April 21, 1931. L. ROSEMAN 1,801,570

FASTENER TAPE FEEDING AND CONTROL MEANS FOR SEWING MACHINES

Filed Jan. 24, 1928 5 Sheets-Sheet 1

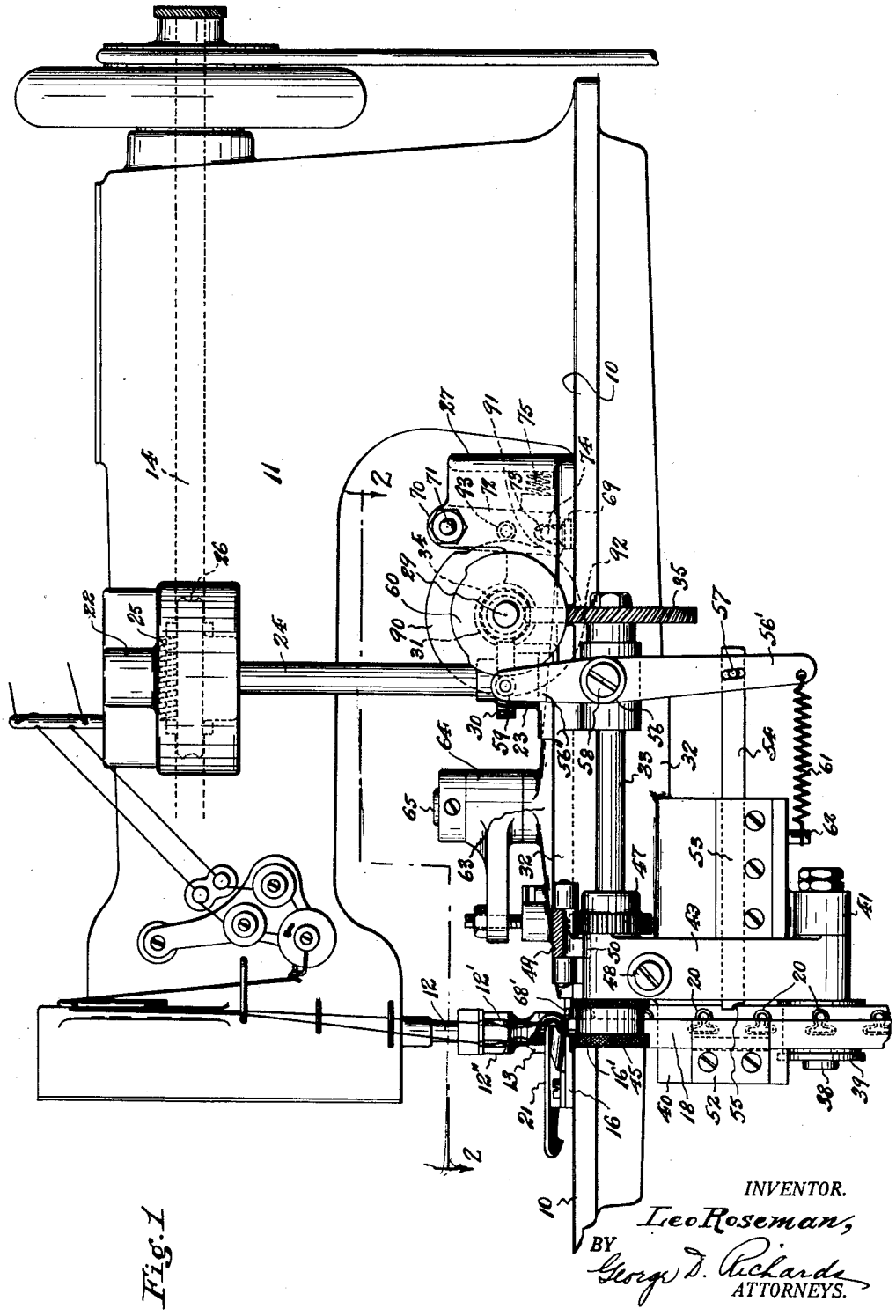


Fig. 1

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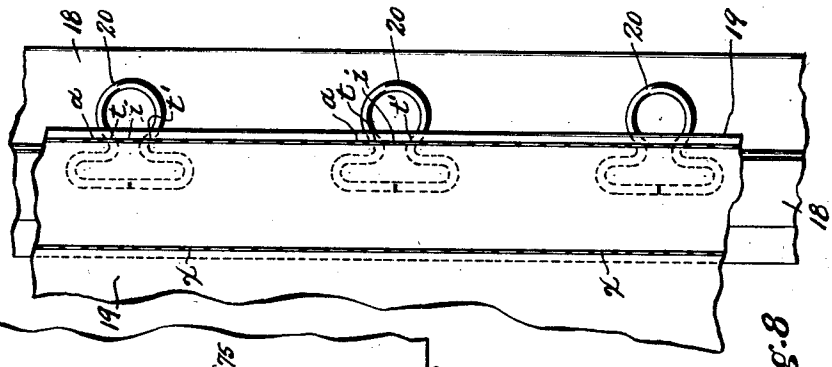


