

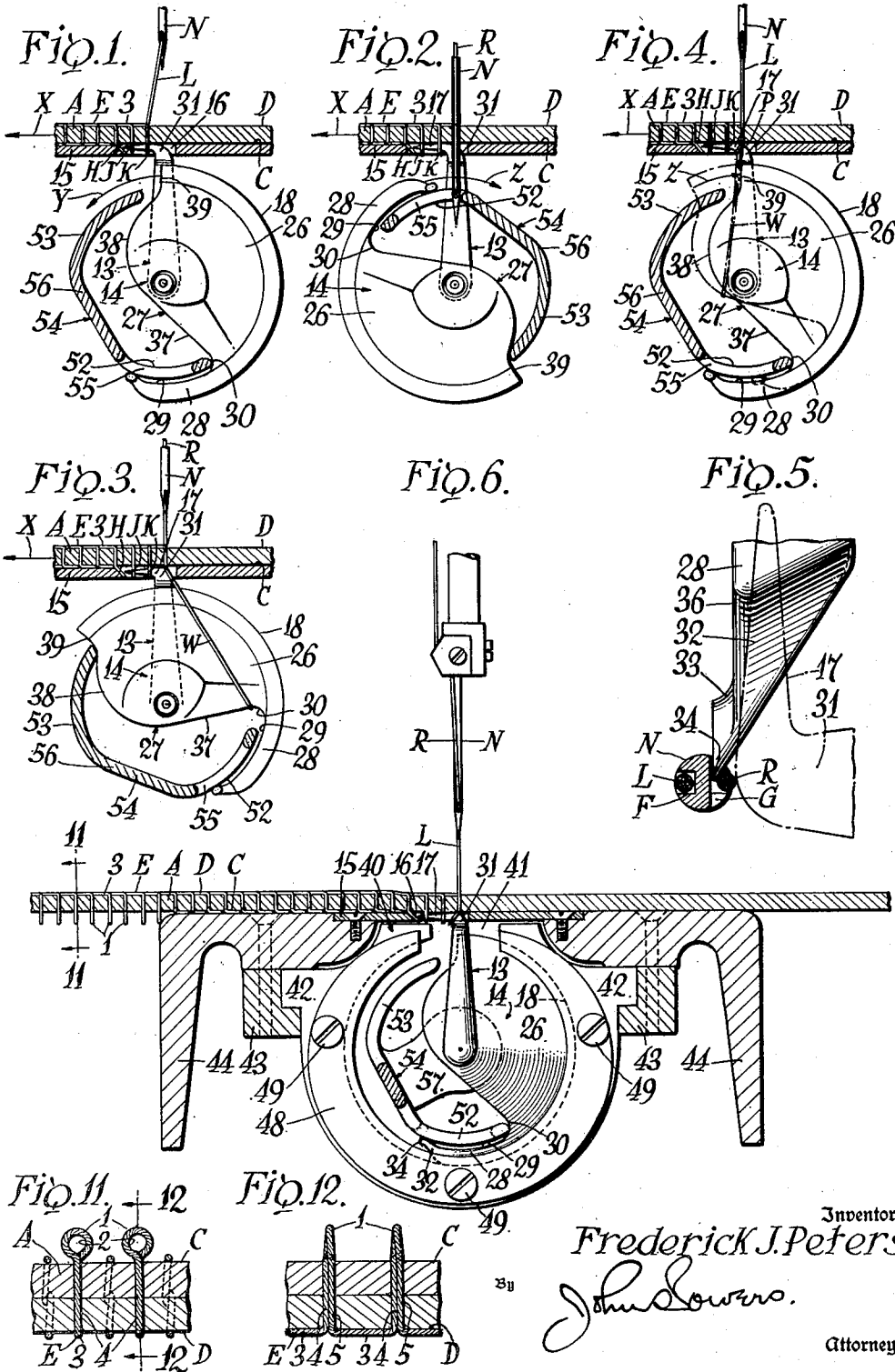
April 20, 1954

F. J. PETERS
MECHANISM FOR FORMING LOOP STITCHING IN CONVEYER
BELTING COMPOSED OF TEXTILE FABRIC

2,675,771

Filed Nov. 21, 1951

2 Sheets-Sheet 1



Inventor
Frederick J. Peters,
John Downes.
Attorney

April 20, 1954

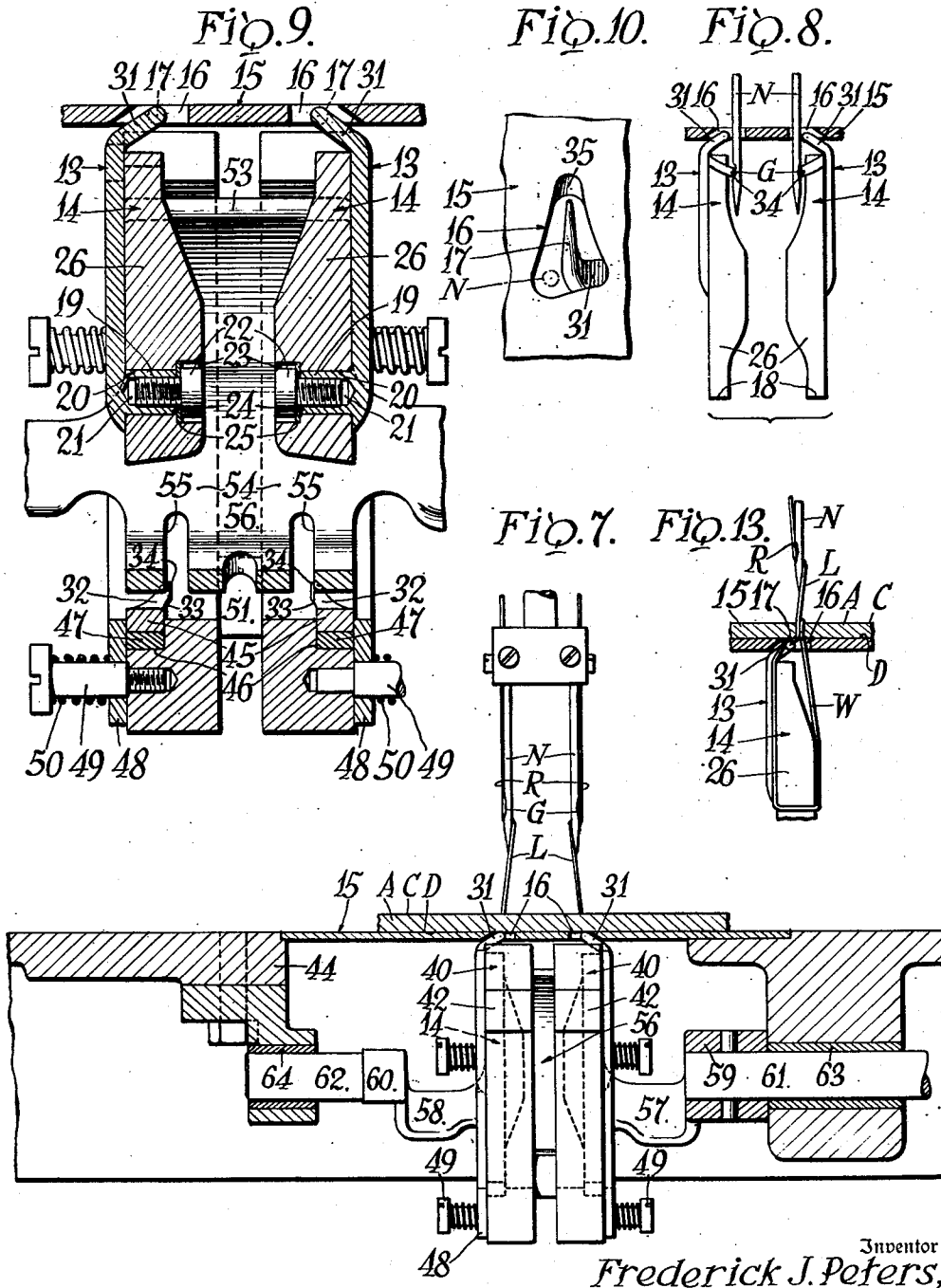
F. J. PETERS

2,675,771

MECHANISM FOR FORMING LOOP STITCHING IN CONVEYER
BELTING COMPOSED OF TEXTILE FABRIC

Filed Nov. 21, 1951

2 Sheets-Sheet 2



Inventor
Frederick J. Peters,
John S. Brown.
Attorney

UNITED STATES PATENT OFFICE

2,675,771

MECHANISM FOR FORMING LOOP STITCHING IN CONVEYER BELTING COMPOSED OF TEXTILE FABRIC

Frederick J. Peters, Grand Island, N. Y., assignor to Globe Woven Belting Company, Inc., Buffalo, N. Y., a corporation of New York

Application November 21, 1951, Serial No. 257,574

4 Claims. (Cl. 112—79)

1

In the copending application for patent of Martin J. Wagner, Serial No. 257,631, there is disclosed and claimed a conveyor belt of the type which is composed of textile fabric encased in a cured coating derived from a latex solution. This belt is characterized by loops of thread of suitable gage which are integrated with the body of textile fabric and project beyond a face thereof. These loops are of substantially uniform dimensions and are flattened in a common plane and caused to adhere to the face of the fabric from which they project. The coating is continuous and completely covers both the fabric and the flattened loops whereby the loops will present a series of flat-topped pads which are in raised relation to the fabric and provide the supporting surface of the belt. As pointed out in that application the loops are preferably provided as parts of lines of stitching in which their dimensions and their substantial uniformity of dimensions are controlled. So far as I am aware this stitching, as characterized by the controlled loops, is novel; and for the purposes of this specification may be called "loop stitching."

