Aug. 26, 1941. C. SEAMAN 2,253,731

SEWING MACHINE AND ATTACHMENT THEREFOR

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Fig. 1.

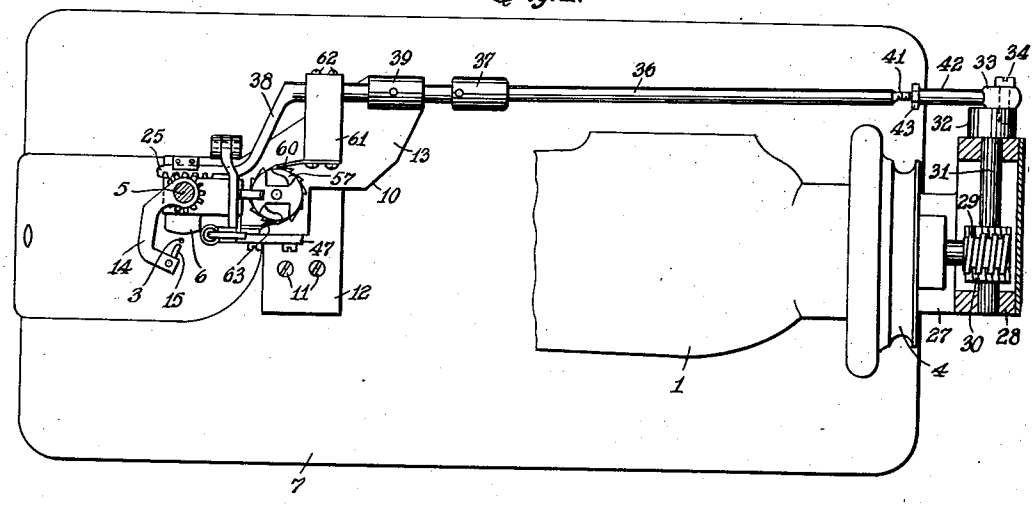
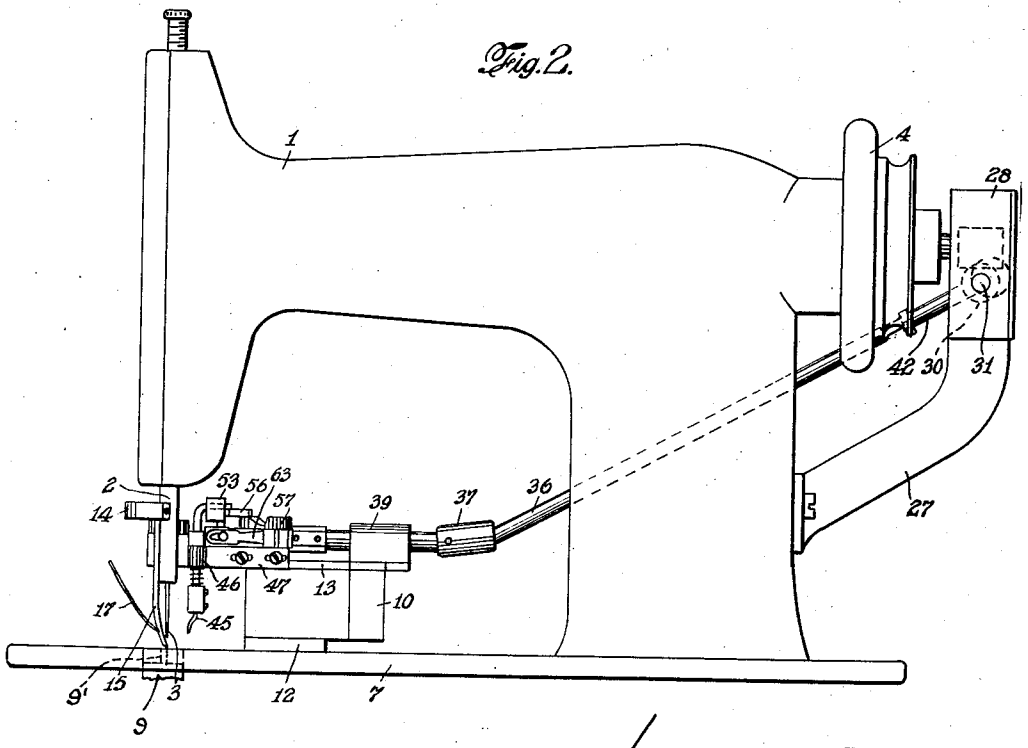


Fig. 2.



