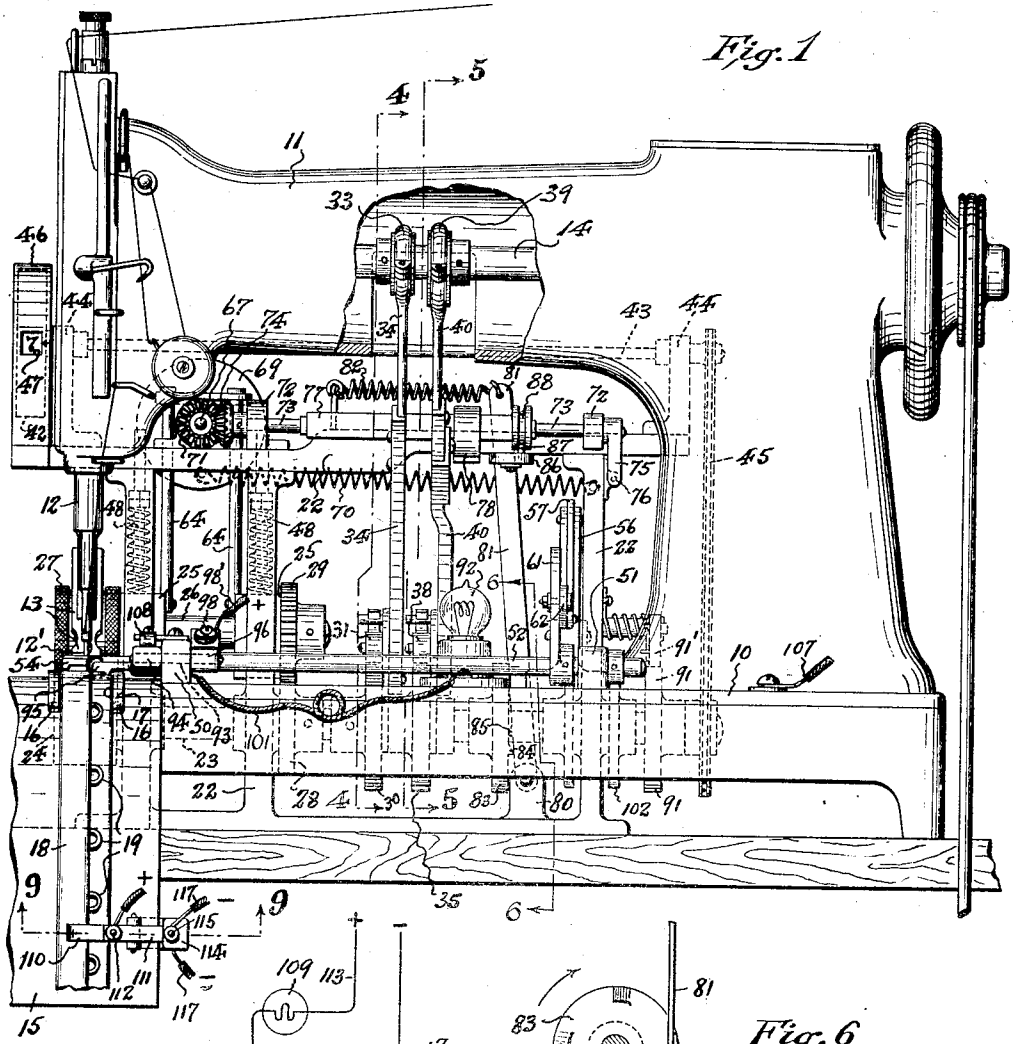
Nov. 2, 1926. 1,605,902

L. ROSENMAN

SEWING MACHINE

Filed Jan. 8, 1925 3 Sheets-Sheet 1

Fig. 1



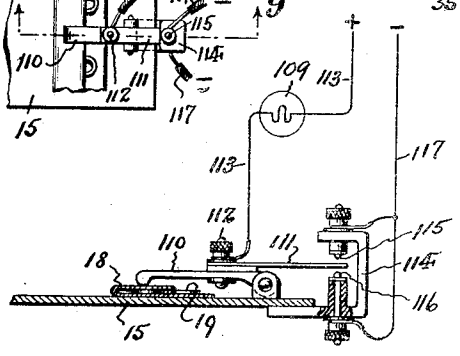


Fig. 9

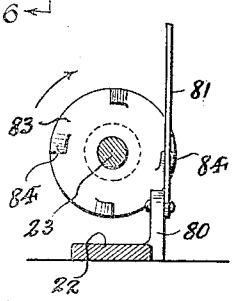


Fig. 6

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SEWING MACHINE

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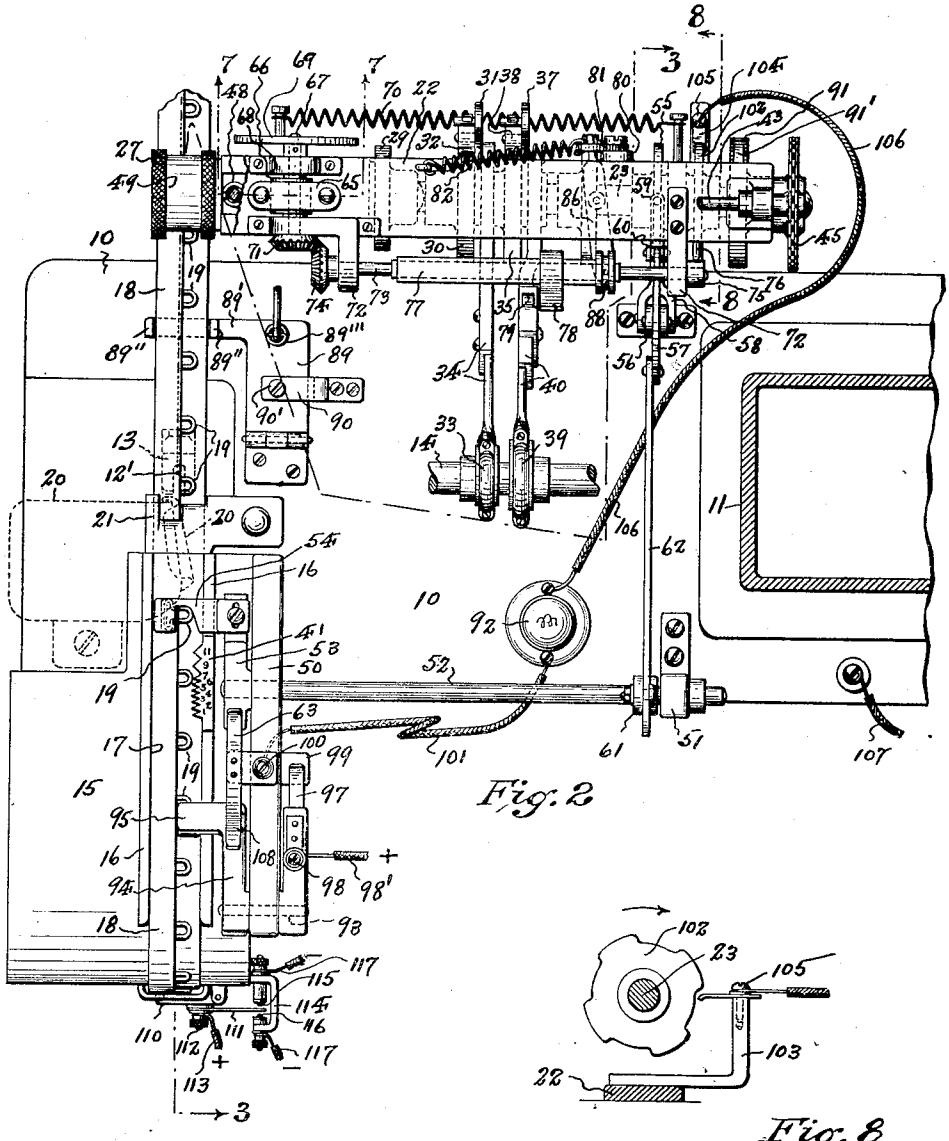