Fig. 8

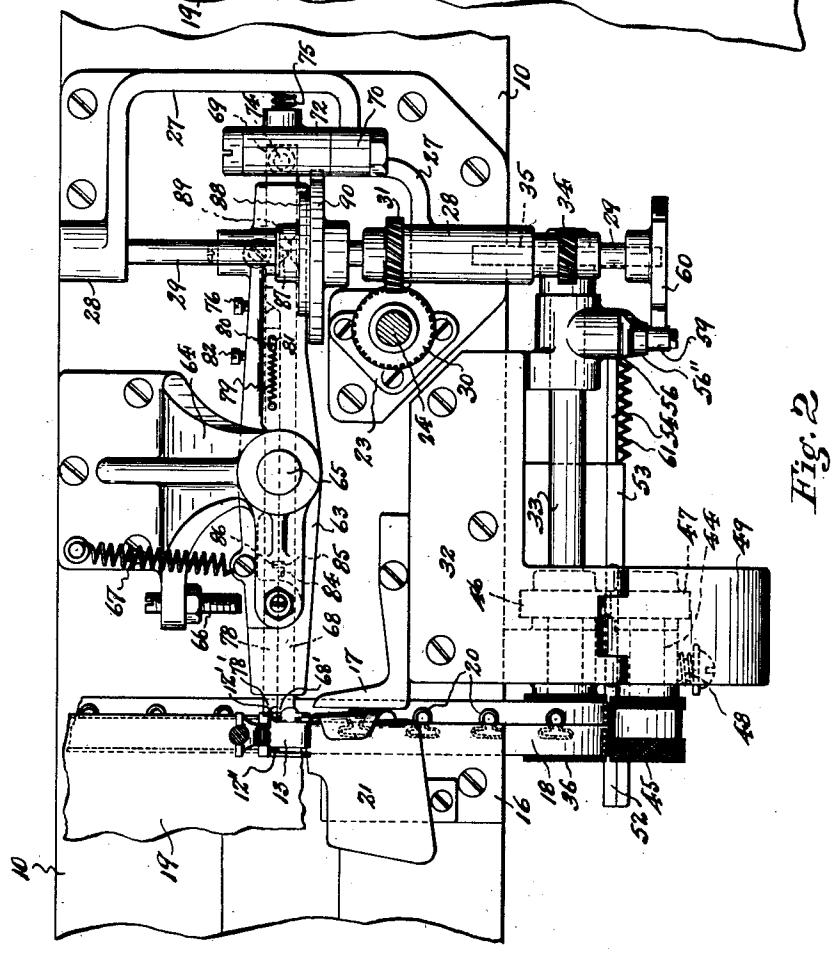


Fig. 2

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FASTENER TAPE FEEDING AND CONTROL MEANS FOR SEWING MACHINES

Filed Jan. 24, 1928 5 Sheets-Sheet 3

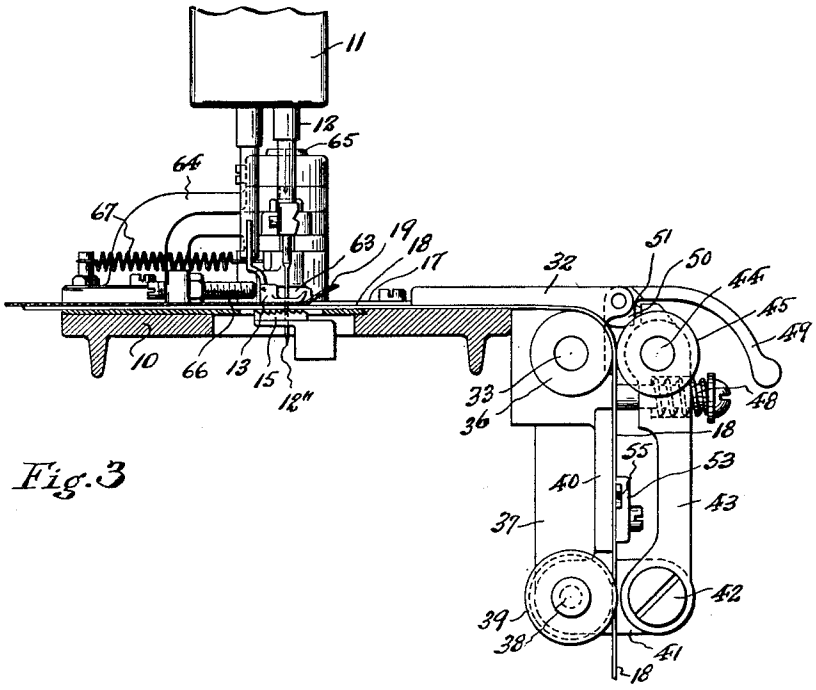


Fig. 3

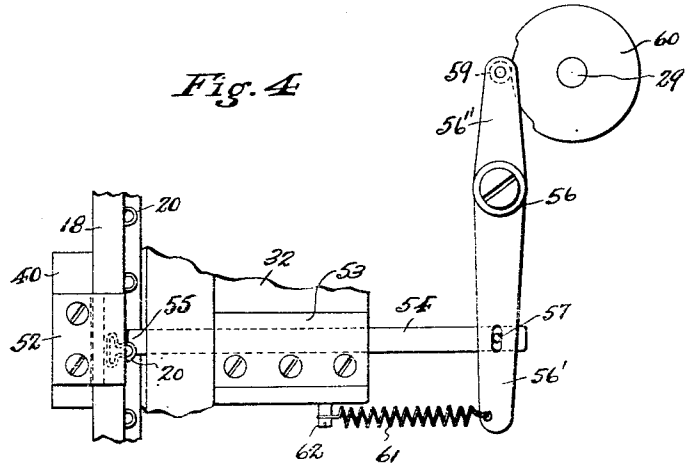


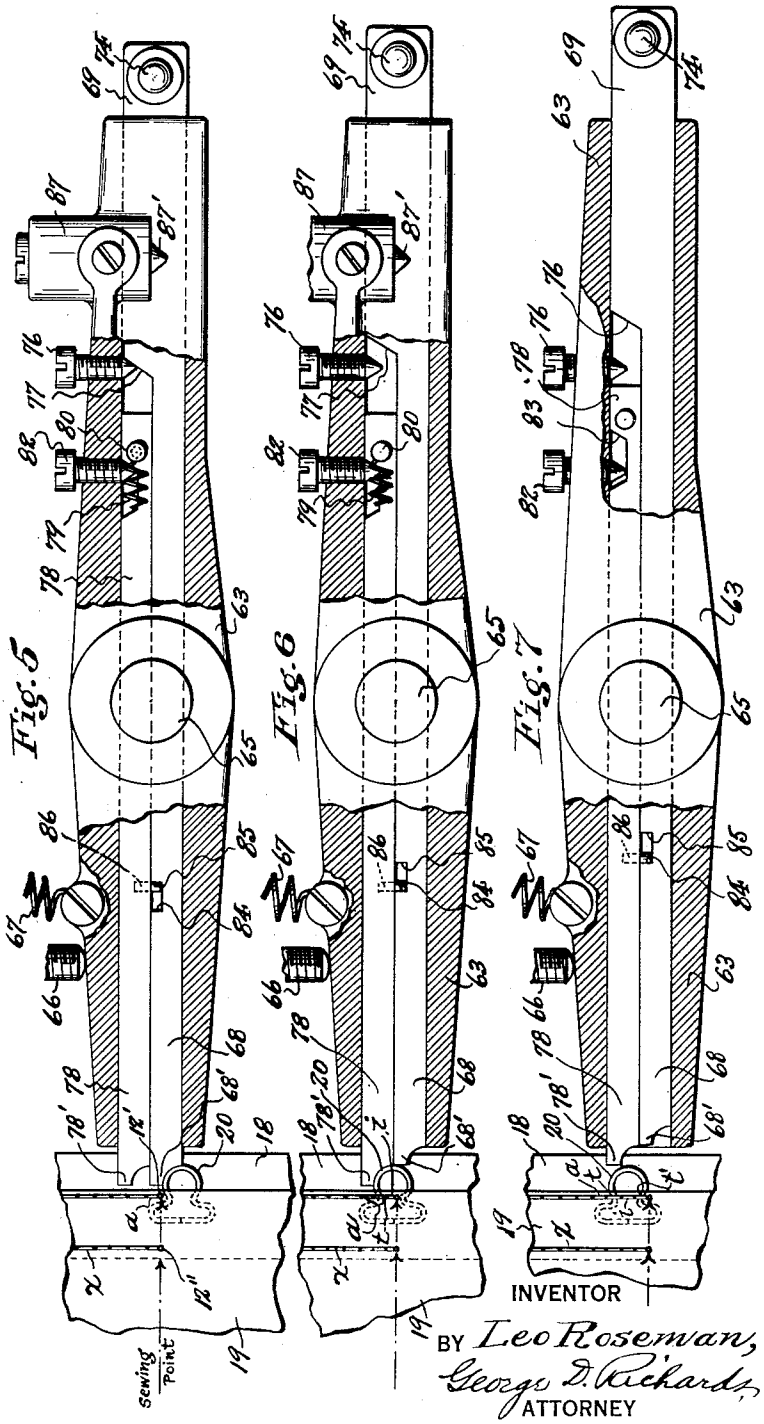
Fig. 4

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FASTENER TAPE FEEDING AND CONTROL MEANS FOR SEWING MACHINES

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FASTENER TAPE FEEDING AND CONTROL MEANS FOR SEWING MACHINES

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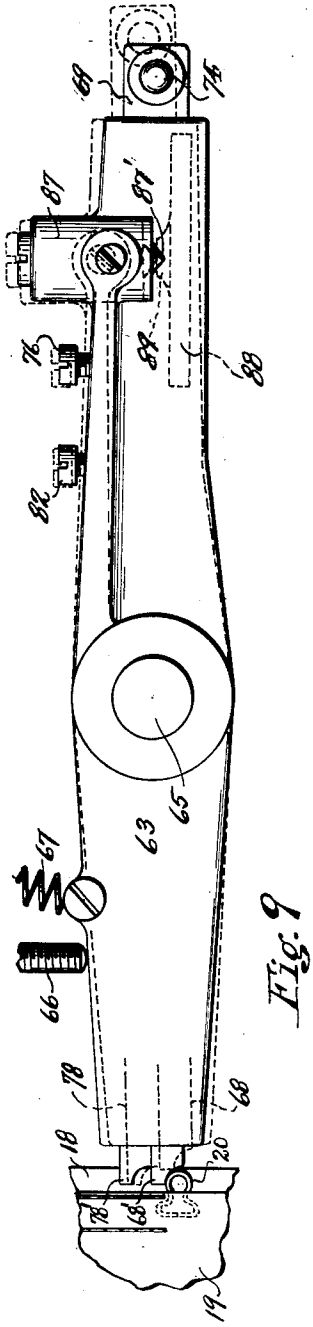


Fig. 9

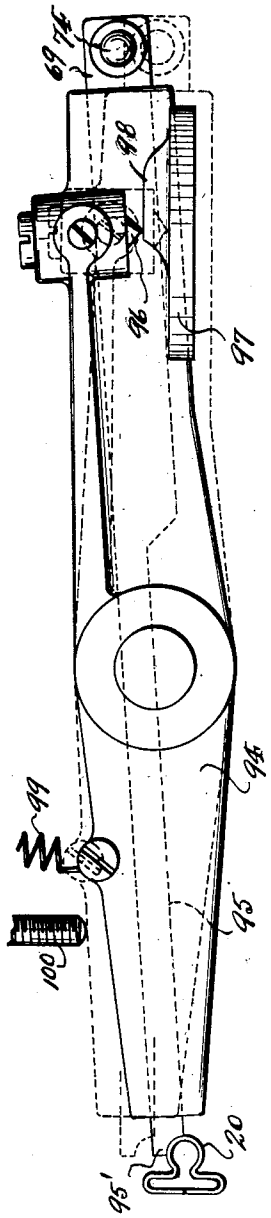


Fig. 10

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Patented Apr. 21, 1931 1,801,570

UNITED STATES PATENT OFFICE

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FASTENER-TAPE FEEDING AND CONTROL MEANS FOR SEWING MACHINES

Application filed January 24, 1928. Serial No. 249,028.

I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates in general to an attachment for sewing machines for sewing work having thereon needle impenetrable objects whereby a continuous row of stitches may be formed in the work with certain of the stitches traversing said objects and the needle is protected against coming into contact with such impenetrable objects in such a manner as to become broken. More particularly the invention is directed toward an attachment for sewing machines utilized in sewing fastener tape which has wire fastener members thereon to eliminate or reduce the possibility of the needle striking the fastener elements during the formation of certain of the stitches which traverse the fastener elements when the tape is being sewed to the edge of a garment or being stitched to reenforce the tape or for securing of the fastener elements thereto.

One object of the present invention is to provide in combination with the work-feed mechanism and the sewing mechanism including a reciprocating needle of a sewing machine when the machine is used for sewing work having impenetrable objects thereon to be traversed by stitches, an attachment embodying novel and improved features of construction to prevent contact of the needle of the sewing mechanism with said objects during the sewing operation, said attachment comprising a stop device which shall be moved into and out of the path of said objects and engaged by each thereof as the object approaches the path of the needle on its work-penetrating movement, said stop device being actuated into the path of each of said objects to stop and hold the object adjacent to but out of the path of said needle during penetration of the work by the needle preparatory to forming the stitch to traverse said object. In other words, the invention provides attachment of the character described for positively holding the impenetrable object or fastener element closely adjacent to but out of the path of the needle during the work-penetrating movement of the needle until the needle has penetrated the work for the beginning of the stitch to traverse the object, whereby it is practically impossible for the object to become located in the path of the descending needle.

Another object is to provide an attachment of the character described for sewing machines wherein the stop device is actuated out of the path of the impenetrable object during the formation of the stitch traversing the object so that the work-feed mechanism of the sewing machine may move the work and the object beneath the needle during the formation of the traversing stitch.