INVENTOR.
CHARLES SEAMAN

BY Wm. S. Pritchard

ATTORNEY.

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SEWING MACHINE AND ATTACHMENT THEREFOR

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Fig. 3.

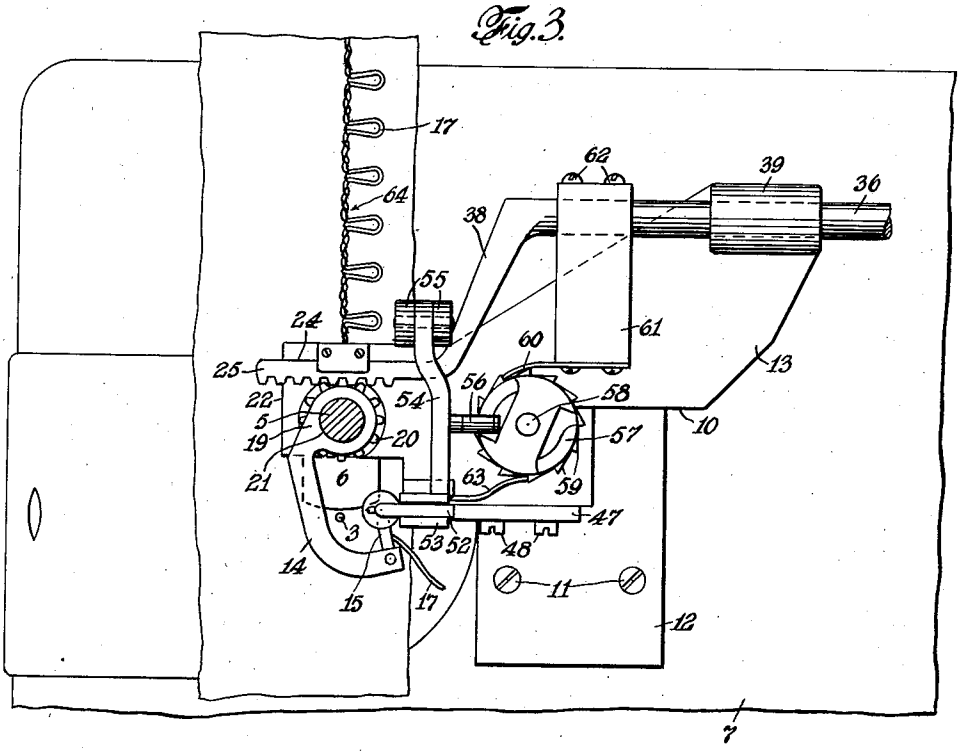
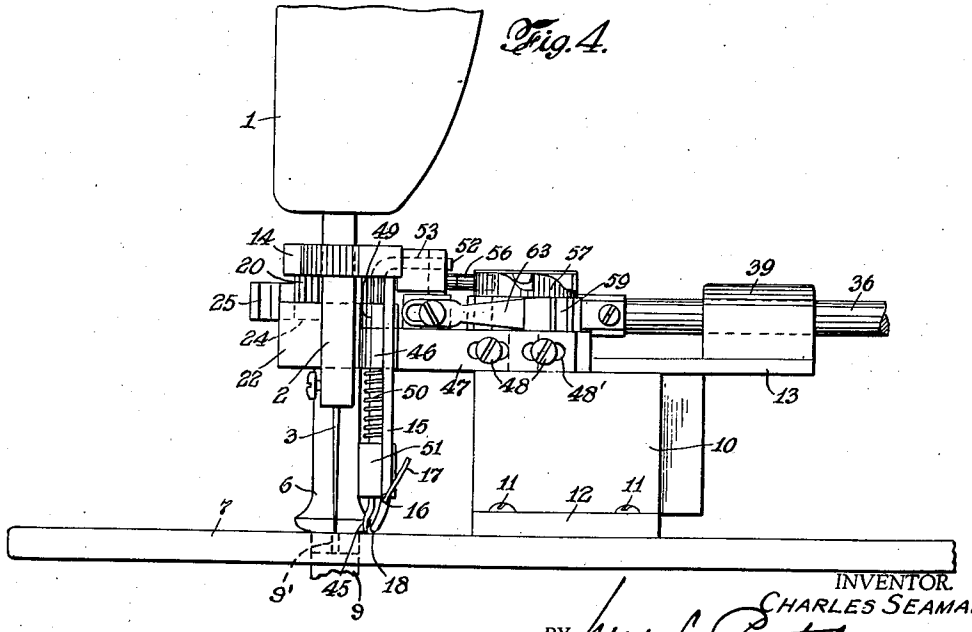


Fig. 4.



