July 26, 1955 L. M. RABINOWITZ 2,713,837

APPARATUS FOR ASSEMBLING FASTENER ELEMENTS

Filed Jan. 3, 1952 2 Sheets-Sheet 1

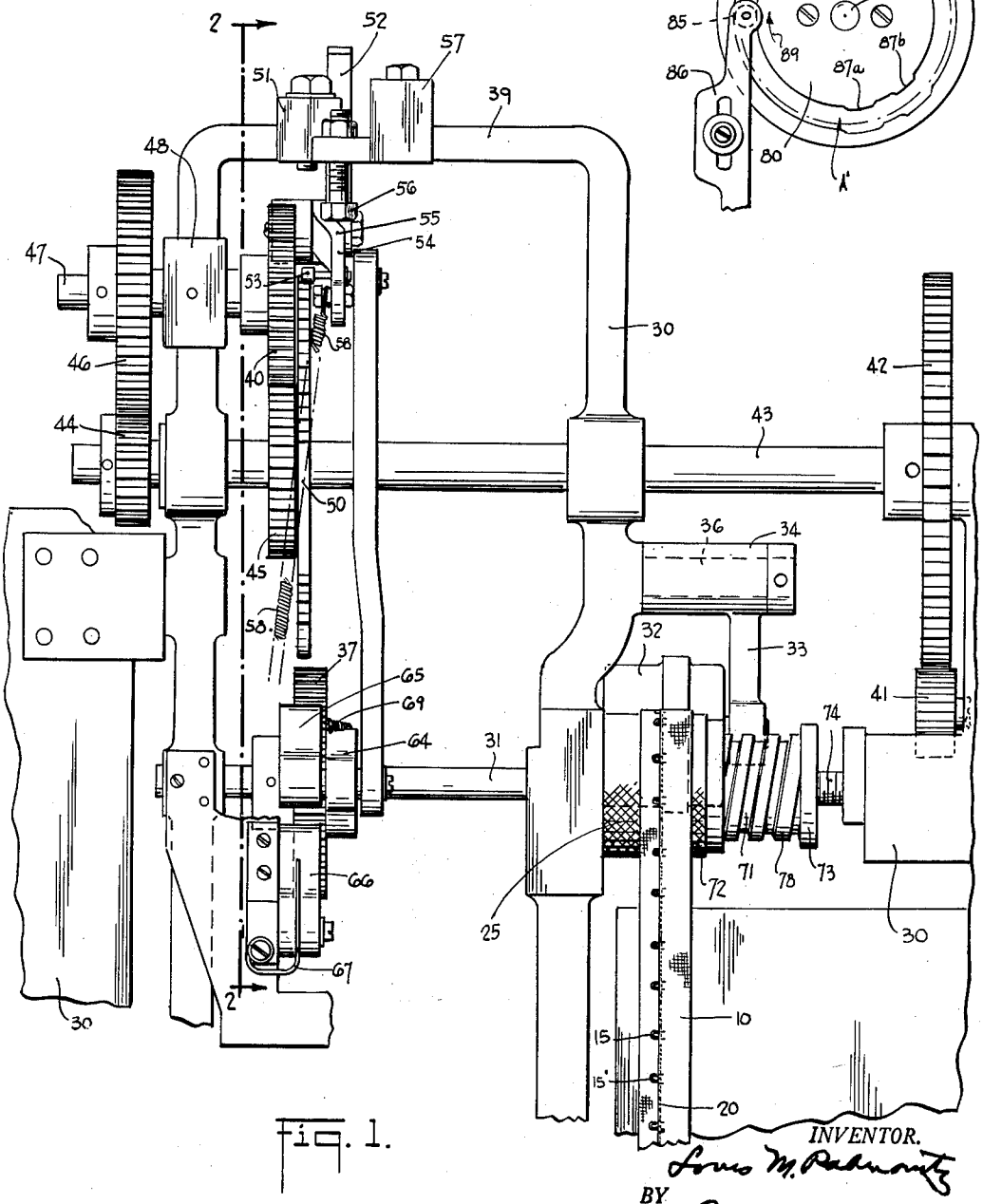


Fig. 1.