A further object is to provide such an attachment which can be utilized in connection with the usual work-feed mechanism and presser foot of a sewing machine and which will ensure the movement of the object or fastener out of the path of the descending needle during the formation of the traversing stitch, so as to avoid the possibility of the needle striking the object or fastener element upon the descent of the needle at the end of the traversing stitch.

Another object is to provide in combination with such a stop device and work-feed mechanism, auxiliary work-feed means, and means for governing movement of the work against over-feeding by said work-feeding mechanisms and said work-feeding means to provide preliminarily at least approximately the required spacing of the fasteners on the tape and proper presentation of the fasteners to said stop device so that the stop device may exactly and finally locate the fasteners in proper relation to the path of the needle.

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 present invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front side elevation of a sew-

ing machine equipped with the novel improved fastener tape feeding and control means made according to and embodying the principles of the present invention; Figure 2 is a fragmentary horizontal section, taken on line 2—2 in Figure 1; Figure 3 is an end elevation in part section; Figure 4 is a fragmentary front side elevation showing the operative position of the secondary stop or feed control mechanism; Figures 5, 6 and 7 are respectively fragmentary plan views on an enlarged scale showing various stages of operations performed by the primary stop and control means; and Figure 8 is a plan view on a large scale of the tape as sewn to garment edge.

Figure 9 is a detail plan view showing the automatic adjustment of primary control devices when sewing tape having fasteners smaller than a given size.

Figure 10 is a detail plan view showing a modified form of primary control means.

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 plate of the sewing machine, upon which is mounted the arm 11, at the free end of which is arranged the 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. While I do not necessarily limit myself in such respect, I nevertheless prefer to employ a machine having the oscillating or rocking type of needle bar, the needle or needles of which enter the feed dog 15 and swing forward synchronously with the forward work feeding movement of the latter. I may also embody my present invention in either a single needle machine or a two-needle machine, and in the accompanying drawings I have shown the latter type in which the needle bar 12 is provided with a needle 12′ and a second needle 12″, the same being arranged abreast of each other in suitably spaced apart relation. The needles cooperate with any well known form of shuttle or sewing hook mechanism (not shown) located in the usual manner beneath the bed 10 of the machine.

Secured upon the bed plate 10, and aligned to the path of movement of fastener tape over the same toward the stitching mechanism of the machine, is a guide-plate 16, the same being undercut as at 16′ to overhang one side of the fastener tape and to form a guideway through and within which the tape passes toward the stitching point; and opposed to said guide-plate 16 is a second guide member 17 to overhang the opposite margin of the fastener tape.

To illustrate the operation of the machine and the novel tape feeding and control means according to the principles of this invention, I have shown eye tape 18 passing through the machine and being stitched to a garment 19. Said eye tape 18 is provided, at suitable longitudinally spaced intervals, with metallic eyes, the loops 20 of which are exteriorly projected from the body of said tape. In order to more clearly explain the functioning of the mechanism, I have shown and shall hereafter describe the operations 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 twelve stitches to the inch. In so illustrating and describing the novel features and functions of the machine according to this invention, I do not intend to impose any limitations as to the spacing of the fasteners of the tape, whether they be hooks or eyes, 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 fasteners of the tape, or with different numbers of stitches per inch, or different kinds of stitches across and intermediate the fasteners of the tape.

In practice the eye tape is first passed through a delivery feed and control mechanism whereby the same is drawn from a roll thereof (not shown) and then passed through the guide means 16—17; and the garment 19 to which the tape is to be sewn is registered with the latter by applying the garment thereto at a point in advance of the stitching point so that both tape and garment pass between the presser foot 13 and feed-dog 15 by which the stitch forming advance thereof relative to the sewing mechanism is produced. Ordinarily the edge of the garment 19 is turned or folded by passing the same through a hemmer plate 21 in advance of its movement with the tape to and between the presser foot and feed-dog.

Journaled in and between an upper bearing 22 fixed on the machine arm 11 and a lower bearing 23 fixed on the bed-plate 10 is a vertical shaft 24. This shaft 24 is driven from the main shaft 14 of the machine by means of an intermeshing worm 25 and worm gear 26 respectively fixed on said main shaft 14 and vertical shaft 24. Fixed on said bed-plate 10 is bearing frame 27 provided with transversely aligned bearing 28 in which is journaled a transverse driven shaft 29. Said transverse shaft 29 is driven from said vertical shaft 24 by means of intermeshing screw-gears 30 and 31 respectively fixed on said vertical and transverse shafts.

The delivery feed and control mechanism comprises a bearing bracket 32 which is fixed on the bed plate to overhang the front side thereof. Journaled in said bearing bracket is a lay shaft 33. This lay shaft 33 is driven from said transverse shaft 29 by means of

intermeshing screw-gears 34 and 35 respectively fixed on said transverse and lay shafts. Fixed on the outer end of said lay shaft 33, so as to be rotated thereby is a feed roller 36, constituting one of a pair of such rollers. At its forward end said bearing bracket 32 possesses a depending arm 37, and journaled on a stud 38 carried by said depending arm 37 is an idler guide-roller 39 vertically alined relative to said feed roller 36. Said bearing bracket 32 is further provided with a supporting plate 40 disposed in vertical plane intermediate said feed roller 36 and guide-roller 39 with its face substantially tangent to the tape bearing circumferential surfaces of said rollers. Projecting forwardly from the lower end of said bearing bracket arm 37 is a knuckle 41, and pivotally connected with said knuckle 41 by a fulcrum stud 42 is an upwardly extending bearing arm 43. Journaled in the upper end of said bearing arm 43 is a spindle 44, and fixed at the outer end of said spindle is a feed roller 45, constituting the second of said pair of such rollers, the same being adapted to oppose and cooperate with said feed roller 36. Said second feed roller 45 is driven in an opposite direction to the feed roller 36 by means of intermeshing spur gears 46 and 47 respectively fixed on said lay shaft 33 and spindle 44. The second feed roller 45 is preferably annularly grooved as shown to provide clearance space for the passage of the metallic eyes of the fastener tape, as the latter is moved through and between the pair of rollers 36—45. The tape engaging faces of the rollers 36—45 are preferably roughened, as by knurling, to better grip the tape when operatively engaging and feeding the same. It may here also be mentioned that the guide roller 39 is preferably annularly grooved as shown to correspond to the total width of the tape passed over the same, so as to hold the latter against lateral displacement therefrom. The bearing arm 43 is yieldably pressed inward to in turn press and maintain said feed-roller 45 into operative tape gripping relation to the feed-roller 36; and to this end suitable pressure spring means 48 is provided. In order to facilitate the separation of the feed rollers 36 and 45 to permit of operative insertion of the fastener tape therebetween there is pivotally connected with the bracket bearing 32 a lever arm 49 having at its pivoted end a cam 50 which, when swung outwardly by the upturning of said lever arm 49, engages a nosing 51, with which the upper free end of said bearing arm 43 is provided, to thereby exert an outwardly swinging pressure on said bearing arm 43 against the tension of said spring means 48, thus separating said feed roller 45 from the feed roller 36, all of which will be readily understood from an inspection of Fig. 3 of the drawings.