INVENTOR.
CHARLES SEAMAN

BY Wm. S. Pritchard

ATTORNEY.

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SEWING MACHINE AND ATTACHMENT THEREFOR

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Fig. 5.

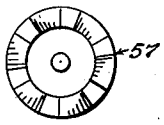


Fig. 6.

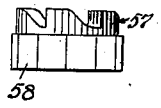


Fig. 7.

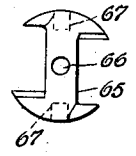


Fig. 8.

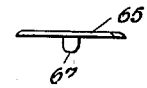


Fig. 9.

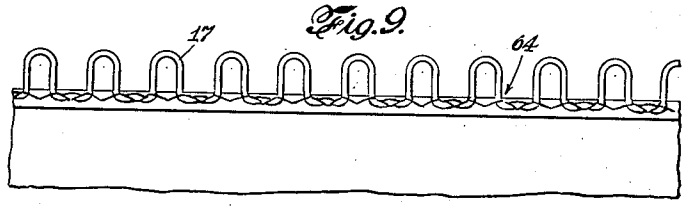


Fig. 10.

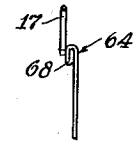


Fig. 11.

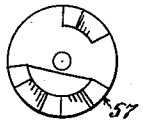


Fig. 14.

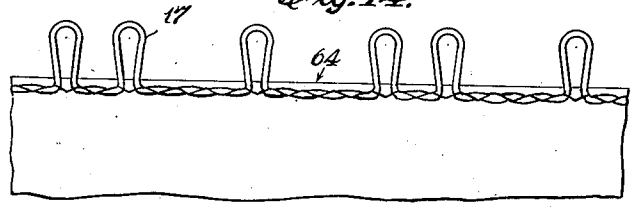


Fig. 12.

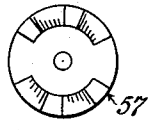


Fig. 15.

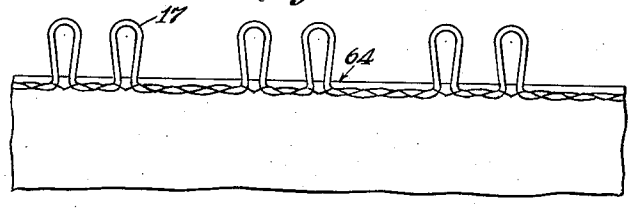


Fig. 13.

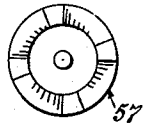
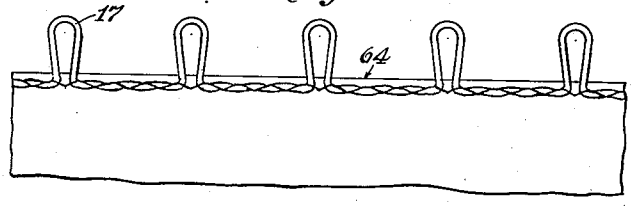


Fig. 16.



INVENTOR.
CHARLES SEAMAN

BY Wm. S. Pattiard

ATTORNEY

Patented Aug. 26, 1941 2,253,731

UNITED STATES PATENT OFFICE

2,253,731

SEWING MACHINE AND ATTACHMENT THEREFOR

Charles Seaman, Jamaica Estates, N. Y.

Application January 9, 1939, Serial No. 249,831

10 Claims. (Cl. 112—101)

This invention relates to sewing machines, and particularly to an attachment designed to present a cord in position to be secured to a base material and, simultaneously therewith and at predetermined intervals, form loops in said cord.

The nature and objects of the invention will become clear from the following description, appended claims, and accompanying drawings forming a part of this specification and wherein:

Figure 1 is a top plan view of a sewing machine with the head partly broken away, embodying the instant invention;

Figure 2 is a front elevation of the sewing machine illustrated in Figure 1;

Figure 3 is an enlarged top plan view with the sewing machine head removed and showing the details of the attachment;

Figure 4 is an enlarged front view of the apparatus shown in Figure 3;

Figure 5 is a top view of a cam which constitutes a part of the attachment;

Figure 6 is a front elevation of the cam shown in Figure 5;

Figure 7 is a top view of an insert which may be used in conjunction with the cam illustrated in Figures 5 and 6;

Figure 8 is a side elevation of the insert shown in Figure 7;

Figure 9 is a view of the back of a material produced in accordance with the instant invention;

Figure 10 is an end view of the material shown in Figure 9;

Figures 11, 12 and 13 are top plan views of modified forms of cams which may be utilized; and

Figures 14, 15 and 16 are views of the backs of materials produced when the cams of Figures 11, 12 and 13 respectively are used.