This invention relates to improvements in loop stitching mechanism, that is to say mechanism which effects a stitching operation and forms the controlled loops of the character and for the purpose above described.

The principal object of the invention is to provide a loop stitching mechanism of simple mechanical character which may be substituted in a sewing machine of conventional construction for the usual oscillatory bobbin carrier used in connection with the lock stitching by which the plies of stitched canvas belting are sewed together and which may be operated by the mechanism employed for the operation of the bobbin carrier.

The conventional sewing machine for the lock stitching includes a pair of needles which are spaced an inch apart and operate in unison, each needle being associated with a bobbin carrier. In the lock stitching the belting is initially fed through the machine with the result of two parallel lines of lock stitching spaced by an inch. The belting is then shifted laterally through a quarter of an inch and again fed through the machine, the operation being repeated until all the lines of lock stitching are formed at quarter inch intervals.

In the special loop stitching the two needles of the conventional sewing machine may be advantageously retained and the sequence of feeding the belting through the machine to form the lines of loop stitching is the same.

2

The present mechanism, generally speaking, is characterized by the combination of an oscillatory loop forming element of novel form and operational characteristics, a relatively stationary loop holding element in association and cooperation with the loop forming element, and a plate having an opening of novel form for immediate cooperation with the loop holding element and with the loops in connection with their formation and the feed movement of the belting through the machine.

In the accompanying drawings:

Figure 1 is a diagrammatic side elevation of a loop stitching mechanism with the belt in section and with the loop holding element engaged with two loops formed by previous operations.

Figure 2 is a similar view showing the starting position of the loop forming element in connection with the formation of a third loop.

Figure 3 is a similar view showing the loop forming element approximately midway in the course of its movement for the formation of a third loop.

Figure 4 is a similar view with the loop forming element in the same position in which it is shown in Figure 1, namely at the completion of its operation in which the loop have been released for engagement by the loop holding element, this figure however showing the loop holding element as engaged with three loops, the other two loops with which it is engaged being shown in Figure 1.

Figure 5 is a view on an enlarged scale showing a needle in horizontal section and the terminal finger of the loop forming element in plan view and at the inception of its engagement with the thread which has been pushed through and below the belting by the needle.

Figure 6 is a sectional view of the sewing machine, this view being taken in the direction of the line of the travel of the belt and showing a loop stitching mechanism in side elevation, with its parts in the relation shown in Figure 4.

Figure 7 is a sectional view of the sewing machine in a plane at a right angle to the direction of travel of the belt and showing the loop stitching mechanisms in front elevation and the needles in their raised positions.