The means for governing or controlling the advance of the tape by the above described delivery feed mechanism, the operation and advantages of which will be hereinafter more fully set forth, comprises a timed secondary stop mechanism operative to engage the eyes of the tape to arrest movement of the latter whereby tendency to improperly timed movement toward the stitching mechanism is prevented and a uniform properly controlled movement of the tape and its fasteners to the stitching point of the sewing mechanism is initially assured, whereby the selected number of stitches between and across the fasteners is maintained. Connected with said supporting plate 40 is guide plate 52 adapted to overhang the rearward marginal portions of the tape 18; said guide plate being located between the feed roller 36 and guide roller 39. Mounted on the right hand end of said supporting plate 40 is a slideway member 53 in which is slidably disposed, for forward and back reciprocation therein, a stop bar 54 provided at its forward or free end with a stop finger or projection 55 adapted to conform to the sides of the eyes 20 of the fastener tape. The means for automatically controlling and timing the operation of the stop bar 54 whereby its stop finger or projection 55 may be projected into and withdrawn from the path of movement of the eyes of the tape as required, preferably consists in an oscillatable lever 56, to the lower arm 56′ of which the tail end of said stop bar 54 is coupled by the pin and slot connection 57. Said lever 56 is pivoted on a fulcrum stud 58 with which bearing bracket structure 32 is provided, and the upper arm 56″ of said lever possesses a roller projection 59. Fixed on said transverse shaft 29, so as to be rotated thereby, is a rotary cam wheel 60 adapted to engage said roller projection 59 to produce timed oscillations of said lever 56 and consequent timed reciprocations of said stop bar 54. A pull spring 61 interconnected between the lower arm 56′ of the lever 56 and an anchor stud 62 carried by said bearing bracket structure 32 maintains said lever 56 in operative relation to the cam wheel 60.

Cooperating with each eye 20 of the fastener tape 18 as it passes the sewing mechanism of the machine, is a primary control mechanism adapted to positively hold and dispose said eye so as to assure such position of the same relative to the reciprocating needle, as the work is advanced by the feed of the machine, that all risk of contact of the needle with the eye is avoided, and properly traversing stitches with respect to each individual eye are obtained. This primary control mechanism comprises a housing 63 pivotally mounted on the bed-plate 10 to extend toward the fastener bordered margin of the tape 18 and adjacent to the stitching joint of the sewing mechanism of the machine. Said housing 63 may for certain purposes, if

desired, be so pivoted relative to the bed-plate 10 as to be capable of controlled oscillation in horizontal plane. The means for thus pivoting said housing 63 comprises a bearing bracket 64 secured on said bed plate 10 to overhang the housing so as to receive the pivot stud 65 with which said housing is furnished. The forward end of said housing 63 is normally disposed and yieldably held in forwardly swung initial position against an adjustable positioning stop 66, which is supported by and in connection with said bearing bracket 64, by means of a pull spring 67 which is suitably connected by one end to the forward end portion of the housing, and by its opposite end is anchored to said bracket bearing base or other suitable stationary point. Slidably related to and carried by said housing 63 is a main stop bar 68 having a tail-piece 69 projecting exteriorly from the rearward end of said housing. Adjacent to the rearward end of said housing 63 is a bearing support 70, forming a part of said bearing frame 27, in which is fixed a fulcrum stud 71. Pivoted on said stud 71 to depend therefrom is a lever arm 72 having a bifurcated lower end portion 73 which straddles and operatively engages a push-piece 74 with which the tail piece 69 of the main stop bar 68 is provided. A compression spring 75 is arranged intermediate said lever arm 72 and a stationary part of said bearing frame 27, said spring normally thrusting against said lever arm 72 to swing the same forward and in turn slide forward said main stop-bar 68 to normal operative position as determined by a stop screw 76 mounted in said housing 63 to coact with a stop shoulder 77 with which said stop-bar is provided. Also slidably disposed in said housing 63 in side by side relation to said main stop bar 68 is an auxiliary stop-bar 78, the same being yieldably held in forwardly moved operative position by a pull spring 79 anchored on the top of said housing 63 and connected with a coupling pin 80 which is affixed to the rearward end portion of said auxiliary stop bar, and which projects exteriorly through a slot 81 above said housing 63. The normal position of said auxiliary stop bar is determined by a stop screw 82 mounted in said housing 63 to coact with a stop shoulder 83 with which said auxiliary stop bar is provided. Said main stop bar 68 and auxiliary stop bar 78 are coupled together for relative movement by means of a notch in the former adapted to provide longitudinally spaced apart forward and rearward shoulders 84 and 85, and said stop bar 78 is provided with a coupling pin 86 which enters between said shoulders 84 and 85 so as to be operatively engaged thereby at proper times. The means for imparting the desired rearward swinging movement to said housing 63 and to the stop bars carried thereby comprises an upstanding support 87 fixed on said housing 63 adjacent to its rearward end, and in which is adjustably mounted a laterally projecting nosing 87′. Fixed on said transverse shaft 29, so as to be rotated thereby, is a cam wheel 88 provided on a side face thereof, which is opposed to said nosing 87, with a cam portion 89 adapted at properly timed intervals to engage said nosing 87 to swing forward the rear end of said housing 63 to thereby turn the same on its pivot stud to produce the desired rearward swing of its forward end. The means for retracting the stop-bars 68—78 at proper times comprises a cam-wheel 90, also fixed on and rotated by said transverse shaft 29. Said cam-wheel 90 is provided on its circumference with a first cam-stop 91 and a second cam step 92 which, as the cam-wheel rotates, move successively into engagement with a roller stud 93 mounted on the side of said lever arm 72 to impart successive rearward swinging impulses thereto which are transmitted through the push-piece 74 to the tail-piece 69 of the stop bar for purposes hereinafter made clear. The stop bar 68 is provided at its forward end with a stop finger 68′ suitably shaped to fit the sides of the eyes 20 of the tape; and in like manner, the stop bar 78 is also provided with a similarly shaped stop finger 78′.