In accordance with the principles of the instant invention, a base material and a cord to be secured thereto are fed past the path of travel of the needle. At predetermined times, the cord is engaged and prevented from passing in the path of the needle, whereby predetermined spaced loops are formed in the cord secured to the base material. The loops, as will become more apparent hereafter, are secured at the base thereof with the consequence that the portions thereof extending beyond the base thereof are freely disposed.

In the preferred embodiment of the invention, the cord is supplied in position to be secured to the base material by means which oscillates in an arcuate path in front of the needle from a position to the left of the needle to a position to the right of the needle, and vice versa. As a consequence, the needle penetrates the base material alternately and progressively adjacent each side of the cord, the cord being secured in position by the thread passing thereover. At predetermined intervals during the operation of the oscillating means and when the latter is at one of its extreme positions, say its extreme position to the right of the needle, the cord supplied by the oscillating means is engaged, whereby a portion thereof is maintained out of the path of travel of the needle. The cord is thus held until the oscillating means has moved in the opposite direction and to its extreme point of travel therein and has presented a succeeding portion of the cord in position to be secured to the base material and until the needle has secured it to the base material. The portion of the cord maintained out of the path of the needle forms a loop secured only at the base thereof. After the loop has been formed and secured, the cord is released and the operations repeated.

The apparatus for carrying out the aforementioned operations comprises a sewing machine of the usual type to which an attachment constituting one part of this invention is secured. The attachment is provided with means designed to be pivotally mounted on the presser foot bar. The pivotally-mounted means carries a cord-supplying means and, during the operation of the machine, is oscillated in the manner previously described. The attachment is also provided with means to produce loops in the manner previously described. Both the mechanisms for feeding the cord and for forming the loops are designed to be driven and operated from the main driving shaft of the machine and in the desired timed relationship.

In order to more fully explain the invention, reference will now be made to the accompanying drawings wherein the invention is shown as embodied in a sewing machine comprising a head 1 having a needle bar 2 carrying a needle 3, said needle bar being reciprocated by a driving means, such as a driving shaft (not shown) driven by a pulley 4 in the usual manner. The sewing machine head is also provided with a presser foot bar 5 carrying a presser foot 6, said presser foot bar being actuated by a lever (not shown). The presser foot 6 is adapted to maintain the material in engagement with feed dogs 9 extending through an aperture 9' in the base 7 of the machine. The elements thus far described are of

standard construction and operate in the usual manner for feeding and stitching materials.

In the embodiment shown, a block 10 is provided which is adapted to be secured to the base 7 in any convenient manner, as by set screws 11, which extend through a flange 12 into tapped holes in the base 7. The block 10 is provided with a shelf 13 on which the mechanisms for feeding the cord 17 and for forming the loops in the cord are positioned.

The mechanism for feeding the cord 17 comprises an arm 14, of the form substantially as shown in Figures 1 and 3, provided at one end thereof with a downwardly extending tubular member 15 provided with a hole 16 through which the cord 17, to be secured to the base material and looped, is introduced into the tubular member 15. The cord 17 passes downwardly and emerges from the free end 18 of the tubular member 15. As previously mentioned, the tubular member 15 is to be oscillated, i. e. alternately moved in an arcuate path in front of the needle from a position to the left of the needle to a position to the right of the needle. With this in view, the other end 19 of the arm 14 is provided with a gear 20 and an aligned aperture 21 extending therethrough, whereby the arm 14 and its appurtenant elements may be slidably mounted on the presser foot bar 5. To maintain the arm 14 in position on the presser foot bar 5, the shelf 13 is provided with a block 22 in which the end 19 of the arm 14 is disposed. This block is provided with a hole (not shown) in alignment with the hole 21 in the end 19, whereby it also may be slidably positioned on the presser foot bar 5. The block 22 is provided with a slot 24 in which a rack 25 is positioned. The teeth of the rack 25 mesh with the teeth of the gear 20 and, upon reciprocation of the rack, the arm 14 and hence the tubular member 15 will be oscillated. It is to be noted that the form and shape of the arm 14 is such that upon oscillation thereof the tubular member 15 will be moved in an arcuate path in front of the needle and from a position to the left of the needle to a position to the right of the needle, and vice versa. It is further to be noted that in either of the extreme positions, to the left or to the right of the needle 3, the tubular member 15 presents the cord 17 supplied thereby in the path of the needle 3.