Fig. 2

Fig. 8

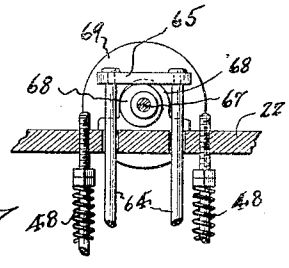


Fig. 7

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SEWING MACHINE

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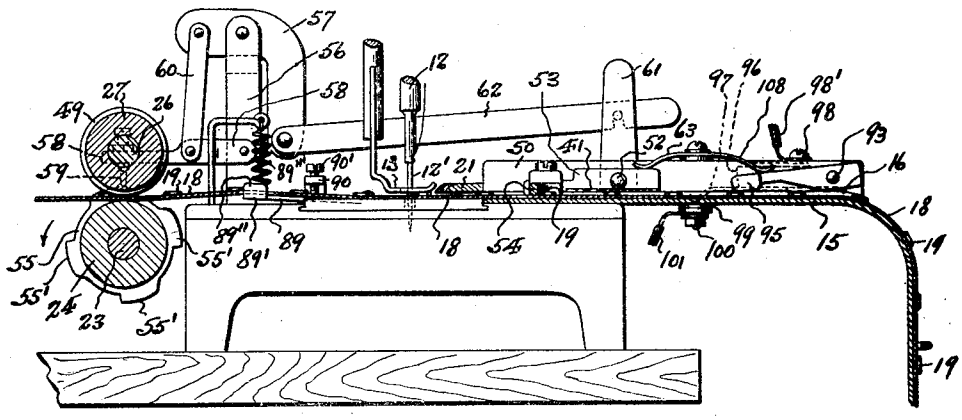


Fig. 3

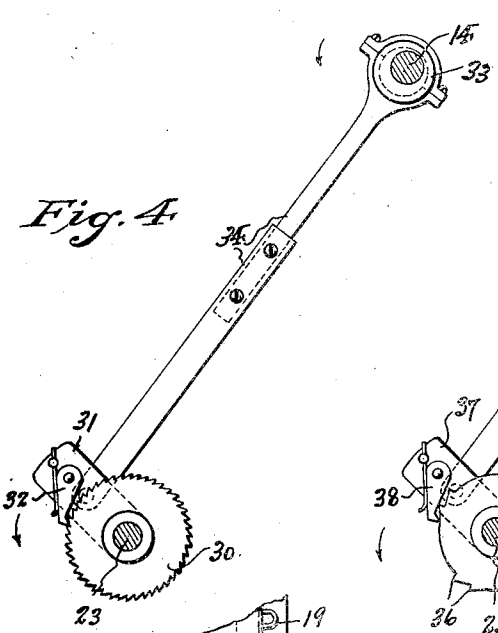


Fig. 4

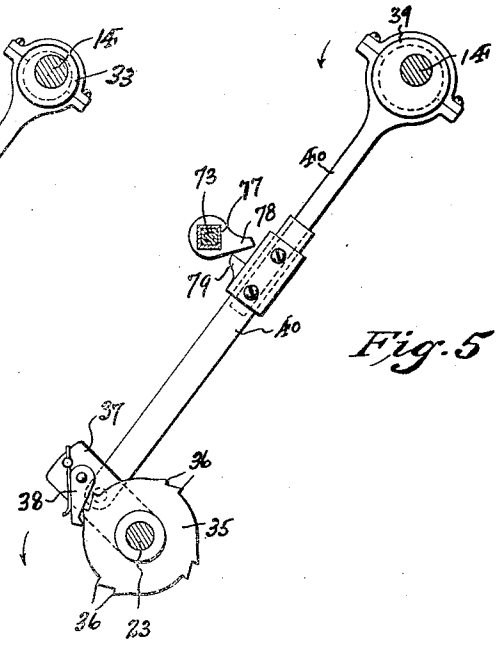


Fig. 5

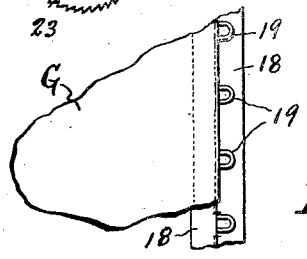


Fig. 10

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Patented Nov. 2, 1926. 1,605,902

UNITED STATES PATENT OFFICE.

LEO ROSENMAN, OF NEWARK, NEW JERSEY.

SEWING MACHINE.

Application filed January 8, 1925. Serial No. 1,161.

This invention relates, generally, to improvements in sewing machines; and the invention has reference, more particularly, to a novel construction of sewing machine, preferably arranged to be driven by power at high speed, and adapted to attach, by a sewing operation, fastener provided tape to garments, and especially to various kinds of women's undergarments.

In the manufacture of women's undergarments it is, in many instances, customary to provide the meeting edges of the garment with hook and eye fasteners, to facilitate the proper spacing of the hooks and eyes along the meeting edges of a garment, and to enable the attachment thereof to be rapidly carried out with a minimum of operations, there has come into use materials known as hook tape and eye tape. Such tapes are provided with the hooks or eyes, as the case may be, already attached thereto in desired longitudinally spaced relation, so that all that is necessary to be done in equipping a garment with such fasteners is to sew the tapes to the marginal portions of the meeting edges of the garments.