Figure 8 is a diagrammatic front elevation showing the loop stitching mechanism with the loop forming elements in their starting positions and the needles in their lowered positions.

Figure 9 is a cross sectional view of the loop stitching mechanisms as mounted in the sewing machine.

Figure 10 is a partial plan view of the plate

3

which cooperates with the loop holding element of the loop stitching mechanism.

Figure 11 is a fragmentary cross sectional view of the belting to which the loop stitching has been applied, this view being taken on the line 11—11 of Figure 6 but with the belting reversed for the purpose of processing as disclosed in said Wagner application.

Figure 12 is a fragmentary longitudinal sectional view of the belting to which the loop stitching has been applied, this view being taken on the line 12—12 of Figure 11.

Figure 13 is a partial rear elevation of the loop forming mechanism and assumes that the loop forming element is in the position shown in broken lines in Figure 4, the belting being shown in cross section.

Belts in accordance with the invention of said Martin J. Wagner are characterized by loops 1 of thread or yarn of suitable gage which project beyond the load bearing face C and are provided by lines of special loop stitching E which are produced by the mechanism of the present invention.

In the manufacture of the belting the loops 1 originally project in normal relation from the face C.

The special loop stitching E has the general characteristics of the well known fair stitching by which the outer sole of a shoe is bonded to the welt, differing, however, in the feature of the controlled loops which are of substantially uniform dimensions. Each line of loop stitching follows a path which involves straight aligned thread portions 3 adjoining the face D of the belting, parallel adjoining thread portions 4 and 5 extending through the fabric of the belting in normal relation to adjacent thread portions 3 at adjacent ends thereof, and the loops 1 connecting the opposite ends of the thread portions 4 and 5.

Figures 7 and 8 show the two needles N of the conventional sewing machine and the two similar loop stitching mechanisms, one for each needle, the duplication of the needles and the loop stitching mechanism in the same machine being sufficiently indicated in Figure 8 by a bracket. It will, of course, be understood that the description of a single loop stitching mechanism will be applicable to both of the mechanisms shown in Figures 7 and 8.

The loop stitching mechanism comprises a relatively stationary loop holding element 13, an oscillatory loop forming element 14 and a horizontal plate 15 which provides a part of the supporting surface for the belt and is formed between its upper and lower faces with an opening 16 of novel form. The opening 16 provides for the operation of the needle and also accommodates a horizontal tapering pointed finger 17 at the upper end of the loop holding element 13 and guides each loop in its movement away from the finger. The finger 17 extends in the direction of the feed movement of the belting A and overhangs the loop forming element 14 which is pivotally connected at a point coincident with its axis of oscillation to the lower end of the loop holding element 13. The finger 17 extends in the direction of the movement of the belting fabric through the sewing machine. Its free end may be considered its forward end and is the end from which the loops are successively released as the belting fabric is moved step-by-step through the sewing machine in the stitch forming operation. The opposite or rear end of the finger 17 is connected to the loop holding ele-

4

ment 13 by a lateral offset 31 (to be later described) and thereby is shouldered. The shouldered rear end of the finger is the end which receives the loop from the loop forming element 14, it being understood that the loops are movable from the rear end of the finger to the pointed free end from which they are withdrawn. The opening 16 has front and rear end walls which are aligned generally in the direction of the movement of the belting fabric through the sewing machine and which are respectively adjacent the ends of the finger 17 and thereby cooperate with the finger to hold the loop holding element 13 relatively stationary during the oscillation of the loop forming element 14.

The loop forming element 14 is mounted and operated similarly to the bobbin carrier for which it is substituted. Accordingly it has a circularly curved bearing face 18 which conformably engages the inner curved face of a split bearing ring 47 which is carried by a vertically positioned supporting frame 40 of interrupted annular outline with its confronting ends in spaced relation to provide a clearance 41 (Figure 6). The frame 40 is provided at its opposite sides with coplanar outwardly projecting lugs 42 which have supporting engagement with angle pieces 43 secured to a stationary frame part 44 of the sewing machine.