In the operation of the machine, the eye tape 18 is led from a supply reel (not shown) over the guide roller 39, and then upwardly over the supporting plate 40 and through the guide plate 52 to pass between the delivery feed rollers 36 and 45 (the latter having first been separated laterally by raising the lever 50 to permit of the insertion of the tape therebetween). When the lever 59 is released, the pressure of the spring means 48 presses the delivery feed rollers 36 and 45 together so as to grip the tape. The leading end of the tape extends forwardly over and from the roller 36 through and between the guiding device 16 and 17, and is inserted between the presser foot 13 and feed dog 15 of the sewing mechanism. The garment, to which the tape is to be sewn, is passed through the hammer 21 so as to overlay the tape between the presser foot and feed dog. The work having thus been positioned ready for the sewing operation, the machine is started; as the machine operates power is transmitted from its main shaft 14 through the intermediate transmission mechanism already above described to the gripping feed rollers 36 and 45, the rotation of which feeds forward the tape toward the sewing mechanism of the machine at a predetermined rate, while at the same time drawing the tape from the supply reel. It will thus be understood that, incidentally, the gripping feed rollers 36—45 relieve the presser foot and feed dog mechanism of the sewing machine from the burden of drawing off the tape from the supply reel, so that the presser foot

and feed dog mechanism may advance the work merely for stitch forming purposes.

The primary control mechanism which is adapted to positively adjust, hold and dispose each eye of the tape, as it passes the sewing mechanism, in such manner as to assure the traversing of the sewing needles across the metal eyes without danger of contact with the latter (with consequent risk of either breaking the needle or injuring the eye), operates as follows:

The housing 63 is normally held stationary against the stop 66, and the stop bars 68 and 78 are projected forwardly so as to lie in the path of the eyes 20 of the tape closely adjacent to the sewing point of the machine. As an eye approaches the sewing point it engages the stop finger 68′ of the projected bar 68 at a moment prior to the descent of the needle 12′ in front of the forward side of the eye. The engagement of the eye by the stop finger 68′ both adjusts the eye relative to the path of reciprocation of the sewing needle 12′ and prevents the eye from advancing to such an extent as would be likely to bring the forward side of the same into the path of the sewing needle, thus positively assuring that the descending needle in completing the approach stitch *a* (see Fig. 5), enters through the garment and tape at a predetermined point closely adjacent to the forward outer side of the eye, and so as to assure that the succeeding formed stitch *t* will properly traverse such part of the eye without any risk whatever of striking the metal of the latter. By the time the needle 12′ has descended on the outside of the eye in completing the eye-approaching stitch *a*, and before it is again withdrawn upwardly preparatory to a succeeding downward stroke in making the succeeding first eye traversing stitch *t*, the first step of the cam-wheel 90 is timed to engage the roller 93 of the lever arm 72, whereby an initial rearward swinging movement of the latter is produced. This initial movement of the lever arm 72 is transmitted through the push-piece 74 to the tail piece 69 of the stop bar 68, whereby the latter is retracted to withdraw its stop finger 68′ from the eye so that said eye may proceed forward under the advancing movement of the feed of the sewing mechanism. The initial retraction of the stop bar 68 brings the shoulder 84 thereof into contact with the pin 66 of the stop bar 78, without, however, moving the latter. As a consequence of this operation the stop finger 78′ remains in the path of the advanced eye and is engaged thereby so that as the intermediate stitch *i* is completed between the sides of the eye, the latter is again positively held in a position to assure that, in descending to complete said intermediate stitch *i*, the needle 12′ is prevented from engaging the rearward side of the eye and so positioned relative to said eye as to assure the traversing thereof by the next succeeding formed traversing stitch *t′* (see Fig. 6). By the time the needle 12′ is raised, after completion of the intermediate stitch *i* and preparatory to making the rearward traversing stitch *t′*, the second step 92 of the cam 90 is brought into engagement with the roller 93 of the lever arm 72 to again produce a second retracting movement of the push-bar 68, which, by reason of the fact that its shoulder 84 is at the time engaged with the pin 66 of the stop bar 78, also, therefore, transmits the retractive movement to said stop bar 78 so that the same is withdrawn from the path of the eye as the rearward traversing stitch *t′* is made (see Fig. 7).

From the foregoing it will be observed that should an eye approach the path of the needle in such position on the tape as to stop in the path of movement of the needle during a needle penetrating moment in the operation of the sewing machine, the eye will be positively stopped and held back by the fingers 68′ and 78′ during the work-feed movement as the eye approaches the path of the needle, whereby the eye is positively prevented from moving to a point directly beneath the needle. The eye is so held until the needle has penetrated the work, but is released upon the next said work-feeding movement during which the traversing stitch *t′* is made. The work-feed mechanism then positively moves the eye forwardly beyond the path of the needle so that the needle cannot strike the eye on its next descent at the end of the traversing stitch. The machine may, therefore, be operated at a high speed with full assurance that proper stitching will be produced, and that the needle will not be broken or damaged by contact with any of the eyes.

The machine may be operated as a single needle machine, or (as shown in the drawings) the same may be operated as a two needle machine, whereby a second line of stitching *x* may be produced through the garment and the inner edge of the tape body 18.