When sewing eye tape to a garment, it is generally desirable that the loops of the eyes project beyond the edge of the garment to which the tape is attached; and to assure a neat, smooth, and gapeless attachment, without fly effect, it is necessary that the line of stitching shall traverse the loops of the eyes. By reason of the latter necessity a relatively expensive and highly trained and skilled operator is required, and even with such an operator the work is but slowly accomplished, much time being lost for the reason that the operator must stop machine and manually feed eye-loops relative to the needle to produce the traversing stitches, and when the machine is not stopped in time the sewing machine needle is frequently broken by striking the metal of the eye, so that time is consumed by replacement of the needle and rethreading. It also quite frequently occurs that the work is spoiled, even by the most skillful operator.

It is the principal object of this invention, therefore, to provide a novel means for controlling the movement of the eye tape to the sewing mechanism of the machine, so that accurate placing of the attaching stitches relative to the loop of the eye is assured, whereby the machine needle will skip the sides of the latter, and whereby any slight variation in the spacing of the eyes on the tape will be automatically compensated for, to always bring the loop of the eye in proper position relative to the machine needle; all to the end that the sewing operations may be carried on at relatively high sped, and without necessity for employing an especially trained or highly skilled operator.

Another object of this invention is to provide, in connection with the tape movement controlling means, signal indicating means, for giving to the operator a timely warning in the event properly controlled movement of the tape is interrupted, and also for warning the operator of the approach of the end or a pieced section of tape; all to the end that the machine may be stopped in time to make proper adjustments, or renew the supply of tape, before risk of spoiling the garment occurs.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a sewing machine made according to and embodying the principles of this invention; Figure 2 is a plan view of the same, with portions broken away to more clearly illustrate the eye tape movement controlling means; Figure 3 is a fragmentary transverse section, taken on line 3—3 in Figure 2; Figure 4 is a fragmentary transverse section, taken on line 4—4 in Figure 1; Figure 5 is a fragmentary transverse section, taken on line 5—5 in Figure 1; Figure 6 is a fragmentary transverse section, taken on line 6—6 in Figure 1; Figure 7 is a detail fragmentary vertical longitudinal section, taken on line 7—7 in Figure 2; Figure 8 is a fragmentary transverse section, taken on line 8—8 in Figure 2; and Figure 9 is a detail cross section taken on line 9—9 in Figure 1. Figure 10 is a fragmentary view of a portion of garment with fastener tape sewn thereto according to this invention.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring to said drawings, the reference character 10 indicates the bed of the machine, upon which is mounted the arm 11, at the free end of which is arranged the

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usual reciprocating needle bar 12 and spring tensioned presser foot 13, the same being actuated from the main shaft 14, which extends through said arm 11 in the usual way. The needle bar 12 is provided at its lower end with the usual sewing machine needle 12', which cooperates with any well known form of shuttle mechanism (not shown) located in the usual manner beneath the bed 10 of the machine.

Suitably affixed to the bed 10 of the machine, in front of and alined with the needle bar 12 and presser foot 13, is a guide plate 15, upon which are secured laterally spaced apart guide-ribs 16 to form, intermediate thereof, a guideway 17 to lead the eye-tape 18 to the sewing mechanism of the machine.

Said eye tape is provided, at suitable longitudinally spaced intervals, with metallic eyes, the loops 19 of which are exteriorly projected from the body of the tape. In order to more clearly explain the operation of the machine, I have shown and shall hereinafter describe the operations of the machine in connection with eye tape, the eyes of which are spaced one inch apart, and with the stitching mechanism of the machine adapted to produce eleven stitches to the inch. In so illustrating and describing the novel features and functions of my machine, I do not intend to impose any limitations as to the spacing of the eyes of the tape or as to the number or kind of stitches produced by the sewing mechanism, since in such respects the machine may be readily constructed and adapted to function with relation to any desired spacing of the eyes of the tape, or with any desired number or kind of stitches across and intermediate said eyes of the tape.

In practice the eye tape is led to the sewing mechanism of the machine by the above described guide means, and the garment to which the tape is to be attached is registered with the tape by laying the garment G over the tape in advance of the presser foot and sewing mechanism, so that garment and tape together pass to the latter mechanism. If desired, the edge of the garment may be passed through a hemmer 20 (see dotted representation thereof in Figure 2 of the drawings) in advance of its movement with the tape to the presser foot and sewing mechanism of the machine. An illustration of the finished sewing is shown in Figure 10. It may also be desirable to provide, intermediate the presser foot 13 and the inner end of the guideway 17, a keeper guide-piece 21, which is grooved on its under side to permit the passage of the eye-tape beneath the same. Said keeper guide-piece 21 tends to hold the eye-tape flat on the bed 10 of the machine as it advances to and beneath the presser foot 13.

Associated with the rear side of the machine is a suitable supporting frame-work 22. Journaled in the lower portion of said supporting frame-work 22 is a longitudinal shaft 23, upon one end of which is fixed a lower feed roll 24, which is disposed in the rear of and alined with the presser foot and sewing mechanism of the machine. Vertically movable, in connection with said frame-work 22 and above said shaft 23, are a pair of bearing blocks 25. Journaled in said bearing blocks 25 is a second longitudinal shaft 26, upon one of which is fixed an upper feed roll 27 adapted to cooperate with said lower feed roll 24. Said second shaft 26 is driven from said shaft 23 by intermeshing gears 28 and 29, with which said shaft 23 and shaft 26 are respectively provided.

In operation the eye tape and garment pass between the upper and lower feed rolls 27 and 24 so as to be gripped thereby, and by the rotation of the feed rolls are caused to be progressively moved or advanced relatively to and past the sewing mechanism of the machine. In the form of my invention as illustrated in the accompanying drawings, the feed rolls 27 and 24 are so sized, that each quarter revolution thereof will advance the eye-tape 18 a distance equivalent to the distance separating the eyes or loops 19 thereof, measured from center to center of the latter. Suitable means are provided for actuating the feed rolls 24 and 27, both to intermittently advance the eye-tape the normal stitch length or distance, as well as to so advance the eye-tape at proper times so that what may be termed "jump-stitches" will be formed across the sides of the eyes or loops 19 of the eye-tape, whereby the sewing needle 12' is prevented from striking the metal of the eyes or loops at the risk of breaking and thereby entailing necessity of stopping the machine for the replacement of needle and for rethreading. I have shown in the drawings one form of feed roll actuating means which is satisfactory, but which is subject to more or less mechanical variation. The illustrated feed roll actuating means comprises a ratchet wheel 30 which is fixed on said shaft 23. This ratchet wheel preferably possesses forty-four teeth, thus providing eleven teeth in each quarter of its circumference, corresponding to eleven normal stitches per inch to be produced by the sewing mechanism of the machine at each quarter revolution of the feed rolls 24 and 27. Pivotally mounted on the shaft 23, adjacent to said ratchet wheel 30, is an oscillator arm 31. Pivoted upon said oscillator arm 31 is a spring-pressed pawl 32 which cooperates with the teeth of said ratchet wheel 30. Oscillations of the oscillator arm, properly synchronized relative to the operation of the sewing mechanism of the machine, are produced by an eccentric