The loop holding element 13 is in the form of an upright arm which at its lower end (Figure 9) is provided with a laterally projecting stud 19 of circular cross section. The stud 19 is coincident with the horizontal axis about which the vertically positioned loop forming element 14 oscillates and is somewhat loosely fitted in a transverse opening 20 in the element 14, the loose fit enabling the free oscillation of the loop forming element relatively to the loop holding element 13. The stud 19 is formed with an axial threaded recess 21 for a screw 22 by which the assembly of the elements 13 and 14 is maintained. The opening 20 has an enlargement 23 beyond the stud 19 to accommodate the head of the screw 22 and also to provide an annular shoulder 24 as an abutment for a bearing washer 25.

The element 14 includes a body 25 which may be said to be in the form of a mutilated disc. The bearing face 18 is the peripheral edge face of the body 25 which is otherwise characterized by a cam edge face designated generally as 27. The element 14 also includes an arm 28 formed as a concentric extension of the body 25 and along which the face 18 is continued, the arm 28 having a curved inner face 29 concentric with the face 18. The cam face 27 extends from one end of the face 18 to the inner end of the face 29 and terminates in a component 30 of a suitable degree of reverse curvature which merges with the face 29. The finger 17 at the upper end of the loop holding element 13 is laterally offset as at 31 to overhang the loop forming element 14, as best shown in Figures 5 and 8, with its inner side closely adjacent the needle N when projecting beyond the lower face C (the drawings being considered) of the belting A. In the course of the operation of the element 14 the arm 28 moves directly below the offset 31. The arm 28 terminates in a tapering finger 32 which extends in a direction generally opposite to the finger 17 and has at its end a short lateral extension 33 terminating in a point 34. The extension 33 is offset from that side of the finger 32 which is remote from the upright part of the

5

loop holding element 13 and the point 34 of the extension 33 is directed laterally slightly beyond the inner face of the finger 17.

The loop forming element 14 has an operative stroke and a return stroke. During its operative stroke it first forms an extended bight W in the thread, this bight being held under tension by the usual reciprocating sewing machine thread carrier (not shown) and becoming the ultimate loop, and thereafter releases the bight which is thereupon tensioned about the finger 17 and held by it in the form of a loop I until the next downward stroke of the needle through the belting A. The needle N is of the standard construction used in lock stitching and has on its opposite sides the usual thread channels F and on one side the usual shallow transverse thread clearance groove G which is located above the eye. In Figure 5 the groove G is shown at the right side of the needle and for convenience of description the thread portion in the channel F at the opposite side of the needle and which is connected to the thread carrier is designated L and the thread portion which extends across the groove G and from the upper face D (the drawings being considered) of the belting is designated R. The operative stroke of the loop forming element 14 is clockwise, the drawings being considered, and during the movement of the arm 28 below the offset 31 the extension 33 enters the groove G as shown in Figure 5 and moves through it and its point 34 picks the thread portion R from the needle.

The needle N operates through the opening 16 which, as shown in Figure 10, is generally pear-shaped. The finger 17 extends toward the narrow end of the opening 16. The wall of the opening 16 at its narrow end has an upward and outward inclination as shown at 35. The needle N operates near the wider end of the opening. When the needle is within the opening 16 its location is adjacent the inner face of the finger 17 at the approximate point where the finger projects from the offset 31, its position being such that the extension 33 of the finger 32 which, as above noted, projects very slightly beyond the inner side of the finger 17, may readily enter and move through the thread clearance groove G of the needle and pick up the thread portion R. In Figure 5 the finger 17 is indicated by broken lines in order to show its relation to the extension 33 during its movement through the groove G of the needle. Since the extension 33 is laterally offset at the end of the finger 32 it will be located beyond the adjacent side face 36 of the finger 28 to an extent such that when it passes beyond the groove G ample clearance with reference to the face 36 will be left for the movement of the needle.

The general pear-shape of the opening 16 provides ample clearance for the loops through which the finger 17 projects. The tapered form of the finger 17 facilitates the movement of the loops along the finger in connection with the step by step feed of the belting. The inclined face 35 at the narrow end of the opening 16 serves as a guide for the loops during the feed movement of the belting whereby the loops are readily and temporarily folded between the face C of the belting and the supporting surface of the machine. When the belting has passed beyond the supporting surface the loops spring back into the positions in which they project in normal relation from the face C as shown in Figure 6.