As shown in Figs. 5, 6 and 7 the distance between the stop projections of fingers 68′ and 78′ of the respective stop-bars 68 and 78 is normally predetermined to accommodate an eye of a given size, that is the spaced relation of said stop fingers 68′ and 78′ is determined according to the width of an eye of given size so that when such eye engages the second stop finger 78′ its rear side will be properly disposed relative to the descending path of the sewing needle 12′. If desired, selectively usable means may be provided whereby, in operation of the machine, the functioning of the stop-fingers may be accommodated to eyes of smaller or larger sizes than said given size. Such means has been illustrated in the accompanying drawings, and consists in a means for positioning the housing 63 to properly dispose the

second stop-finger for proper engagement (in one case) with a smaller eye after operation and withdrawal of the first stop-finger 68'. Such means comprises a cam wheel 88, which, when the machine is operating on maximum size eyes is withdrawn on the shaft 29 so as to be inoperative relative to the pivoted housing 63 (as shown in Fig. 2), but which, when a smaller eye is operated upon, is set forward and locked on said shaft 29 in active relation to the housing 63. In operation, after the stop finger 68' has functioned, and while the same is withdrawn to permit advance of the eye for the formation of a first traversing stitch *t*, the rotated cam-wheel 88 is timed to carry its cam portion 89 into engagement with the nosing 87' at the rear end of the housing 63, and by engagement therewith swings the housing against the tension of the spring 67 so that its forward end is swung rearwardly to shift the stop finger 78' to proper position to engage and hold the smaller eye preparatory to the formation of the second traversing stitch *t'* (see Fig. 9). It will be obvious that the amount of shifting movement imparted to the housing 63 and the stop finger 78' may be made to correspond exactly to the difference in width as between an eye of given size and a smaller sized eye, by adjusting the cam wheel toward the nosing 87' to produce the desired amount of throw, and that by the above described means the mechanism may be readily adapted to function in connection with more than one size of eye from an eye of predetermined maximum size to one of minimum size. Conversely, by properly timed manipulation or shifting of the housing prior to the engagement of an eye by the first stop finger 68', whereby said finger is slightly advanced, and then releasing said housing for return to normal position prior to the stopped engagement of the eye by the second stop finger 78', it will be obvious that the mechanism may be accommodated to sizes of eyes larger than said given size of eye, all of which will be obvious.

In the operation of the sewing mechanism, the stitch forming advance of the work is primarily effected by the presser foot and feed dog devices of the sewing mechanism to produce the desired number of stitches extending between and across the eye of the tape. If uncontrolled such work advance by the presser foot and feed dog devices for various reasons may not operate uniformly, with the result that the fastener tape may be inaccurately fed so that the eyes thereof might eventually get out of proper time relative to the primary control means and its stop fingers. In order to assure the uniform and yet controlled movement of the tape by the sewing mechanism feed devices and relative to the primary stop fingers I have provided the secondary feed control to cooperate with the sewing mechanism feed devices. In operation the sewing mechanism feed devices will feed away or advance all of the tape which the secondary feed control devices releases, but the secondary stop bar is reciprocated in timed relation so as to project its stop finger 55 in the path of each eye of the tape, so that if the sewing mechanism feed devices tend to over-feed the tape such over-feeding is checked by the engagement of the eyes with the stop finger 55 and the feed rollers 36—45 are prevented from feeding forward the tape. The feed rollers 36—45 are sized to feed the tape a little in excess of the stitch forming advance of the work by the sewing machine feed devices, which is calculated to produce twelve stitches between and across the eyes, or twelve stitches to the inch, and consequently the stop finger 55 by engaging each eye tends to hold back the tape once during the formation of each group of twelve stitches, thereby limiting the production of the twelve stitches to the distance between and over the eyes of the tape, e. g. one inch. This functioning not only assures a controlled tension on the advanced tape calculated to assist in the production of the desired number of stitches between and across the eyes by the feed devices of the sewing mechanism, but also tends to compensate for any slight inaccuracies which may exist with respect to the relative spacing apart of the eyes on the tape.

The secondary stop finger 55 and the auxiliary feed rollers 36—45 thereby serve to ensure preliminarily approximately the required spacing of the eyes on the tape and proper presentation of the eyes to the stop fingers 68', 78' and said fingers then exactly and finally locate the eyes in proper relation to the path of the needle.

In the foregoing description of the primary control mechanism, constituted by the stop bars 68 and 78, the construction and functioning thereof has been fully disclosed. As an alternative to the double stop bar construction and arrangement therein involved, I wish now to call attention to a modified arrangement whereby the primary control and disposition of the eyes of the tape at the sewing point may be accomplished by a single stop bar but nevertheless according to the general principles involved in this invention. This modified arrangement is illustrated in Fig. 10 of the drawings, and comprises, the pivoted housing 94 in which is slidably mounted a stop bar 95 having a stop projection 95', said stop bar being subject to timed retraction by a cam actuated lever arm mechanism corresponding to that already above described. Said housing 94 is provided with a nosing 96 to cooperate with a cam wheel 97 having a lateral cam projection 98. In operation, the stop bar 95 is normally projected to dispose its stop finger 95'

in the path of an eye 20 approaching the sewing point, and prior to properly timed engagement of said eye 20 therewith, the forward end of the housing is swung rearwardly against the tension of a pull spring 99 by the operation of the cam wheel 97 and its cam projection 98 to dispose said stop finger 95′ in a position to engage and hold the eye 20 relative to the path of descent of a sewing needle preparatory to producing a first traversing stitch *t*. As the traversing stitch *t* is formed, the cam projection 98 releases the housing 94 so that it may swing under the tension of the pull spring 99 against a stationary stop 100, thereby advancing the stop finger 95′ to a second position adapted to arrest and hold the eye preparatory to the formation of the second traversing stitch *t′*, and thereafter the stop bar 95 is retracted to remove the stop finger 95′ from the path of the eye to permit the advance of the work for the formation of said second traversing stitch *t′*.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of 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 a sewing machine having a sewing mechanism including work feeding means and a cooperating reciprocating needle, of means in combination therewith to control the movement of tape having metallic fasteners thereon relative to said sewing mechanism, said means comprising a stop-bar mounted for movement toward and from the needle, said stop bar having a portion normally lying in the path of movement of the fasteners and with which each fastener engages as it reaches the sewing needle to positively position the same relative to stitch forming descents of said sewing needle, timed means to withdraw said stop-bar from the engaged fastener to permit the latter to advance during the formation of each stitch traversing the same, an auxiliary tape feeding means in advance of the sewing mechanism of the machine, and means to govern the movement of the tape against over-feeding as advanced by said work-feeding and auxiliary tape feeding means.

2. In a sewing machine having a sewing mechanism including work feeding means and a cooperating reciprocating needle, means to control the movement of tape having metallic eyes thereon to predetermine the position of the latter relative to the sewing needle, said means comprising a pair of stop-bars arranged one behind the other and each having a stop-finger for projection into the path of movement of said eyes past the sewing point, means for movably mounting said stop bars, and timed means for successively withdrawing said stop-bars and their stop fingers to release said eyes during the formation of stitches traversing the sides thereof.