In the preferred embodiment, the needle 3 does not penetrate the cord 17, but passes adjacent one side thereof. Due to the oscillating of the cord-supply means (tubular member 15), the needle alternately and progressively passes adjacent each side of the cord, the cord being secured to the base material by the sewing thread passing thereover.

In accordance with this invention, the rack 25 is reciprocated by means operatively connected to the main drive shaft. With this in view, a bracket 27 secured to the head carries a housing 28 in which a worm 29 is secured to the needle bar actuating shaft. A gear 30 carried on one end of a shaft 31, appropriately journaled in the housing, meshes with the worm 29, whereby rotatory motion is imparted to the shaft 31. A collar 32 is attached to the other end of the shaft 31, and an eccentric 33 is secured to said collar in any suitable manner, as by means of a screw 34. The arm 42 of the eccentric 33 is connected to one end of a rod 36, the opposite end thereof being secured to a universal 37. One end of a curved arm 38, the latter being slidably mounted in a bearing 39 carried on the shelf 13, is secured to the universal 37, the other end being secured to or formed integral with the rack 25. Thus, upon rotation of the needle bar actuating shaft, reciprocatory motion will be imparted to the rack 25. The travel of the rack 25 may be controlled by adjusting the length of the rod 36. Any means may be utilized for this purpose. In the form shown, the rod 36 is provided with a threaded portion 41 which is designed to be threaded into a hole in the arm 42 of the eccentric 33. A lock nut 43 is provided to lock the parts in position after adjustment.

The loop-forming mechanism comprises means which periodically, at predetermined intervals, acts to engage the cord and prevent the same from being positioned in the path of the needle. In the form shown, there is provided a pin 45 which is slidably carried in a bearing 46 formed on the arm 47 which is adjustably secured, by means of set screws 48 cooperating with elongated slots 48', to the shelf 13. A collar 49 is provided on the top of the bearing 46, and a spring 50 cooperating with the under surface of the bearing 46 and the upper surface of a collar 51 secured to the pin 45 urges the pin 45 in a downward direction. The upper end of the pin 45 is bent, as indicated by the reference numeral 52, and is disposed in the fork 53 carried on one end of the arm 54, the other end thereof being pivotally mounted between two ears 55 secured to the shelf 13.

As previously mentioned, the loop is formed when the lower end of the pin 45 engages and prevents a portion of the cord from being fed into the path of the needle. Means are, therefore, provided to raise or lower the pin to effect the desired function. In the form shown, this is secured by a cam mechanism, next described.

The arm 54 carries a cam roller 56 which cooperates with a cam 57 rotatably mounted on a shaft 58 secured on the shelf 13. The cam 57 is designed so that the pin 45 may be brought into loop-forming operation, i. e. lowered so that it may engage the cord, at predetermined intervals, the design of the cam, of course, depending on the nature and spacing of the loops to be made.

The cam 57 is driven by motion transmitted from the main drive shaft and, in the preferred embodiment, by the same mechanism which reciprocates the rack 25. With this in view, the cam 57 is provided on its circumferential surface with teeth 59 which are designed to cooperate with a driving pawl 60 carried by a block 61 securely fastened to the arm 38 by means of screws 62. Thus, upon reciprocation of the arm 38, the pawl 60 will engage the teeth 59 and cause the cam to rotate counterclockwise. In order to prevent retrograde movement of the cam, there is provided a holding pawl 63 which is adjustably secured to the shelf 13.

The size of the loops may be varied by the adjustment of the arm 47 toward or away from the needle and by correspondingly varying the length of the rod 36.

It is to be understood that the block 10, the shelf 13, the block 22, the bearing 39, etc. may be formed in a single casting.