6

The sequence of operations is shown in Figures 1 to 4. As shown in these figures the movement of the belting is to the left as indicated by the arrows X.

Figure 1 shows the finger 17 in relation to the last three previously formed loops, these being distinguished in the order of their formation as H, J and K. Figure 1 assumes that following the formation of the last loop K a step of movement of the belting has been completed, the loop K meantime having been moved along the finger 17. In this figure the loop forming element 14 is shown in the position which it has at the completion of an operative stroke and after it has released the bight W which was meantime tensioned about the finger 17 as the loop K; and the needle N is shown fully raised and positioned, with reference to the belting, for its next operative or downward stroke, the completion of which is shown in Figure 2.

From the position shown in Figure 1 the loop forming element 14 moves on its return stroke which is counterclockwise as is indicated by the arrow Y, Figure 1 being considered. At the completion of this stroke the loop forming element 14 is brought to what may be called its starting position as shown in Figure 2. In this position its arm 28 is located beyond the path of the needle and the needle has completed its downward movement through the belting.

The operative stroke of the loop forming element 14 proceeds from the position shown in Figure 2 and is clockwise as indicated by the arrow Z. During the initial stage of the operative stroke of the loop forming element the extension 33 of the finger 32 passes through the thread clearance groove G of the needle and the point 34 picks the thread from the needle, all as above described and as shown in detail in Figure 5. As soon as the extension 33 passes beyond the groove G the needle returns to its elevated position, as shown in Figures 3 and 4 which also show the loop forming element in further successive stages of its operative stroke during which it has formed the tensioned bight W.

The cam face 27 has two major components 37 and 38. The component 37 is substantially straight and is a bight forming component extending at a suitable acute angle to the inner curved face 29 of the arm 28. The reversely curved component 38 of the cam face 27 extends between the component 37 and the face 29 and forms what may be called the throat of the angle. The component 38 is a curved component and may be called the bight releasing component. It merges with an angularly directed terminal component 39 which extends to the end of the bearing face 18.

When the extension 33 enters the groove G of the needle it passes above the lower end of the thread portion R with the effect of pulling the thread against the tension exercised by the thread holder and starting the bight which, as started, slides relatively along the surface 29 until it engages in the throat provided by the cam component 38. As the movement of the element 14 continues the bight, maintained under tension the while, is elongated. In Figures 3 and 4 the bight is shown partially elongated and enveloping the loop forming element 14, that is to say with its components extending along the sides of the element 14 between the belting and the throat provided by the cam component 38, the straight cam component 37 being shown in Figure 3 as having a slight upward inclination to the right.

As the element 14 continues on its operative stroke the cam component 37 is brought to a position of angularity in which the bight may be released. In Figure 4 this position is shown in broken lines and is one in which the straight cam component 37 extends upward to the left at an angle favorable to the movement of the bight from the throat provided by the component 39 to the bight releasing component 38. At this time the bight has been moved across the outer face of the loop holding element 13 and is in position to envelop the finger 17. When the element 14 completes its operative stroke, as shown in full lines in Figure 4, the tension on the bight will have drawn it along the cam component 39, shortening it the while, with the result that the bight has been pulled fully clear of the element 14, and, in its ultimate shortened dimension, has been arrested and held by the shouldered rear end finger 17 which it envelops. The bight thus held is the completed loop and is shown at P in Figure 4, its position being at the point where the finger 17 adjoins the offset 31. The position of the element 14 shown in full lines in Figure 4 is the same position in which it is shown in Figure 1. Following the engagement of the newly formed loop by the finger 17 the belt is advanced through a step of its feed movement whereby the loop distinguished as H is folded completely between the belting and the supporting surface of the machine and the other loops distinguished as J, K and P are brought into the same relation as the loops H, J and K shown in Figure 1. Thereafter the element 14 moves on its return stroke as above described until it reaches its starting position shown in Figure 2 at which time the cycle of operations is repeated.

