Feb. 20, 1951 R. M. GIBBONS, JR 2,542,764

APPARATUS FOR SEWING STRINGER TAPE FOR SLIDE FASTENERS

Filed Dec. 21, 1946 3 Sheets-Sheet 1

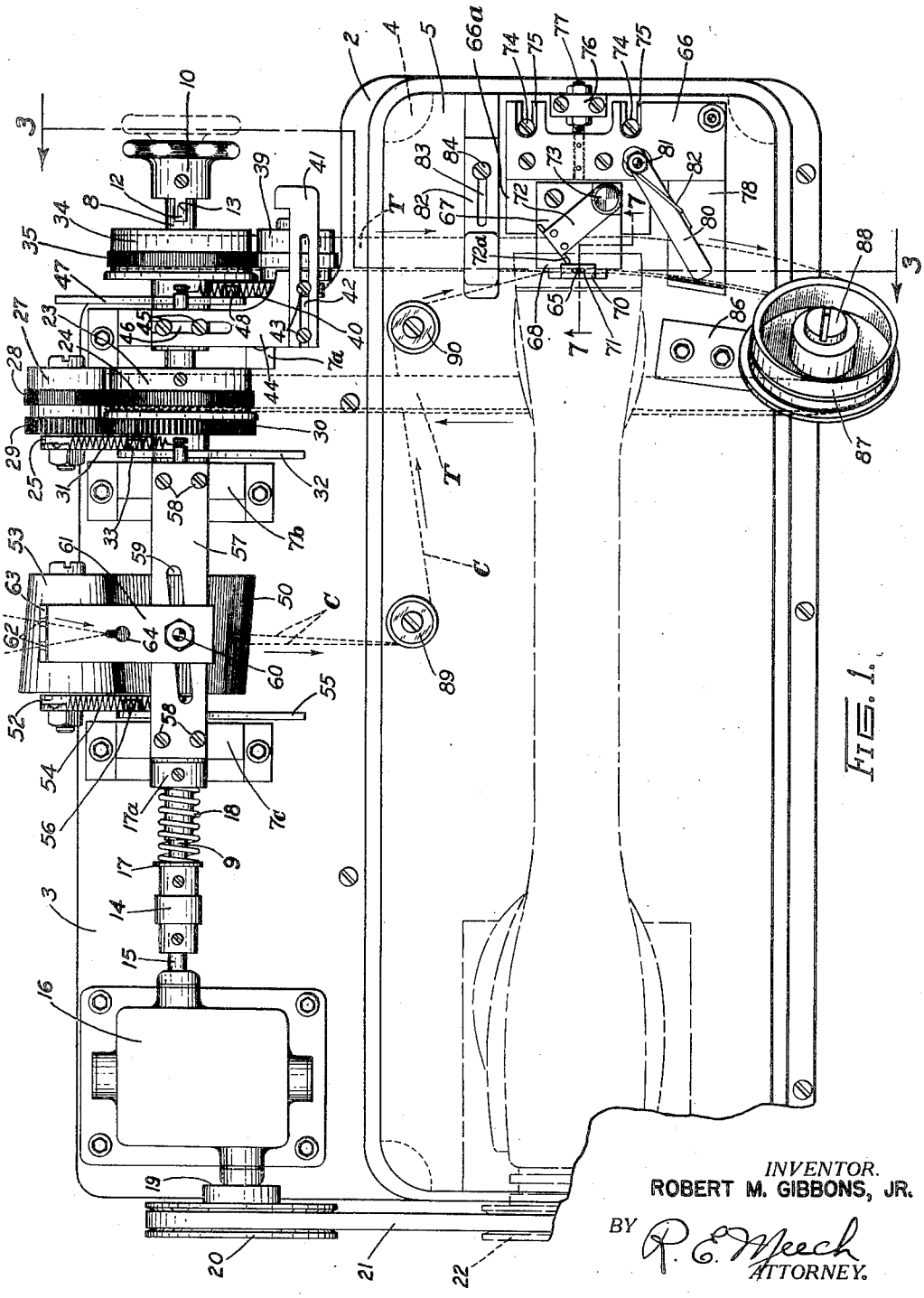

FIG. 1.