3. In a sewing machine having a sewing mechanism including work feeding means and a cooperating reciprocating needle, means to control the movement of tape having metallic eyes thereon to predetermine the position of the latter relative to the sewing needle, said means comprising a pair of stop-bars arranged one behind the other and each having a stop finger for projection into the path of movement of said eyes past the sewing point, means for movably mounting said stop bars, timed means for successively withdrawing said stop-bars and their stop fingers to release said eyes during the formation of stitches traversing the sides thereof, auxiliary tape feeding rolls in advance of the work feeding means of the sewing machine, and an auxiliary stop means for timed engagement with the eyes of the tape to govern the tape against over-feeding.

4. In a sewing machine having a sewing mechanism including work feeding means and a cooperating reciprocating needle, means to control the movement of tape having metallic eyes thereon to predetermine the position of the latter relative to the sewing needle, said means comprising a pair of stop bars arranged one behind the other and each having a stop finger for projection into the path of movement of said eyes past the sewing point, said stop fingers being normally spaced apart for a distance corresponding to the width of an eye of given size, a pivoted housing in which said stop bars are slidably mounted, means for holding said housing and the stop bars carried thereby in normal operative position, timed means for successively withdrawing said stop bars and their stop fingers to release said eyes during the formation of stitches traversing the sides thereof, and means for moving said housing from normal position to shift the operative position of one stop bar and its stop finger to accommodate the same to eyes of sizes different than said given size.

5. In a sewing machine having a sewing mechanism including work feeding means and a cooperating reciprocating needle, means to control the movement of tape having metallic eyes thereon to predetermine the position of the latter relative to the sewing needle, said means comprising a pair of stop bars arranged one behind the other and each having a stop finger for projection into the path of movement of said eyes past the sew-

ing point, said stop fingers being normally spaced apart for a distance corresponding to the width of an eye of given size, a pivoted housing in which said stop bars are slidably mounted, means for holding said housing and the stop bars carried thereby in normal operative position, timed means for successively withdrawing said stop bars and their stop fingers to release said eyes during the formation of stitches traversing the sides thereof, and means for moving said housing from normal position to shift the operative position of one stop bar and its stop finger to accommodate the same to eyes of sizes different than said given size, auxiliary tape feeding rolls in advance of the work feeding means of the sewing machine, and auxiliary stop means in advance of said feeding rolls, said stop means having a finger for projection into the path of movement of the eyes, and timed means for actuating said auxiliary stop means to release the same from an engaged eye.

6. In a sewing machine, a work feeding means, a reciprocating needle, stop mechanism adjacent to the needle to engage metallic eyes of fastener tape fed through the machine, and means to produce timed step by step operation of said stop mechanism relative to reciprocable movements of said needle to positively hold an eye engaged thereby to dispose sides thereof to be traversed by stitches out of but forwardly adjacent to the path of needle descent preparatory to the formation of stitches traversing the sides of such eye.

7. In a sewing machine, a work feeding means, a reciprocating needle, stop mechanism adjacent to the needle to engage metallic eyes of fastener tape fed through the machine, and means to produce timed step by step operation of said stop mechanism relative to reciprocable movements of said needle to positively hold an eye engaged thereby out of but adjacent to the path of needle descent preparatory to the formation of stitches traversing the sides of such eye, and auxiliary means in advance of said work feeding means to prevent over-feeding of the fastener tape at the sewing point of the machine.

8. In combination with a sewing mechanism including work feeding means and a cooperating reciprocating needle, of movable stop means arranged to engage protruding objects on materials fed to said sewing mechanism, whereby said objects, when engaged by said stop means, are arrested to dispose each part thereof to be traversed by stitches at a point near to but in advance of the path of needle descent to be temporarily so held until the needle descends preparatory to a traversing stitch formation, and timed means to withdraw said stop means and thus release said objects for onward movement across the path of needle descent during the formation of each traversing stitch.

9. In combination with the work-feed mechanism and the sewing mechanism including a reciprocating needle of a sewing machine for sewing work having needle impenetrable objects thereon to be traversed by stitches, an attachment to prevent contact of the needle of the sewing mechanism with said objects, comprising a stop device movable into and out of the path of said objects and engaged by each thereof as the object approaches the path of the needle on its work-penetrating movement, and means for actuating said stop device into the path of each of said objects to stop and hold the object adjacent to but out of the path of said needle during penetration of the work by the needle preparatory to forming the stitch to traverse said object.

10. The combination set forth in claim 9 wherein said means for actuating the stop device also moves the stop device out of the path of said object during the formation of said traversing stitch.

11. The combination set forth in claim 9 wherein said means for actuating the stop device also moves the stop advice out of the path of said object upon the next forward feeding movement of said work-feed mechanism.

12. In combination with the work-feed mechanism and the sewing mechanism including a reciprocating needle of a sewing machine for sewing work having needle impenetrable objects thereon to be traversed by stitches, an attachment to prevent contact of the needle of the sewing mechanism with said objects, comprising a stop device movable into and out of the path of said objects and engaged by each thereof as the object approaches the path of the needle on its work-penetrating movement, and means for actuating said stop device in timed relation to the work-penetrating movement of said needle to stop said object adjacent to but out of the path of the needle preparatory to the formation of the stitches traversing said object and to release said object after the needle has penetrated the work and during the formation of said traversing stitches.

13. In combination with the work-feed mechanism and the sewing mechanism including a reciprocating needle of a sewing machine for sewing work having needle impenetrable objects thereon to be traversed by stitches, an attachment to prevent contact of the needle of the sewing mechanism with said objects, comprising a stop device movable into and out of the path of said objects and engaged by each thereof as the object approaches the path of the needle on its work-penetrating movement, and means for actuating said stop device in timed relation to the work-feed mechanism to stop and hold said

objects adjacent to but out of the path of the needle until the needle has penetrated the work preparatory to the formation of the stitches traversing said object and to release said object upon the next forward work-feeding movement of said work-feed mechanism.

14. The combination set forth in claim 9 with the addition of auxiliary work-feeding means, and a timed secondary stop means movable into and out of the path of each of said objects and engaged thereby in advance of the needle to ensure preliminarily approximately the required spacing of said objects on the work and proper presentation of said objects to said stop device.

15. The combination set forth in claim 12 with the addition of auxiliary work-feeding means and a timed secondary stop means movable into and out of the path of each of said objects and engaged thereby in advance of the needle to ensure preliminarily approximately the required spacing of said objects on the work and proper presentation of said objects to said stop device.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 21st day of January, 1928.

LEO ROSEMAN.