As above stated the mounting of the loop forming element 14 is the same as the mounting of the bobbin carrier in a conventional sewing machine and the mechanism for its operation is also the same. These conventional parts are shown in Figures 6, 7 and 9.

The bearing face 18 of the loop forming element 14 is provided upon a peripheral portion 45 (Figure 9) which is of uniform cross sectional dimension and serves for the mounting of the element 14 in the frame 40. For the purpose of such mounting the frame is formed at one side with a rabbeted recess 46 which accommodates the ring 47, this being of suitable bearing metal and being the part upon which the face 18 has direct engagement. The rabbet 46 provides a side wall and the base of a circularly curved channel in which the peripheral portion 45 is mounted, the opposite side wall of this channel being provided by a plate 48 of interrupted circular curvature arranged adjacent the outer side face of the frame 40. The plate 48 bears upon the outer face of the peripheral portion 45 of the element 14 and in addition to completing the channel in which the peripheral portion 45 is mounted serves the purpose of compensation for wear. Accordingly the plate 48 has a slidable mounting upon the shanks of screws 49 which project laterally from the frame 40 with their ends tapped into threaded recesses formed in the frame. The plate 48 is subject to the pressure of the springs 50 mounted upon the shanks of the screws 49 and reacting against their heads.

Similarly to the bobbin carriers of the conventional sewing machine the loop forming elements 14 are maintained in operative relation to the needles by the usual spacers 51 interposed between the frames 40. The oscillation of the loop

forming element 14 is effected by a pair of connected oppositely projecting arms 52 and 53 which oscillate in unison and are arranged within the frame 40 in confronting relation to the cam face 27. The components 39 and 38 of the face 27 provide shoulders for cooperation with the respective arms 52 and 53, the arm 52 bearing against the shoulder provided by the component 39 and the arm 53 bearing against the shoulder provided by the component 38. The arms 52 and 53 are elements of a yoke-shaped part 54 (Figure 6) which is formed with a peripherally directed slot 55 in order to provide a clearance for the movement of the needle.

The extent of the part 54 from the end of one arm to the end of the other is such that when one of the arms 52 or 53 bears against its companion shoulder the other arm will be spaced from its companion shoulder. Thereby the part 54 has a delayed action effect in initiating the operative and return strokes of the loop forming element. Thus in Figures 2 and 3 the arm 53 is shown as bearing against the shoulder 39 in order to push the element 14 through its operative stroke, the end of the arm 52 at such time being spaced from its companion shoulder 38 and thus clearing the throat of the angle formed by the face 29 and the bight forming component 37, this clearance permitting the bight to slide relatively beyond the end of the arm 52. When the loop forming element 14 reaches the end of its operative stroke the movement of the part 54 is reversed with the result that the arm 52 is brought into engagement with the shoulder 38 and the arm 53 is moved away from the shoulder 39. It follows that upon the completion of the operative stroke of the element 14 a momentary pause occurs before the movement of the element 14 on its return stroke and during this pause, the arm 53 having moved away from the shoulder 39 at the time, the bight W is drawn through the space between the end of the arm 53 and the shoulder 39 and tensioned as a loop upon the finger 17, this operation being clearly shown in Figure 4 in which the part 54 is positioned with its arm 52 against the shoulder 38 in order to effect the movement of the element 14 through its return stroke.

In connection with the duplication of the loop forming mechanism the parts 54 are integrally combined in a single member 56 which bridges the space between the two frames 40 and is provided at its opposite sides with laterally projecting supporting arms 57 and 58. The arms 57 and 58 terminate in sleeves 59 and 60 which are fitted upon aligning horizontal shafts 61 and 62 supported in fixed bearings 63 and 64 respectively, the shaft 61 being both an operating shaft and a supporting shaft and the shaft 62 being a supporting shaft. The shaft 61 is the shaft which effects the oscillation of the usual bobbin carrier and is rocked by the usual mechanism, illustration of which is deemed unnecessary.