In Figures 5 and 6, there is shown a six-point cam which, when used in the apparatus previously mentioned, will produce a material 64, the back and end views respectively being shown in Figures 9 and 10. It is obvious that by utilizing cams of different designs, the size of and spacing between loops in any predetermined length of material may be obtained. Figures 11, 12 and 13 show three additional illustrative cams which will,

when used in the apparatus previously described, produce materials, the rear views of which are shown in Figures 14, 15 and 16 respectively.

In some instances it is not expedient, though of course it is within the scope of this invention, to carry in stock a number of different cams for the production of each of the various desired effects. Sometimes the desired effects may be obtained by modifying the cam surface by blocking out or filling in certain of the low portions thereof. Figures 7 and 8 illustrate an insert comprising a disc **65** provided with an aperture **66** by means of which the insert may be disposed on the cam shaft in position on the apparatus. The insert may be provided with projections **67**, two of which are shown in Figure 8, and which are designed to fit in the low points of say, for example, the cam shown in Figure 5, with the result that instead of six low points the modified cam will have only four low points. It is obvious that the insert **65** may be provided wtih as many projections to fit into the desired number of dwells of the cam **57**. By this arrangement, one cam with the necessary number of inserts may be utilized to secure a various number of products having different effects.

In operation, after the needle **3** has been threaded and the cord threaded through the tubular member **15**, the base material is fed under the presser foot **6** and in engagement with the feed dogs in the usual manner. Upon operation of the machine, the needle bar actuating shaft will be actuated, whereby the arm **38** will be given a reciprocating movement. As a consequence, the rack **25** will be given a reciprocating movement which, through the gear **20**, will be transmitted as an oscillatory movement to the cord feed **15** through the arm **14**. During this oscillatory movement, the tubular member **15** will move in an arcuate path in front of the needle from a position to the left of the needle to a position to the right of the needle. During the oscillatory movement, when the cord feed **15** is at either one of its extreme positions, the cord will be fed past the path of travel of the needle. As a consequence, the needle will penetrate the base material alternately and adjacent each side of the cord, the sewing thread passing over the cord and thus securing it in position.

The reciprocation of the arm **38** also reciprocates the pawl **60** which in its forward movement coacts with the teeth **59** of the cam **57**, thereby imparting rotary motion to said cam. When the cam roller **56** rides on the high points of the cam **57**, the pin **45** is maintained out of contact with the cord. When the roller **56** rides in a hollow of the cam **57**, the spring **50** forces the pin **45** downwardly, with the result that it engages the cord at the end of the travel of the tubular member **15** to the right and holds it during the period when the cam roller rides in the hollow. In Figure 4, the pin **45** is shown in position to engage the cord fed by the tubular member **15**. While the cord is held by the pin **45**, the arm **14**, together with the tubular member **15**, moves in the arcuate path to the left in Figure 4 and presents a succeeding portion of the cord, which constitutes the base of the loops, in position to be secured to the base material. After the needle has secured the cord at the base of the loops, the cam has reached a high point, and the roller riding thereon lifts up the pin. It is, of course, to be understood that the various parts are adjusted to operate in the timed relationship necessary to produce the desired results.

The product produced by the instant invention is capable of divers uses. It may be used for the production of a highly ornamental trimming. When the product is to be used for ornamental purposes, the cord may be formed of a material and color which contrast with the base material to which it is attached. It is, of course, to be understood that for ornamental purposes, the base material may be infolded, as shown by the reference numeral **68** in Figure 10.

One of the important uses to which the invention may be put is in the production of loops serving as button holes. It is obvious that, since the loops are attached only at the base thereof, they are otherwise free for movement and may be manipulated over a button. When the loops are to be used as button holes, it has been found that highly advantageous results are obtained when the cord is made of an elastic material such as Lastex.

Though in the foregoing description the cord supply means is described as being oscillated, it is clear that by utilizing an appropriately shaped arm **14**, the cord supply means may be reciprocated from a position to the right of the needle to a position to the left of the needle and present the cord in position to be secured by stitching to the base material.

Since it is obvious that various changes and modifications may be made in the above description without departing from the nature or spirit thereof, this invention is not restricted thereto except as set forth in the appended claims.

I claim:

1. In a sewing machine, a reciprocating needle bar carrying a needle, a needle bar actuating shaft to reciprocate said needle, means to simultaneously feed a base material and a cord past the path of the needle, means oscillating in front of said needle to supply the cord in position to be secured to said base material, a pin adjacent the end of the travel of the oscillating means in one direction and adapted to be lowered and raised, cam means to periodically lower said pin to engage the cord and hold it out of the path of travel of the needle whereby a loop is formed in the cord and thereafter raise said pin to disengage said cord, a pawl to drive said cam, and means actuated by the needle bar actuating shaft to actuate said pawl.