Fig. 3.

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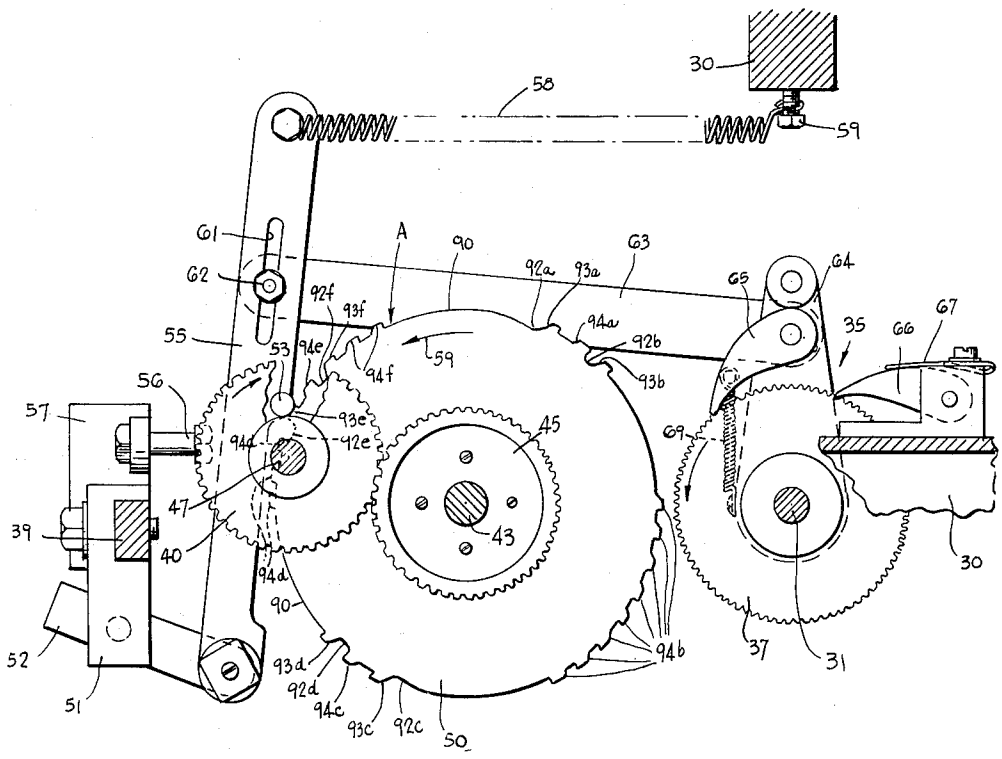


Fig. 2.

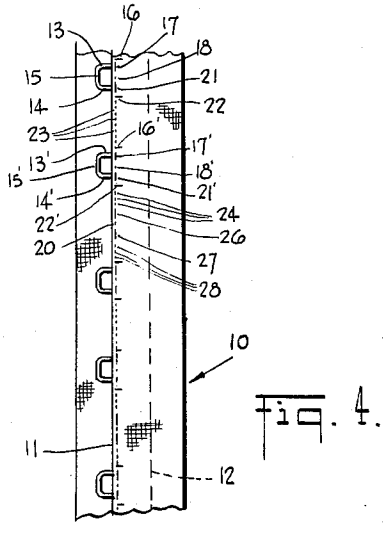


Fig. 4.

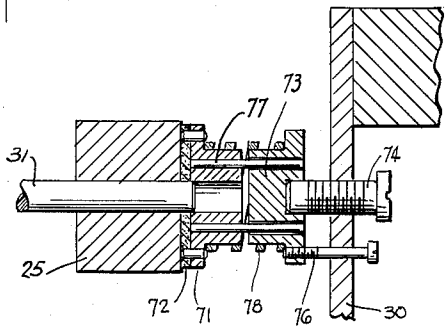


Fig. 5.