I claim:

1. For use in a sewing machine of the type employed in the manufacture of stitched canvas belting and for cooperation with the usual vertically movable needle in forming in conveyer belting composed of textile fabric lines of stitching characterized by uniformly spaced loops of uniform dimensions which project in normal relation from the lower face of the belting, the needle carrying the thread under tension and having the usual thread channels and a thread clearance groove at one side and above its eye:

a loop stitching mechanism comprising, in combination, a stationary loop holding element having a horizontal loop engaging finger which extends in the direction of the feed movement of the belting through the sewing machine and has a forward free end from which the loops are successively released as the belting fabric is moved through the sewing machine and a shouldered rear end, a plate which provides a part of the supporting surface for the belting and which is formed between its upper and lower faces with an opening in which the finger is positioned, the opening having front and rear end walls which are aligned generally in the direction of the movement of the belting fabric through the sewing machine, the forward and rear ends of the finger being respectively adjacent the front and rear end walls of the opening, and a vertically positioned loop forming element mounted for oscillation about a horizontal axis and movable with reference to a starting position through an operative stroke and a return stroke, the loop forming element having a peripheral face, a cam face extending from an end of the peripheral face, and an extension projecting concentrically from the opposite end of the cam face and along which the peripheral face is continued, the finger overhanging the peripheral face, the cam face having a substantially straight bight forming component which extends at an acute angle to the extension, a reversely curved terminal component extending between the bight forming component and the inner face of the extension and providing the throat of the angle formed by the bight forming component and the inner face of the extension, and a curved bight releasing component extending from the bight forming component to the peripheral face, the extension of the loop forming element being operatively movable under the finger and having a tapering terminal finger which extends in a direction opposite to the finger of the loop holding element and at its end has a short lateral extension terminating in a point, the lateral extension being movable through the thread clearance groove of the needle as lowered and the point of the lateral extension being operative at that time to pick the thread from the needle and to initiate a tensioned bight which during the operative movement of the loop forming element extends along each side thereof in enveloping relation and is maintained by and movable along the cam face, the loop forming element in its operative stroke effecting in succession the operations of initiating the bight and causing its relative movement to the throat of the angle formed by the bight forming component and the inner face of the extension, the elongation of the bight, the positioning of the bight forming component at an angle favorable to the release of the bight and the release of the bight consequent to its movement, as tensioned, along the

bight forming component and the bight releasing component, the bight upon release from the loop forming element being tensioned as a loop of the stitching in enveloping relation about the loop engaging finger of the loop holding element, the loop forming element being thereupon movable through its reverse stroke to its starting position in which its extension is withdrawn from under the finger of the loop holding element and is positioned in front of the needle at the completion of its downward stroke.

2. A loop stitching mechanism as set forth in claim 1 wherein the loop holding element is in the form of an upright arm arranged at one side of the loop forming element and pivoted coaxially thereto, the arm at its upper end having a laterally offset portion from which the finger of the loop forming element projects.

3. A loop stitching mechanism as set forth in claim 1 wherein the opening in the plate is generally pear-shaped and has a wider end and a narrower end, the finger is directed toward the narrower end of the opening, and the wall of the opening at its narrower end has an upward and outward inclination, the opening being dimensioned to accommodate the loops as they are tensioned about the finger and thereafter moved along the finger in connection with the feed movement of the belting and the narrower end wall of the opening serving to initiate the folding of the loops between the face of the belting from which they project and the supporting surface of the machine.

4. A loop stitching mechanism as set forth in claim 1 wherein the loop holding element is in the form of an upright arm arranged at one side of the loop forming element and pivoted coaxially thereto, the arm at its upper end having a laterally offset portion from which the finger of the loop forming element projects, the opening in the plate is generally pear-shaped and has a wider end and a narrower end, the finger is directed toward the narrower end of the opening, and the wall of the opening at its narrower end has an upward and outward inclination, the opening being dimensioned to accommodate the loops as they are tensioned about the finger and thereafter moved along the finger in connection with the feed movement of the belting and the narrower end wall of the opening serving to initiate the folding of the loops between the face of the belting from which they project and the supporting surface of the machine.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
523,361	Lichfeldt	July 24, 1894
1,902,704	Kadlec	Mar. 21, 1933
2,546,357	Dedmon et al.	Mar. 27, 1951