2. In a sewing machine, a reciprocating needle bar carrying a needle, a needle bar actuating shaft to reciprocate said needle, a presser foot bar carrying a presser foot, means to simultaneously feed a base material and a cord past the path of travel of the needle, an arm pivotally mounted on said presser foot, means carried on one end of said arm to supply the cord, a gear secured to the other end of said arm and mounted on said presser foot bar, a rack cooperating with said gear, means connected to the needle bar actuating shaft to actuate said rack whereby the cord supply means will move alternately and progressively from a position to the left of the needle to a position to the right of the needle and present the cord in position to be secured to the base material, a pin adjacent the end of the travel of the cord supply means in one direction and adapted to be lowered and raised, cam means to periodically lower said pin to engage the cord and hold it out of the path of travel of the needle whereby a loop is formed in the cord and thereafter raise said pin to disengage said cord, a gear secured to said cam means, a pawl cooperating

with said gear to drive said cam, and means connected to the needle bar actuating shaft to actuate said pawl.

3. In a sewing machine, a reciprocating needle bar carrying a needle, a needle bar actuating shaft to reciprocate said needle, a presser foot bar carrying a presser foot, means to simultaneously feed a base material and a cord past the path of travel of the needle, an arm pivotally mounted on said presser foot, means carried on one end of said arm to supply the cord, a gear secured to the other end of said arm and mounted on said presser foot bar, a rack cooperating with said gear, means connected to the needle bar actuating shaft to actuate said rack whereby the cord supply means will move alternately and progressively from a position to the left of the needle to a position to the right of the needle and present the cord in position to be secured to the base material, a pin adjacent the end of the travel of the cord supply means in one direction and adapted to be lowered and raised, cam means to periodically lower said pin to engage the cord and hold it out of the path of travel of the needle whereby a loop is formed in the cord and thereafter raise said pin to disengage said cord, a gear secured to said cam means, a pawl cooperating with said gear to drive said cam, and means connected to the needle bar actuating shaft to actuate said pawl, said pawl actuating means also being the said rack-actuating means.

4. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, an arm adapted to be pivotally mounted on the presser foot of a sewing machine, means carried on one end of said arm adapted to supply the cord, a gear secured to the other end of said arm and adapted to be mounted on said presser foot bar, means on said block to maintain said gear in position on said presser foot, a rack carried by said block and cooperating with said gear, means adapted to be connected to and actuated by the needle bar actuating shaft of the sewing machine to reciprocate said rack whereby the cord supply means will move alternately and progressively from a position to the left of the needle to a position to the right of the needle and present the cord in position to be secured to the base material, a pin carried on said block adapted to be positioned adjacent the end of the travel of the cord supply means in one direction, said pin being adapted to be lowered and raised, cam means carried on said block adapted to periodically lower said pin to engage the cord and hold it out of the path of travel of the needle whereby a loop is formed in the cord and thereafter raise said pin to disengage said cord, a gear secured to said cam means, a pawl adapted to cooperate with said gear to drive said cam, and means adapted to be connected to the needle bar actuating shaft to actuate said pawl.

5. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, an arm adapted to be pivotally mounted on the presser foot of a sewing machine, means carried on one end of said arm adapted to supply the cord, a gear secured to the other end of said arm and adapted to be mounted on said presser foot bar, means on said block to maintain said gear in position on said presser foot bar, a rack carried by said block cooperating with said gear, means adapted to be connected to and actuated by the needle bar actuating shaft of the sewing machine to reciprocate said rack whereby the cord supply means will move alternately and progressively from a position to the left of the needle to a position to the right of the needle and present the cord in position to be secured to the base material, a pin carried by said block adapted to be positioned adjacent the end of the travel of the cord supply means in one direction, said pin being adapted to be lowered and raised, cam means carried by said block adapted to periodically lower said pin to engage the cord and hold it out of the path of travel of the needle whereby a loop is formed in the cord and thereafter raise said pin to disengage said cord, a gear secured to said cam means, a pawl adapted to cooperate with said gear to drive said cam, and means adapted to be connected to the needle bar actuating shaft to actuate said pawl, said pawl-actuating means being the said rack-actuating means.

6. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, means to supply a cord to be secured to a base material adapted to be pivotally mounted on the presser foot bar of a sewing machine, said means being of a shape so that upon oscillation thereof it will move in an arcuate path in front of the needle of said sewing machine alternately from a position to the left of the needle to a position to the right of said needle and thereby present the cord in position to be secured to the base material, means on said block to maintain the cord supply means in position on said presser foot, means carried on said block adapted to be connected to and actuated by the needle bar actuating shaft of the sewing machine to oscillate said cord supply means, and means carried by said block adapted to be cooperatively connected to and periodically actuated by the said needle bar actuating shaft to engage the cord and hold a portion thereof out of the path of the needle whereby a loop is formed.

7. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, means to supply a cord to be secured to a base material adapted to be pivotally mounted on the presser foot bar of a sewing machine, said means being of a shape so that upon oscillation thereof it will move in an arcuate path in front of the needle of said sewing machine alternately from a position to the left of the needle to a position to the right of said needle and thereby present the cord in position to be secured to the base material, means on said block to maintain said cord means in position on said presser foot, a pin carried on said block adapted to be positioned adjacent the end of travel of the cord supply means in one direction, and means carried by said block adapted to be cooperatively connected to and actuated by the needle bar actuating shaft to periodically lower said pin to engage the cord and hold it out of the path of the needle whereby a loop is formed, and thereafter raise said pin to disengage said cord.

8. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, means to supply a cord to be secured to a base material adapted to be pivotally mounted on the presser foot bar of a sewing machine, said means being of a shape so that upon oscillation thereof it will move in an arcuate path in front of the needle of said sewing machine alternately from a position to the left of the needle to a position to the right of said

needle and thereby present the cord in position to be secured to the base material, means carried by said block to maintain said cord supply means in position on said presser foot, means carried on said block adapted to be connected to and actuated by the needle bar actuating shaft of the sewing machine to oscillate said cord supply means, a pin carried by said block adapted to be positioned adjacent the end of travel of the cord supply means in one direction, and means adapted to be cooperatively connected to and actuated by the said needle bar actuating shaft to periodically lower said pin to engage the cord and hold it out of the path of the needle whereby a loop is formed, and thereafter raise said pin to disengage said cord.

9. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, an arm adapted to be pivotally mounted on the presser foot bar of a sewing machine, means on said block to maintain said arm in position on said presser foot, cord supply means carried by said arm, said arm being of a shape so that upon oscillation thereof the cord supply means will be moved in an arcuate path in front of the needle of the machine alternately and progressively from a position to the left of the needle to a position to the right of the needle and thereby present the cord to the needle in position to be secured to a base material, a gear mounted on said presser foot bar and secured to said arm, a rack carried by said block meshing with said gear, means adapted to be connected to and actuated by the needle bar actuating shaft to reciprocate said rack, a pin carried by said block adapted to be positioned adjacent the end of travel of the cord supply means in one direction, a cam carried by said block adapted to periodically lower said pin to engage the cord and hold it out of the path of the needle whereby a loop is formed, and thereafter raise said pin to disengage said cord, and means adapted to be connected to and actuated by the needle bar actuating shaft of the machine to actuate said cam.

10. A sewing machine attachment comprising a block adapted to be secured to the base of a sewing machine, a shelf carried by said block, means adapted to feed a cord carried by said shelf, said cord feeding means comprising an arm provided at one end thereof with means to supply the cord, said arm being provided at its opposite end wtih a gear having an aperture whereby said gear may be mounted on the presser foot of said machine, a block carried by said shelf adapted to be positioned on said presser foot beneath said gear to maintain said arm in position, said block on said shelf being provided with a slot, a rack disposed in said slot and adapted to cooperate with said gear, means adapted to reciprocate said rack, means adapted to connect said reciprocating means to the needle bar actuating shaft of the machine, said arm being of a shape so that, upon actuation of the gear carried thereby by said rack, it will alternately and progressively move from a position from the left of the needle to a position to the right of the needle and present the cord in position to be secured to the base material, means carried on said block adapted to periodically engage said cord to hold a portion thereof out of the path of travel of the needle whereby a loop is formed, said means comprising a pin, adapted to be raised and lowered, said pin being provided with a roller adapted to cooperate with a cam rotatably mounted on said block, said cam being provided with teeth on the peripheral surface thereof, a pawl adapted to cooperate with said teeth to rotate said cam, said pawl being connected to and adapted to be actuated by the means which reciprocates said rack.

CHARLES SEAMAN.