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APPARATUS FOR ASSEMBLING FASTENER ELEMENTS

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Application January 3, 1952, Serial No. 264,787

7 Claims. (Cl. 112—105)

This invention relates to a method of and apparatus for assembling fastener elements, such as eyelets, in longitudinally spaced groups along an elongated fabric strip. More particularly, the invention method and apparatus are directed to providing a novel stitching arrangement for the fasteners, and which is cyclically repeated along the strip.

These elongated strips containing fastener elements are widely used in the clothing art, particularly in the manufacture of lingerie items such as brassieres. As presently manufactured, the eyelets are arranged in groups of two, or sometimes three, along the strip. A space equal to twice the distance between the eyelets of a pair is left between each pair. An operator can then sever the strip midway between each pair to provide shorter strips, each of which is secured to the free end of a brassiere for cooperation with hooks on a similar strip secured to the other free end.

In the usual method of assembling the eyelets to the strip, the latter is fed longitudinally relative to a sewing head which sews a uniform line of stitches along the strip. At predetermined spaced and uniform intervals, an eyelet is stitched to the strip, the motion of the strip being halted, stepped, and again halted during attachment of the two legs of the eyelet to the strip. To provide the larger spacing between the sets or pairs of eyelets, no eyelet is attached to the strip at every third location (when the eyelets are arranged in pairs). By severing the strip at these blank locations, shorter strips, each containing a uniformly spaced set of eyelets, are provided.

However, this arrangement has certain disadvantages. In the first place, the location of the cut is not definitely marked, so that the cutter must visually estimate the midpoint between eyelet sets. This frequently results in the short, cut strips being unequal in length, or with the eyelet set not centered therealong. Consequently, there is a possible mismating of the eyelets with their cooperating hooks when the strips are assembled to a garment.

More importantly, the amount of material remaining on each strip on each side of the eyelet set is far more than is needed either for structural support of the attached eyelets or for adequate attachment of the strip to a garment.

The present invention overcomes these disadvantages in a novel manner by providing a predetermined sequence involving stitches of differing lengths and relative orientations. Intermediate the sets of eyelets, the seam is composed of a series of stitches characterized by a group of stitches at the cutting point including a pair of stitches of one character separated by a single stitch of a different character, thus providing a well-defined "marker" for the subsequent cut. The series of stitches between eyelet sets is preferably greater in length than the series of stitches securing the eyelets of each set to the strip, but substantially less than twice the spacing of the individual eyelets of each set.

The invention arrangement thus provides the distinct advantages of first, providing a definite "marker" for the subsequent cutting and which is distinct and outstanding from the immediately adjacent stitches, and, second, greatly reducing the length of fabric needed for a given number of eyelet sets. All this is effected solely by the stitching operation by varying the character of the stitches at preset intervals along the strip.

For an understanding of the invention principles, reference is made to the following detailed description of a typical embodiment thereof as illustrated in the accompanying drawing.

In the drawing:

Fig. 1 is a partial plan view of cyclical control apparatus for effecting the invention;

Fig. 2 is a vertical sectional view of the apparatus, on the line 2—2 of Fig. 1;

Fig. 3 is a partial elevation view of mechanism, synchronized with the apparatus of Fig. 1, for laterally shifting a needle or sewing head relative to the strip and at timed intervals;

Fig. 4 is a partial plan view of an eyelet strip formed by the invention method and apparatus and before cutting; and

Fig. 5 is an axial sectional view through a brake mechanism for a strip driving roll included in the apparatus of Figs. 1 and 2.

In accordance with the invention method, as applied to a strip **10**, such as shown in Fig. 4, in which the eyelets are arranged in spaced pairs inserted laterally between overlapping edges, the sequence of stitching is as follows. Beginning with the leading leg **13** of the first eyelet **15** inserted between the lapped strip edges, the strip or tape is held fixed against longitudinal movement while the sewing head is reciprocated twice laterally of the strip to make a dual lateral or "tack" stitch **16** in advance of leg **13** to fix the eyelet against movement in one direction longitudinally of the strip. The sewing head then remains laterally fixed while the strip is stepped longitudinally in a sequence involving a long step, a short step substantially one-half the long step, and a second long step. This forms a long stitch **17** binding leg **13** to the strip, a short stitch **18** between leg **13** and trailing leg **14** and a long stitch **21** binding leg **14** to the strip. Next, the tape remains stationary while the sewing head is reciprocated twice laterally of the strip to form another "dual" tack stitch **22** fixing the eyelet against movement in the opposite direction along strip **10**.