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33, of proper stroke, which is connected with and actuated by the main shaft 14 of the machine; said eccentric having a connecting rod or link 34, the lower free end of which is pivotally connected with said oscillator arm 31. Also mounted on said shaft 23 is a second ratchet-wheel 35, which possesses properly positioned in each quarter of its circumference two ratchet teeth 36 double the length of the ratchet teeth of said ratchet wheel 30, the circumference of said ratchet wheel 35 being otherwise blank. The ratchet wheel 35 is so positioned on the shaft 23 relative to the ratchet wheel 30, that the teeth 36 correspond in position to the last four teeth in each series of eleven teeth with which the quarters of said ratchet wheel 30 are provided. Pivotally mounted on the shaft 23, adjacent to said ratchet wheel 35, is an oscillator arm 37. Pivoted upon said oscillator arm 37 is a spring pressed pawl 38 which cooperates with the ratchet wheel 35. Oscillations of said oscillator arm 37, properly synchronized relative to the operation of the sewing mechanism of the machine, are produced by an eccentric 39, having double the stroke of the eccentric 33. Said eccentric 39 is connected with and actuated by the main shaft 14 of the machine, and is provided with a connecting rod or link 40, the lower free end of which is pivotally connected with said oscillator arm 37. In operation, after the loop 19 of an eye of the eye tape is advanced past the sewing needle 12′ and the latter is raised preliminary to making the first of the series of stitches of normal length intermediate the eyes, the operative downward stroke of the eccentric 33 swings downwardly the oscillator arm 31, so that the pawl 32 engages the first of a series of eleven teeth in a quarter of the ratchet wheel 30, and thus advances the ratchet wheel 30 the distance of one tooth. This movement is transmitted through the shafts 23 and 26 to the feed rolls 24 and 27, which are turned a sufficient distance to draw forward the eye-tape the distance of one normal stitch, or one-eleventh of an inch. While the eccentric 33, oscillator arm 31 and pawl 32 are recovering under the continued rotation of the main shaft 14, the latter operates the needle bar 12 and cooperative sewing mechanism to produce the operative reciprocation of the sewing needle 12′. These operations are successively repeated until the eye-tape has been intermittently advanced to produced seven stitches intermediate adjacent eyes of the eye-tape. In the meantime the ratchet wheel 35 has been inoperative, since the pawl 38 of its associated oscillator arm 37 has been traversing a blank portion of the circumference of said ratchet wheel 35. Upon completion of the seventh normal stitch, however, the pawl 38 has been brought into operative relation to the first of the two teeth 36 in the corresponding quarter of the ratchet wheel 35, so that on the next rotation of the main shaft 14, the eccentric 39 produces an operative stroke of the oscillator arm 37, which by reason of the double length of stroke imparted by said eccentric 39, causes the pawl to advance the ratchet wheel 35 and thus rotate the shaft 23 and in turn the shaft 26 for a distance twice that produced by the operation of the ratchet wheel 30, thus doubling the feeding movement of the feed rolls 24 and 27, and advancing the eye-tape relative to the sewing needle for a distance equivalent to two normal stitches, or two-elevenths of an inch, which, to better aid an understanding of the operation, may be called eighth and ninth stitches, which are thus combined into one stitch, which bridges the near side of the metallic loop of the approaching eye. When the needle 12′ descends it therefore passes downwardly between the sides of said eye. While the sewing needle 12′ thus reciprocates the eccentric 39, oscillator arm 37 and pawl 38 recover, so that the latter is brought into engagement with the second of the teeth 36 on operative quarter of the ratchet 35. The next rotation of the main shaft 14 produces a second operative stroke of the eccentric 39, which in turn produces a second operative stroke of the oscillator arm 37 and pawl 38, so that the latter again advances the ratchet wheel 35, and in turn the shafts 23 and 26 for a distance twice that produced by the operation of the ratchet wheel 30, thus again doubling the feeding movement of the feed rolls 24 and 27, and again advancing the eye-tape relative to the sewing needle for a distance equivalent to two normal stitches, or two-elevenths of an inch, which, to better aid an understanding of the operation, may be called the tenth and eleventh stitches, which are thus combined into one stitch, which bridges the far side of the metallic loop of the approaching eye, and thus permits the sewing needle to traverse the eye, and again be positioned for normal stitching between the eyes. While the ratchet-wheel 35 is operative in the manner above described, the ratchet wheel 30 will be freely advanced, the pawl 32 yielding to its movement. While the ratchet wheel 30 is operative the ratchet wheel 35 is inoperative by reason of its blank or toothless sections. The arrangement of stitches resulting from the above described operations are not to be considered as limiting the scope of this invention, since various modifications of stitch arrangement may be attained by suitable corresponding modifications of the interrelated cooperation of the ratchet wheels 30 and 35 without departing from the principles of this invention.