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Filed Dec. 21, 1946 3 Sheets-Sheet 2

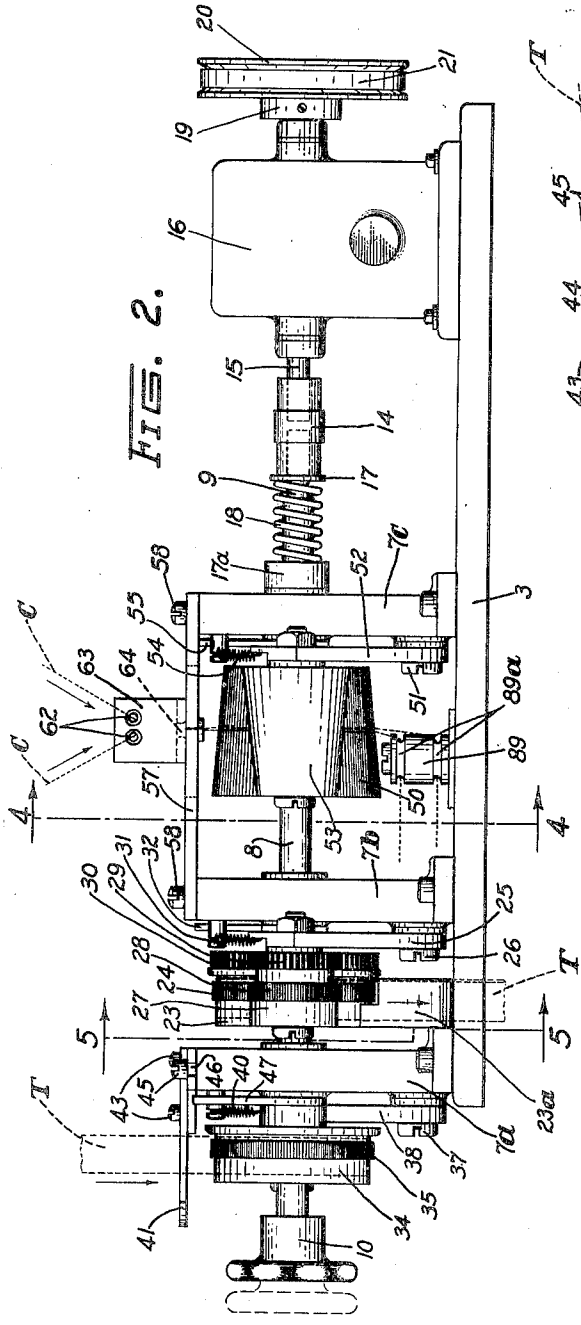

FIG. 2.

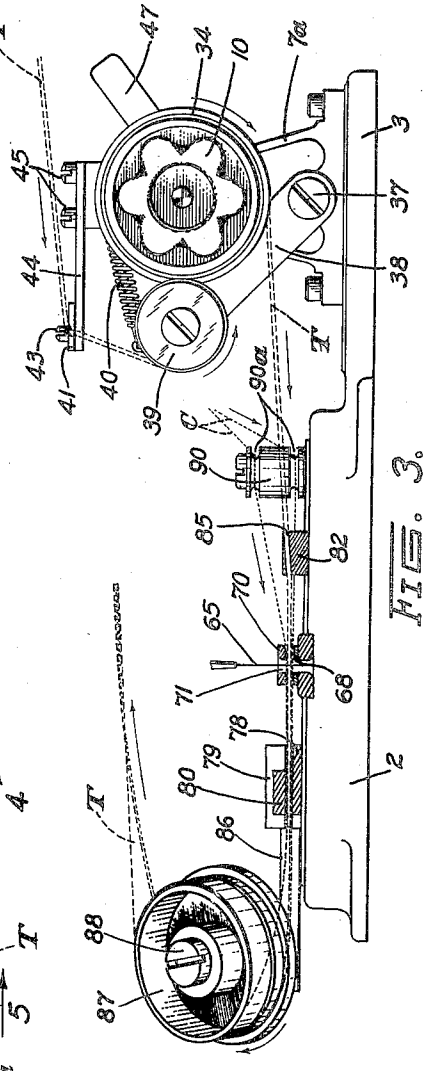

FIG. 3.