With the sewing head laterally fixed, the strip is now advanced, in a series of short steps, to the position of the leading leg **13'** of the next eyelet, and the next eyelet is positioned in the strip. For example, eight short steps may be given the strip in a typical practical embodiment. This forms a seam comprising a series of short stitches **23** uniting the lapped strip edges between the eyelets of one pair. The second eyelet is then stitched to the strip in the same sequence of lateral and longitudinal stitching as described in the immediately preceding paragraph, primed corresponding reference characters being used.

The novel "cut line" marking is now provided in the following manner and following the formation of the tack stitching securing the trailing leg **14'** of the second eyelet **15'** to the strip. The sewing head is maintained fixed in alignment with the seam. The strip is advanced three short steps to form three short stitches **24** (a different number of short stitches may be used if desired). Next, the strip is given a long step, followed by a short step and a second long step. This forms two long stitches **26, 27** separated by a short stitch **20**. The strip is then advanced three short steps to the position of the leading leg of the first eyelet of the next pair, forming three short stitches **28**, and the described cycle of steps is repeated.

The cutting line is thus clearly indicated by a short stitch **20** intermediate two pairs of eyelets. This short stitch is easily located, as it has a long stitch **26**, **27** on each side, and the long stitches are made prominent by the series of short stitches **24** and **28** separating each long stitch from the adjacent pair of eyelets.

Figs. 1, 2 and 3 illustrate a preferred cycle control and strip stepping apparatus, according to the invention, for drawing strip **10** past a sewing head (not shown). The eyelet feeding mechanism may be of a conventional type known to the art, and has not been illustrated as it forms no part of the present invention.

Strip **10** is drawn past the sewing head by a knurled roller **25** fixed to a shaft **31** rotatably mounted in a frame **30**. An idler roller **32** is rotatably mounted on a spring biased arm **33** having a hub **34** oscillatable on a stub shaft **36** secured to frame **30**. Roller **32** presses the tape **10** against stepping roller **25** for frictional drawing of strip **10**. Shaft **31** and drive roller **25** are stepped by a ratchet and pawl mechanism, generally indicated at **35**, and including a ratchet wheel **37** fixed to shaft **31** and driven by the cycle control and stepping mechanism.

The latter includes a main driving pinion **41**, rotated by a driving motor (not shown) and driving a gear **42** pinned to one end of a shaft **43** rotatable in frame **30**. The opposite end of shaft **43** has fixed thereon a pinion **44** driving a gear **46** secured on one end of a short shaft **47** rotatable in a bearing **48** on frame **30**. The opposite end of shaft **47** has fixed thereon a gear **40** driving a gear **45** pinned to a control cam **50** freely rotatable on shaft **43**.

A bracket **51** mounted on a transverse member **39** of frame **30** supports a stationary arm **52** on which is pivoted a substantially upright arm **55** carrying, intermediate its ends, a roller cam follower **53** engaging cam **50**. The upper end of arm **55** is offset laterally, as at **54**, roller **53** projecting laterally from this offset portion. In alignment with offset **54** is an adjustable stop **56** mounted on a bracket **57** on frame member **39** adjacent bracket **51**. A tension spring **58**, extending between the free end of arm **55** and a bolt **59** secured to a part of frame **30**, biases arm **55** to maintain roller **53** engaged with cam **50**, stop **56** acting as a limit for outward displacement of arm **55**.

A slot **61** formed intermediate the ends of arm **55** adjustably receives a bolt **62** securing one end of a connecting arm **63** to arm **55**. The opposite end of arm **63** is pivotally connected to a crank **64** freely oscillatable on shaft **31**. Crank **64** pivotally supports a pawl **65** biased by a tension spring **69** into engagement with ratchet **37**. Oscillation of crank **64** thus drives ratchet **37**, shaft **31**, and roller **25**. Counter-rotation of ratchet **37** is prevented by a pawl **66** pivotally mounted on frame **30** and biased by a spring **67** to engage ratchet **37**.