In order to aid the operator in initially

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positioning the eye-tape in the machine ready to carry on the sewing operations, and also to provide at all times an indication that the tape is running in proper synchronized relation to the sewing mechanism 1 have provided a novel means for idicating the tape position. This means comprises two separate indicating devices, the readings of which should at all times correspond. The first device may be termed a gauge plate 41, which is secured in desired location in connection with the guide plate 15, so as to overhang the guide-way 17, and to this end may be secured or fastened upon a guide-rib 16. As shown more clearly in Figure 2 of the drawings, the gauge plate 41 is provided with a plurality of indicator points corresponding to the number and spacing of the stitches which are produced by the sewing mechanism of the machine, and said points may be numbered consecutively in correspondence to the number and position of the stitches. The eyes of the eye-tape will move past the said indicating points toward the sewing mechanism of the machine, and the movement of a visible eye relative to the indicating points will correspond to and indicate the movement of the eyes of the tape relative to the needle of the sewing mechanism of the machine. For example, if the center of an eye adjacent to the gauge plate 41 is opposite the indicator point numbered seven, this will indicate to the operator that the seventh stitch in the series between the eyes has been made toward the eye approaching the needle of the sewing mechanism, all of which will be understood from an inspection of Figure 2 of the drawings. The second indicating device comprises a rotatable indicator wheel 42, bearing on its circumferential face numeral indications corresponding to the number and position of the series of stitches intermediate the eyes of the tape. Said indicator wheel 42 is fixed upon one end of a longitudinal shaft 43 which is journaled in bearing supports 44 mounted on the supporting frame work 22. Said shaft 43 is driven from said shaft 23 by a one to four chain and sprocket drive 45, or other equivalent transmission means, in such manner that each quarter revolution of the shaft 23, and of the feed rolls 24 and 27 driven by the latter, said shaft 43 and indicator wheel is caused to make a complete revolution; in other words during the advance of the eye tape by the feed roll movement for a distance equivalent to the distance between the eyes of the tape from center to center, said indicator wheel makes a complete revolution, successively exposing to view the indicating numbers corresponding to the successive stitches produced by the sewing mechanism from eye to eye. The indicator wheel is enclosed by a suitable housing 46 which is provided with an opening 47 through which the indicating numbers of the wheel are successively disclosed. For example, upon completion of the seventh stitch of said series of stitches, the indicating numeral 7 will be disclosed, and so on through each series of stitches, the indicating numbers will be disclosed in correspondence with the formation of the stitches. The above described indicating wheel arrangement will be best understood from an inspection of Figure 1 of the drawings.

It is preferable that the upper feed wheel 27 be under an upwardly yieldable tension, and to this end downwardly thrusting tension or compression springs 48 are disposed between the bearing blocks 25 and the upper portion of the frame work 22. It is also preferable that the upper feed roll 27 be annularly grooved, as at 49, intermediate its opposite circumferential marginal sides or edge portions, thus providing a clearance space for the metallic eyes of the tape, as the same pass through and between the feed rolls.

One of the most important features of my present invention, comprises a means for positively controlling the movement of the eye-tape, so that the loops of the eyes of the same will always be brought into proper relation to the sewing needle 12' preparatory to traversing said loops with the stitching, and so that slight variations in the feeding movement of the tape, or in the spacing of the eyes on the tape will be compensated for. This means consists of an automatically controlled positive stop device which coacts with the eye-tape so as to positively arrest the latter, to prevent over-running of the eye-tape under the impulsion of the feeding means and consequent displacement of the eyes from properly timed and spaced presentation to the sewing mechanism of the machine. Secured to the bed 10, so as to extend adjacent to or border one side of said guide plate 15, is a bearing bracket or support 50, and spaced longitudinally from the latter, and also secured to said bed 10, is a bearing piece 51. Journaled in and extending between said bearing means 50 and 51 is a rock-shaft 52. Fixed on the end of said rock-shaft 52 adjacent to said guideway 17 is a rocker-arm 53 adapted to be oscillated by the movement of said rock-shaft. Fixed on the forward end of said rocker-arm 53 is a transverse stop-piece 54, the free end of which extends transversely across the guideway 17. The underside of said stop-piece 54 is so shaped as to provide an abutment to engage and arrest an eye loop of the tape which is moved forwardly toward the same as the tape is advanced relative to the sewing mechanism of the machine. Means is provided for producing properly synchronized movements of the stop-piece relative

to the tape movement so that the same at proper times moves into operative relation to the tape and in the path of an approaching eye of the latter, and at proper times is raised or removed from such operative relation to release the tape. In one form, as illustrated in the drawings, the latter means comprises a timing cam 55, which is fixed on said shaft 23 so as to rotate therewith. Fixed on the bed 10 in a proper location is a fulcrum post 56, upon which is pivotally supported a bell-crank lever 57. Also pivoted on said fulcrum post 56 is a lever-arm 58, the free end of which extends over said timing cam 55. Adjustably connected with the free end of said lever-arm 58 is a stud 59, which engages the operative periphery of said timing cam 55. The upper or horizontal arm of said bell-crank lever 57 is pivotally interconnected with said lever arm 58 by a link 60. Extending upwardly from said rock-shaft 52 is a lever-arm 61. The lower or vertical arm of said bell-crank lever 57 is operatively interconnected with said rock-shaft lever-arm 61 by an interconnecting link 62. The stop-piece 54 is normally retained in raised or released relation to the eye-tape by means of a leaf spring 63, or equivalent means, which engages the rear end of the rocker-arm 53, to thus normally up-tilt the forward end of the latter on which the stop-piece 54 is carried, thus also, through the reverse relation of said rock-shaft, positioning the above-described link and lever mechanism in normal initial relation to the timing cam 55. The rotation of the timing cam 55 at proper times carries one of its peripheral cam projections 55′ (see Figure 3) into operative engagement with the stud 59 of the lever arm 58, thus exercising a lifting pressure on the latter, which through the link 60 rocks the bell-crank lever 57, to in turn, through the link 62 and lever arm 61, produce a forward operative rotation of the rock-shaft 52, thereby turning downward the forward end of the rocker arm 53, and thus moving the stop-piece 54 downwardly upon the eye-tape in front of an approaching eye-loop thereof. The stop-piece 54 being thus operatively positioned, is so held by the cam 55 so that, as the tape advances under the impulsion of the feeding mechanism, the approaching eye-loop is carried into engagement with the stop-piece, and thus the movement of the tape is accurately arrested whereby the eye-loop advancing toward the needle 12′ of the sewing mechanism of the machine is stopped in proper position relative to said needle 12′ preparatory to the production by said sewing mechanism of the eye traversing "jump-stitches". The timing cam 55 is so shaped as to its operative peripheral cam projections 55′, that it will release its operative effect upon the stop-piece actuating mechanism, by the time it is necessary to advance the tape for the formation of said "jump-stitches". From the above description it will be quite apparent, that the stop-piece 54 functions to provide a positive governing effect and check upon the advance of the eye-tape to the sewing-mechanism, whereby over-running of the tape is prevented, and also whereby the tape may be always brought up to a proper position and no slack be allowed to form intermediate the stop-piece and the feed-rolls; all of which tends to produce a self-compensating or regulating feeding movement of the tape to the sewing mechanism, so that even if slight irregularities in the spacing of the eyes on the tape occurs, it will not be likely to disturb the properly timed and controlled movement of the succeeding eye-loops in proper relation to the sewing mechanism of the machine.