Back-lash of roller **25** is prevented by the friction drag or brake mechanism shown in Figs. 1 and 5. This mechanism includes a flanged hub **71** having a friction disc **72** secured thereto and engaging the face of roller **25**, the disc **72** having an aperture receiving the end of shaft **31** for centering. A second hub **73** is mounted on the end of a stud **74** secured in frame **30**, being held against rotation by studs **76** extending through the frame and threaded into the flange of hub **73**. Pins **77** secured in hub **71** and extending slidably through hub **73** restrain hub **71** from rotation. A coil spring **78** seated on both hubs biases hub **71** toward roller **25**, the frictional drag being adjustable through stud **74**.

The motion of roller **25** in drawing strip **10** longitudinally through the sewing head is controlled, as to timing and amount, by the cam **50** which operates pawl and ratchet mechanism **35** through movement of roller **53** and thus of arm **55**. For this purpose, cam **50** is provided with a circumferential series of camming surfaces, each either projecting or recessed relative to a median circle concentric with shaft **43**. These depressions and recesses extend substantially equal distances from the median circle.

When cam roller **53** engages a surface of cam **50** coincident with the median circle, no motion is imparted to knurled roller **25** and the strip **10** "idles." When the cam follower **53** engages a projecting cam surface, lever **55** is swung counterclockwise, causing pawl **65** to move ratchet **37** through an angle corresponding to one ratchet tooth, the pawl **65** slipping back to engage the next tooth when cam follower **53** returns to the median circle. If, now, follower **53** rides into a recessed cam surface, pawl **65** moves back another tooth. If roller **53** then returns to the median circle, ratchet **37** is advanced the space of one tooth but, if the recess is followed by a projection, ratchet **37** is advanced the space of two teeth.

The motion of the drive mechanism is correlated with the reciprocation of the sewing needle so that a one tooth advance of ratchet **37** steps roller **25** sufficiently to move strip **10** the length of a short stitch between successive operations of the needle. A two tooth advance of ratchet **37** moves strip **10** through the length of a long stitch between successive needle strokes.

When a lateral stitch **16** or **22** is being formed, strip **10** idles by virtue of cam follower **53** riding along the median circle of cam **50**. At this time, the sewing head is reciprocated laterally of strip **10** by the mechanism shown in Fig. 3. This mechanism includes a worm **81** driven by the same means driving pinion **41** and in synchronism with the pinion. Worm **81** drives a worm gear **82** on a shaft **83** and fixed to a face cam **80**. Face cam **80** has a generally circular cam groove **84** in which rides a roller cam follower **85** rotatably mounted on an arm **86**. The latter is secured by suitable linkage (not shown) to the sewing head. When roller **85** rides on any of the lobes **87***a*, **87***b*, **87***c*, or **87***d* of groove **84**, the sewing head is shifted laterally of strip **10**, between successive needle strokes, to form the lateral stitches **16**, **22**. It should be noted that cam **80** rotates twice as fast as cam **50** and thus goes through two cycles while cam **50** completes one cycle. Also, the first and second pairs are much nearer in one direction around cam groove **84** than they are in the opposite direction. The reason for these provisions will be made clear in the following description of the operating cycle.

In describing the operation of cams **50** and **80**, the stitching sequence previously described for Fig. 4 will be used. Just as the lateral stitch **16** is to be formed, cam roller **53** will engage median circle **90** of cam **50** at the point A, cam **50** rotating in the direction of arrow **59**. At the same time, roller cam follower **85** will be at the point A′ of groove **84** of cam **80**, which latter rotates in the direction of arrow **89**.

As roller **53** moves along circle **90**, ratchet **37** and knurled roller **25** are held stationary. During this time, roller **85** will ride over lobes **87***a*, **87***b* in succession, resulting in the sewing head being reciprocated back and forth laterally of strip **10** twice to make the dual lateral stitch or tack stitch **16**. During the latter part of this motion, roller **53** rides into depression **92***a* of cam **50**, causing pawl **65** to slip back over one tooth of ratchet **37**.