It must be here noted that the above-described automatic positive stop control device is a basic feature of this invention, and is an essential feature in combination with an eye-tape advancing or feeding means, regardless of the detail structure or specific character of the latter means; I therefore desire, in certain of the appended claims, wherein said positive stop control device is claimed in combination with tape advancing or feeding means generally, that the latter means shall be broadly included, and not confined, by interpretation, to the specific form of tape advancing or feeding means herein described and illustrated, which, as to such broad relation and combination of positive stop control and tape advancing or feeding means, may be considered merely illustrative of one form of such means.

In the specific form of tape advancing or feeding means herein illustrated and described, and which comprises the pair of rotatable feed rolls 24 and 27, I have found it desirable to provide automatic means for releasing the grip of the feed-rolls upon the tape, as soon as the eye approaching the stop-piece 54 is brought into arrested engagement with the latter, rather than to allow the feed-rolls to slip on the thus positively arrested tape, although the latter method of operation is not entirely impractical. If the grip of the feed-rolls is released relatively to the tape, the inherent tension of the latter, which accumulates under the pulling impulsion of the feed rolls, will, when the rolls are released, relax while the tape is arrested or positively stopped by the stop-piece 54, thus permitting the tape to normally adjust itself during the formation of each series of fastening stitches, and preferably just prior to the production of the aforesaid "jump-stitches" which traverse the eye approaching and passing the needle 12′ of the sewing mechanism.

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Instead of depending upon the tension of the tape, however, I may in some instances, provide an adjustable tension device intermediate the feed rolls and the stop-piece 54, which will aid in effecting the above described compensating movements of the tape relative to the sewing mechanism. This tension device consists of a pivoted arm 89 mounted on the bed of the machine for vertical swinging movement, and provided with a lateral extension 89′ over which the tape passes. Said extension 89′ may be provided with upstanding laterally spaced guide-lugs 89″ between which the tape passes, and by which the tape is maintained in running alinement to and with the feed rolls. Said arm 89 is downwardly yieldable and is tensionally held in normal raised position by a pull spring 89‴ against a stop-post 90 provided with an adjustable stop-screw 90′, which may be adjusted to determine the desired normal initial lift of the arm 89 and its tape lifting extension 89′. When the tension device above described is employed; if the distance between the eye loop 19 approaching the stop-piece 54 relative to the preceding eye loop is slightly less than normal spacing, the former will be engaged against the stop-piece 54 in advance of the release of the feed rolls, so that the feed movement of the latter will pull on the tape, thus causing the arm 89 to yield downwardly until the feed rolls release. Upon release of the feed-rolls the tension device will again lift to raise the tape to normal position. When the distance between the eye-loop 19 approaching the stop-piece 54 relative to the preceding eye loop is slightly more than normal spacing, the feed rolls will take up the difference before their release, since they are sized to feed the tape a slightly greater distance than the normal distance between the eye-loops of the latter. It will thus be apparent that the feeding of the tape is self-compensating, so that errors are not permitted to accumulate or build up so as to eventually bring the eye-loops of the tape out of properly synchronized movement relative to the sewing mechanism of the machine. It will thus be apparent that, in the described and illustrated arrangement, this releasing movement of the feed rolls 24 and 27 is preferably effected once during each quarter revolution of the latter. The means for automatically accomplishing the said releasing movement of the feed rolls at properly timed intervals relative to the other operations involved, comprises a pair of upwardly extending rods 64 the lower ends of which are respectively attached to said bearing blocks 25, and the upper ends of which extend through the upper portion of the frame work 22. Attached to and extending between the upper free ends of said rods 64 is a cross-head 65. Journaled in bearings 66, fixed on the upper portion of said frame-work 22, is a transverse spindle 67, which is disposed beneath said cross-head 65, and which is provided with a lift cam 68 to engage said cross-head 65. Fixed on the rearward outer end of said spindle 67 is a crank-wheel 69 with which is engaged a pull-spring 70, or equivalent device, which produces a reverse rotation of said spindle to normally hold and return said lift cam to an initial inoperative position. Fixed on the forward end of said spindle 67 is a miter or bevel gear 71. Attached to said supporting frame-work 22 are a pair of longitudinally spaced bearing members 72. Journaled in and extending between said bearing members 72 is a longitudinal spindle 73. Said spindle 73 is provided with a miter or bevel gear 74 which meshes with the gear 71. Fixed on the opposite end of said spindle 73 is a stop arm 75, which engages a stop-stud 76 connected with said supporting frame-work 22, to thus determine the normal initial position of said above described interrelated parts. Longitudinally slidable upon said spindle 73, but so engaged thereupon as to turn therewith, is a sleeve 77, provided with a suitably positioned trip lever 78. Suitably positioned and secured in connection with the connecting rod or link 40 is a tripper projection 79. Pivotally connected with a fulcrum member 80, which is arranged upon the lower portion of the frame-work 22, is an upwardly extending lever 81, which is held in a normally retracted position by a pull spring 82, or equivalent means. Fixed on said shaft 23, so as to be rotated thereby, is a cam-wheel 83, provided on its face with a plurality of properly positioned cam projections 84, which cooperate with a projection or nosing 85 on the lever 81 (see Figure 1), to produce properly timed oscillations of said lever 81. Pivotally mounted in connection with the upper portion of said frame-work 22 is a transverse lever 86 one end of which is operatively coupled with said lever 81, and the opposite end of which is provided with a stud 87 to operatively engage an annularly grooved collar 88 which is secured upon said sleeve 77. In operation, a projection of the cam-wheel 83 is carried into engagement with the projection or nosing 85 of the lever 81 to cause an operative swinging movement of the latter. This movement of the lever 81 is transmitted through the transverse lever 86 to thereby cause a forward shifting movement of the sleeve 77 upon the spindle 73, thus carrying, at the proper moment, the trip lever 78 into the path of movement of the tripper projection 79 of the link or connecting rod 40. At the moment of this shifting of the sleeve 77 and trip lever 78, the connecting rod or link 40 is at the period of its downward

stroke, so that the tripper projection 79 is below the trip lever 78, consequently on the next upward stroke of the connecting rod or link 40, the tripper projection 79 is carried into lifting engagement with the trip lever 78, which is thereby swung upward, thus rotating the sleeve 77, and through the latter also rotating the spindle 73. The rotation of the spindle 73 is transmitted through the gears 74 and 71 to the transverse spindle 67, which is thus rotated to turn the cam 68 into lifting engagement with the cross-head 65. The lifting of the cross-head 65 raises, through the rods 64, the bearing blocks 25, thus elevating the shaft 26 and causing a separation of the feed roll 27 from operative relation to the feed roll 24, thereby releasing the tape from the feeding action of said feed rolls for the purposes and with the advantages above pointed out. The continued up-stroke of the link or connecting rod 40 carries the tripper-projection 79 away from the trip-lever 78, whereupon the pull-spring 82 returns the lever 81 and, through the interconnecting parts, the sleeve 77 to normal initial position, while the pull spring 70 returns the rotatable parts of the mechanism to normal initial positions, so that, after the momentary release of the feed rolls relative to the tape, the same are again returned to normal operative relation to the latter.