Roller **53** now rides up on the double (effective) height projection **93***a*, causing pawl **65** to advance ratchet **37** two teeth, while roller **85** moves along the circular part of track **84**, holding the sewing head laterally fixed. Strip **10** is advanced the length of a long stitch between successive needle strokes to form long stitch **17**. Roller **53** then drops back to median circle **90** and then rides up normal height projection **94***a*, advancing ratchet **37** and roller **25** one step to form short stitch **18**. Roller **53** then rides into recess **92***b* and up double height projection **93***b* to advance roller **25** and strip **10** two steps to form long stitch **21**. Roller **53** then drops back to circle **90** so that pawl **65** slips back over one ratchet tooth.

At this time, roller **85** is about to ride onto lobe **87***c*. Hence, while the strip **10** remains stationary as a result of cam follower **53** riding along median circle **90** of

cam 90, the sewing head is again given two reciprocations laterally of the strip to form the tack stitches 22. As roller 85 returns from lobe 87*d*, to the circular part of track 84, roller 53 is about to engage the first of a series of eight normal height projections 94*b* to correspondingly effect stepping of strip 10 to form the series of eight short stitches 23.

As roller 53 returns from the last projection 94*b* to circle 90, roller 85 again rides onto lobe 87*a*, and the tack stitch 16' is formed while strip 10 remains idle. When roller 53 leaves lobe 87*b*, roller 53 has ridden into depression 92*c*. As roller 53 rides up onto double height projection 93*c*, long stitch 17' is formed, followed by short stitch 18' as roller 53 rides over projections 94*c*. When roller 53 rides into depression 92*d* and over projection 93*d* to return to circle 90, long stitch 21' is formed. While roller 53 rolls along circle 90, roller 85 again rides over lobes 87*c*, 87*d* to form the tack stitch 22'.

The apparatus is now about to form the series of stitches separating the first eyelet group from the second eyelet group and providing the cutting line mark or indication. During this time, roller 85 rides along the circular part of track 84 from lobe 87*d* to lobe 87*a*. As roller 53 successively rides over the three short projections 94*d*, the three short stitches 24 are formed. Roller 53 now rides into depression 92*e* and up over projection 93*e* to form the long stitch 26. Then roller 53 rides over projection 94*e* to form the short "cut mark" stitch 20. The succeeding long stitch 27 is formed as roller 53 rides into depression 92*f* and over projection 93*f*. The short stitches 28 then are formed as roller 53 successively engages the projections 94*f*, after which the described cycle is repeated.

The invention method and apparatus thus form a novel eyelet strip in which there is a saving in materials as compared to such strips as previously formed. Additionally, a definite and clearly defined "cut" mark is provided by a short stitch separating two long stitches which are, in turn, separated from each eyelet group by series of short stitches.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be otherwise embodied without departing from such principles.

What is claimed is:

1. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, the surface of said cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a moving surface of one type engaged with the follower when the sewing head is substantially at the mid point between fastener groups and at least one moving surface of the other type on each side of the moving surface of said one type, to form a marking stitch substantially at the mid point between fastener groups with the marking stitch differing substantially in length from the stitches of said series immediately adjacent thereto.

2. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one groups of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, the surface of said cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a moving surface of one type engaged with the follower when the sewing head is substantially at the mid point between fastener groups and at least one moving surface of the other type on each side of the moving surface of said one type, to form a marking stitch substantially at the mid point between fastener groups with the marking stitch differing substantially in length from the stitches of said series immediately adjacent thereto.

3. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched steam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, the surface of said cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a moving

surface of one type engaged with the follower when the sewing head is substantially at the mid point between fastener groups, at least one moving surface of the other type on each side of the moving surface of said one type, and a plurality of moving surfaces of said one type extending from each of said last-named moving surfaces of said other type, to form a marking stitch substantially at the mid point between fastener groups, with the marking stitch differing substantially in length from the stitches of said series immediately adjacent thereto, and with such immediately adjacent stitches differing substantially in length from the remaining stitches of the seam portion between fastener groups.

4. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, the surface of said cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a first moving surface engaged with the follower when the sewing head is substantially at the midpoint between fastener groups, at least one second moving surface on each side of said first moving surface, and a plurality of first moving surfaces extending from each of said last-named second moving surfaces, to form a relatively short "cut" marking stitch substantially at the midpoint between fastener groups, a relatively long stitch on each side of the marking stitch, and relatively short stitches between each of such relatively long stitches and the adjacent fastener.

5. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, mechanism operable to shift the sewing head laterally of the strip to form a lateral stitch therein, a second cam for operating said mechanism and driven by said driving means in timed relation with said control cam, said second cam having spaced camming surfaces effective to operate said mechanism at spaced intervals and one of said camming surfaces being operably positioned each time the sewing head is adjacent either side of a fastener, said cam follower being engaged with an elongated idling surface each time one of said camming surfaces is so operably positioned, whereby said apparatus is thereupon conditioned to form a lateral stitch on each side of each fastener.

6. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, mechanism operable to shift the sewing head laterally of the strip to form a lateral stitch therein, a second cam for operating said mechanism and driven by said driving means in timed relation with said control cam, said second cam having spaced camming surfaces effective to operate said mechanism at spaced intervals and one of said camming surfaces being operably positioned each time the sewing head is adjacent either side of a fastener, said cam follower being engaged with an elongated idling surface each time one of said camming surfaces is so operably positioned, whereby said apparatus is thereupon conditioned to form a lateral stitch on each side of each fastener, the surface of said control cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a first moving surface engaged with the follower when the sewing head is substantially at the mid point between fastener groups and at least one second moving surface on each side of said first moving surface, to form a relatively short "cut" marking stitch substantially at the mid point between fastener groups and a relatively long stitch on each side of the marking stitch.

7. For the manufacture of a continuous fastener strip in which fasteners are inserted at spaced intervals along the strip and between overlapped longitudinal portions of the strip and secured in place by a longitudinal stitched seam uniting such overlapped portions, the fasteners being arranged in spaced groups each including at least two fasteners, and the seamed strip being later severed between fastener groups to provide shorter strips each containing one group of fasteners; apparatus for drawing said strip longitudinally relative to a sewing head to form said seam comprising, in combination, a driven element

engaged with the strip and operable to draw the same longitudinally past the sewing head, a control cam, driving means for said cam, a cam follower engaged with said cam, and stepping means interconnecting said cam follower and said element and operable to step said element responsive to movement of said cam follower by said cam, said cam having first cam follower moving surfaces constructed to impart a relatively short motion to said follower to correspondingly step said element a relatively short distance to form a relatively short stitch in the seam, second cam follower moving surfaces constructed to impart a relatively long motion to said follower to correspondingly step said element a relatively long distance to form a relatively long stitch in the seam, and cam follower idling surfaces separating said moving surfaces, mechanism operable to shift the sewing head laterally of the strip to form a lateral stitch therein, a second cam for operating said mechanism and driven by said driving means in timed relation with said control cam, said second cam having spaced camming surfaces effective to operate said mechanism at spaced intervals and one of said camming surfaces being operably positioned each time the sewing head is adjacent either side of a fastener, said cam follower being engaged with an elongated idling surface each time one of said camming surfaces is so operably positioned, whereby said apparatus

is thereupon conditioned to form a lateral stitch on each side of each fastener, the surface of said control cam engaged by said follower when the sewing head is adjacent a portion of the strip between fastener groups comprising a series of adjacent follower moving surfaces including a first moving surface engaged with the follower when the sewing head is substantially at the mid point between fastener groups, at least one second moving surface on each side of said first moving surface, and a plurality of first moving surfaces extending from each of said last-named second moving surfaces, to form a relatively short "cut" marking stitch substantially at the mid point between fastener groups, a relatively long stitch on each side of the marking stitch, and relatively short stitches between each of such relatively long stitches and the adjacent fastener.

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