It is desirable to provide means to prevent back-lash or play in the shaft 23, and parts operated thereby, and to this end the said shaft may be provided with a ratchet-wheel 91, with which a detent pawl 91', cooperates (see Figure 1).

I have provided in cooperative relation to the novel fastener tape controlling and feeding mechanism above described, a signal means adapted to give advance warning to the operator in the event the fastener tape is tending to abnormal displacement or advancement out of properly synchronized relation to the sewing mechanism of the machine. This signal means is preferably electrically operated, and may consist either in a visible signal, such as an electric lamp 92, as shown, or in an audible signal, which would be equivalent in purpose and effect. Journaled in said bearing bracket or support 50 is a spindle 93 upon which is fixed a forwardly extending actuating arm 94 provided at its free end with a lateral extension or shoe 95 adapted to be positioned in the path of the eye loops 19 of the tape 18, as the latter advances through the guideway 17. Secured to said spindle 93 on the opposite or outer side of said bearing bracket or support 50 is a forwardly extending carrier arm 96. Secured upon the free end of said carrier arm 96 is a resilient contact finger 97, which is suitably insulated, but which is provided with a suitable terminal connection 98 for attaching thereto a positive circuit wire 98' leading from a suitable source of electrical energy. Supported from said bearing bracket 50, and suitably insulated therefrom, is a contact plate 99, which is positioned adjacent to the free end of said contact finger 97 so as to be engageable thereby. Said contact-plate 99 is provided with a terminal connection 100, which is connected by a circuit wire 101 with one pole of the signal lamp 92. Fixed on said shaft 23, so as to rotate therewith, is a make and break cam 102, which provides an electrical ground through the machine. Supported on a suitable bracket 103, and insulated thereby from electrical ground, is a resilient contact-brush 104, which at proper times is engaged by the make and break cam 102 (see Figures 1 and 8). Said contact-brush 104 is provided with a terminal connection 105, to receive the attachment of a circuit wire 106 leading thereto from the opposite pole of said signal lamp 92. The circuit is established from the ground provided by the machine back to the source of electrical energy, through a negative circuit wire 107. In operation, as the tape 18 advances through the guideway 17, the eye-loops 19 are successively passed beneath the shoe 95 of the actuating arm 94, a spring 108 maintaining the said shoe yieldingly pressed against the body of the tape 18. When thus downwardly tilted in engaged relation to the body of the tape 18, the actuating arm 94 holds the carrier arm 96 downwardly tilted to engage the contact finger 97 in circuit closing relation to the contact-plate 99. When however, an eye-loop 19 passes beneath the shoe 95 of the actuating arm 94, the latter is raised or upturned to likewise upturn the carrier arm 96, and thus remove the contact finger 97 from circuit closing engagement with the contact plate 99. The timed rotation of the make and break cam 102 is such that normally, when the circuit is broken by the lifting of the actuating arm 94, one of the cam projections of the cam 102 will be in circuit closing engagement with the contact brush 104, and, conversely, when the actuating arm 94 is lowered between the eye-loops 19 of the tape 18 and the circuit is closed by the engagement of the contact finger 97 with the contact plate 99, then the cam projection of the cam 102 will be disengaged from the contact brush 104. It will thus be apparent that so long as the tape 18 is advanced by the feeding means in normal synchronized relation to the sewing mechanism of the machine, the electric circuit through the signal lamp will always be interrupted at either one point or the other, but in the event the tape begins to run out of proper synchronism, then the two circuit closing devices will become simultaneously instead of alternately operative, and the signal lamp 92 will be

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illuminated, thus giving warning to the operator to stop the machine, and make whatever adjustments may be necessary to attain a resumption of normal operation.

I have also provided in cooperation with the eye-tape guiding means an additional signal means adapted to warn the operator that the end of the tape is reached, or that pieced tape is approaching, thus notifying the operator not to start the running of another garment through the machine, until the proper supply of tape is renewed. In the form of signal device illustrated in the drawings (see Figures 1 and 9), the same comprises an electrically operated signal, which may be in the form of an electric lamp 109. Mounted on the guide plate 15 is a pivoted arm 110, the free end of which rests upon the eye-tape 18, as the latter advances to the guideway 17. Supported upon said arm 110, but insulated therefrom, is a rearwardly extending contact finger 111, which is provided with a terminal connection 112 to receive the attachment of a circuit wire 113, leading through the signal lamp 109 from a suitable source of electrical energy. Connected with said guide-plate 15 is a bracket 114, by which are supported a pair of fixed insulated contact points 115 and 116, one above and below the free end of said contact finger 111. Said contact points 115 and 116 are connected by circuit wires 117 back to the source of electrical energy. As the eye-tape runs normally beneath the arm 110, the same is upheld in a position to retain the contact finger intermediate of and disengaged from said contact points 115 and 116. When, however, the end of the tape passes from beneath the arm 110, the latter will drop or swing downward, to thus swing upward the free end of said contact finger 111 into circuit closing engagement with the contact point 115, thereby closing the circuit to illuminate the signal lamp 109, and consequently warning the operator that the end of the tape is approaching. In the event the tape is pieced by overlapping two sections thereof, and the overlapped or pieced section is carried beneath the arm 110, the additional or doubled thickness of the tape causes the arm to turn upwardly from normal position, thus swinging downwardly the free end of the contact finger 111 into circuit closing engagement with the contact point 116. The signal lamp 109 is thereupon illuminated, and the operator thereby warned that the pieced section of tape is approaching.

From the above description of this invention it will be evident that I have produced a very efficient means for controlling the movement of eye-tape to the sewing mechanism of a sewing machine of such character that high speed operation may be attained without necessity for employing especially skilled operators.

I am aware that various changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction of the same, without departing from the scope of this invention as described in the foregoing specification, and as defined in the appended claims. Hence, I do not limit this invention to the exact arrangements and combinations of the various devices and parts as set forth in the foregoing specification, nor do I confine myself to the exact details of the construction of said parts as illustrated in the accompanying drawings.

I claim:—

1. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, and an automatic positive stop cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism.

2. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, an automatic stop cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, and means for visibly indicating the properly synchronized stitch-making advance of the tape relative to said sewing mechanism.

3. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing mechanism.

4. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing mechanism, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, said gauge plate being disposed adjacent to the path of travel of the fasteners of the tape, and a rotary indicator wheel synchronized with and actuated by said tape advancing means, said wheel having indicating devices also corresponding to the number and spacing of the said series of stitches to be formed

intermediate and traversing the fasteners of the tape.

5. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, an automatic stop cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, and means for visibly indicating the properly synchronized stitch-making advance of the tape relative to said sewing mechanism, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, said gauge plate being disposed adjacent to the path of travel of the fasteners of the tape, and a rotary indicator wheel synchronized with and actuated by said tape advancing means, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

6. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for intermittently advancing the tape relatively to said sewing mechanism, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, and means for actuating said stop in synchronized relation to said tape advancing means.

7. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, and means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls.

8. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing mechanism.

9. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing mechanism, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, said gauge plate being disposed adjacent to the path of travel of the fasteners of the tape, and a rotary indicator wheel actuated by the means for rotating said gripping rolls and synchronized with the tape advancing movement of the latter, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

10. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, and means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls.

11. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said tape in

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synchronized relation to the tape advancing operations of said gripping rolls, and means for periodically releasing said gripping rolls relatively to the tape while a fastener of the latter is operatively engaged by said stop.

12. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said countershaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, and means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism.

13. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said countershaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, and means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls.

14. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said counter-shaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, and means for periodically releasing said gripping rolls relatively to the tape while a fastener of the latter is operatively engaged by said stop.

15. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said countershaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mech-

anism, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine.

16. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said counter-shaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, and a rotary indicator wheel actuated in synchronism with the tape advancing movement of said gripping rolls, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

17. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said counter-shaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, means for periodically releasing said gripping rolls relatively to the tape while a fastener of the latter is operatively engaged by said stop, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, and a rotary indicator wheel actuated in synchronism with the tape advancing movement of said gripping rolls, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

18. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine.

19. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce

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a series of stitches intermediate and traversing the fasteners thereof, and means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, and a rotary indicator wheel actuated in synchronism with the tape advancing movement of said gripping rolls, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

20. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, a positive stop means co-operative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, means for periodically releasing said gripping rolls relatively to the tape while a fastener of the latter is operatively engaged by said stop, means for visibly indicating the properly synchronized stitch by stitch advance of the tape relative to said sewing machine, said latter means comprising a stationary gauge plate having a plurality of indicator elements corresponding relatively to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape, and a rotary indicator wheel actuated in synchronism with the tape advancing movement of said gripping rolls, said wheel having indicating devices also corresponding to the number and spacing of the series of stitches to be formed intermediate and traversing the fasteners of the tape.

21. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, and a tape tensioning means intermediate said stop-means and said gripping rolls.

22. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to said sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, a tape tensioning means intermediate said stop-means and said gripping rolls, and means for periodically releasing said gripping rolls from advancing relation to the tape.

23. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, a positive stop means co-operative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, and a tape tensioning means intermediate said stop-means and said gripping rolls.

24. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means actuated by said main shaft and synchronized with the operations of said sewing mechanism for intermittently rotating said gripping rolls to so advance the tape as to produce a series of stitches intermediate and traversing the fasteners thereof, a positive stop means co-operative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, a tape tensioning means intermediate said stop-means and said gripping rolls, and means for periodically releasing said gripping rolls from advancing relation to the tape.

25. In combination with a sewing machine having a main rotating shaft for actu-

ating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said counter-shaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches traversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, and a tape tensioning means intermediate said stop means and said gripping rolls.

26. In combination with a sewing machine having a main rotating shaft for actuating the sewing mechanism thereof, means for guiding fastener tape to said sewing mechanism, a longitudinal counter shaft, a lower gripping roll on said counter shaft, a second shaft in intergeared relation to said counter shaft having an upper gripping roll to cooperate with said lower gripping roll, said gripping rolls serving to advance said tape relatively to said sewing mechanism, a ratchet and pawl drive connected with said counter-shaft adapted to produce intermittent rotative impulses of said gripping rolls of normal degree whereby said tape is advanced to produce normal stitches intermediate the fasteners thereof, a second ratchet and pawl drive connected with said counter-shaft in cooperative relation to said first ratchet and pawl drive, said second ratchet and pawl drive being adapted to periodically produce intermittent rotative impulses of said gripping rolls of greater degree whereby said tape is advanced to produce jump stitches transversing the fasteners thereof, means operated by said main shaft for actuating said respective ratchet and pawl drives in synchronized relation to said sewing mechanism, a positive stop means cooperative with the fasteners on the tape for governing the movement of the tape to the sewing mechanism, means for actuating said stop in synchronized relation to the tape advancing operations of said gripping rolls, a tape tensioning means intermediate said stop-means and said gripping rolls, and means for periodically releasing said gripping rolls from advancing relation to the tape.

27. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, and a signal means to indicate abnormal tendencies in the advance of said tape to the sewing mechanism, comprising a plural signal actuating means, one part of which is governed by the movement of the tape in said guiding means and the other part of which is governed by the tape advancing means.

28. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, and an electrical signal means to indicate abnormal tendencies in the advance of said tape to said sewing mechanism, said latter means comprising an electric circuit, a signal device in said circuit, a pair of circuit closing devices in said circuit, means operated by engagement with fasteners of the tape as they advance toward the sewing mechanism for actuating one circuit closing device, and means operated by said tape advancing means for actuating the other circuit closing device, said respective actuating means being normally synchronized for alternate operation whereby the circuit is maintained interrupted during normal conditions.

29. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, means for advancing the tape relatively to said sewing mechanism, means for intermittently releasing said tape advancing means from engagement with the tape, and a positive stop means cooperative with the fasteners on the tape for governing the movement of the latter to said sewing mechanism.

30. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, and means for periodically releasing said gripping rolls from advancing relation to the tape, and a positive stop means cooperative with the fasteners on the tape for governing the movement of the latter to said sewing mechanism.

31. In combination with a sewing machine, means for guiding fastener tape to the sewing mechanism of the machine, a pair of

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rotary gripping rolls for advancing the tape relatively to said sewing mechanism, means for rotating said gripping rolls, and means for periodically releasing said gripping rolls from advancing relation to the tape, a positive stop means cooperative with the fasteners on the tape for governing the movement of the latter to said sewing mechanism, and a tape tensioning means intermediate said stop means and said gripping rolls.

In testimony that I claim the invention set forth above I have hereunto set my hand this 6th day of January, 1925.

LEO ROSENMAN.