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APPARATUS FOR SEWING STRINGER TAPE FOR SLIDE FASTENERS

Filed Dec. 21, 1946 3 Sheets-Sheet 3

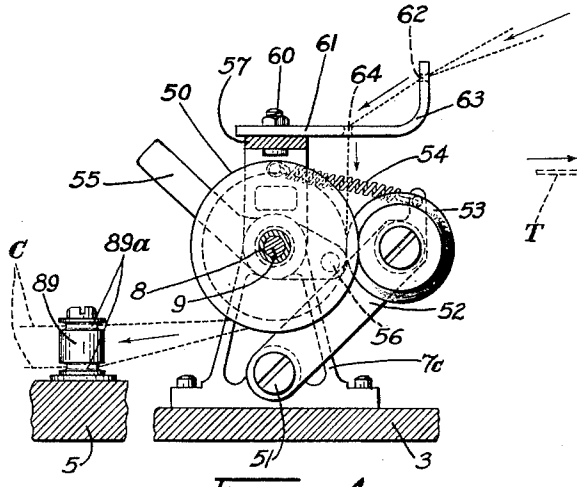

FIG. 4.

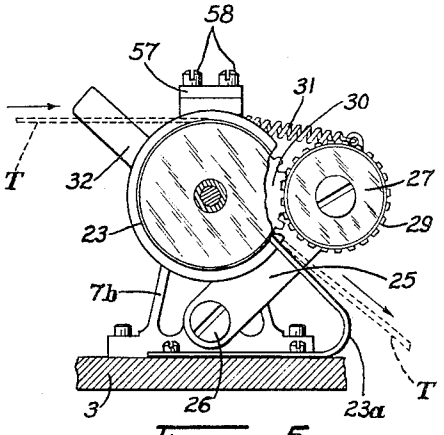

FIG. 5.

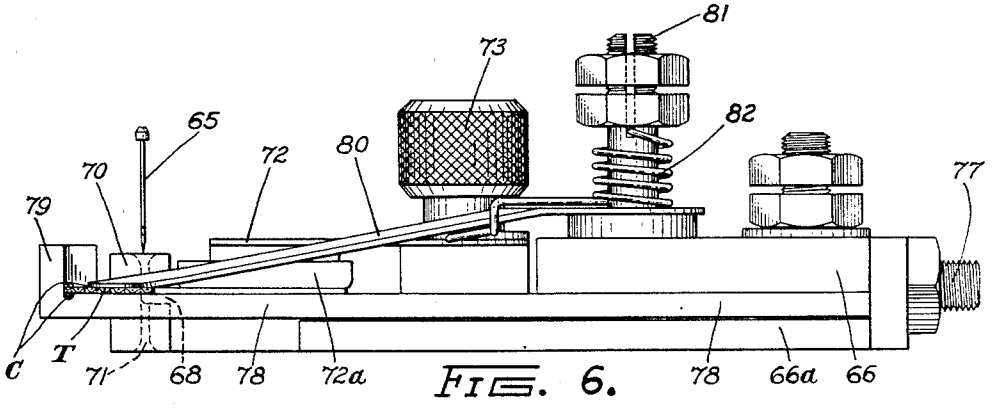

FIG. 6.

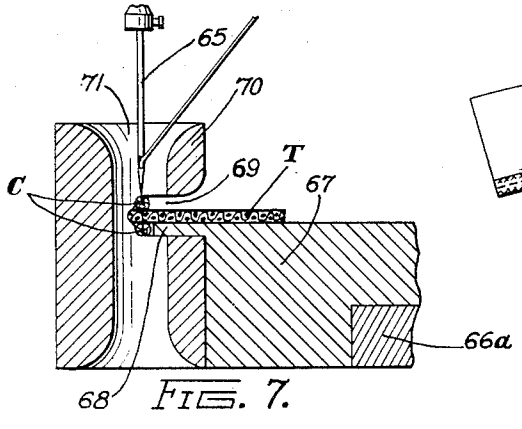

FIG. 7.

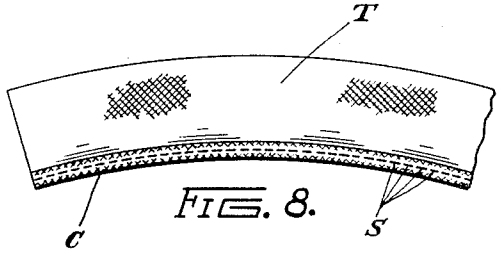

FIG. 8.

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UNITED STATES PATENT OFFICE

2,542,764

APPARATUS FOR SEWING STRINGER TAPE FOR SLIDE FASTENERS

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Application December 21, 1946, Serial No. 717,747

13 Claims. (Cl. 112—2)

1

This invention relates to stringer tape for slide fasteners, and particularly to an improved apparatus or attachment for use with automatic sewing machines for sewing cords to the tape to form a beaded edge therealong to which the fastener elements are attached.

In the manufacture of slide fasteners of the type consisting of a series of closely-spaced interlocking fastener elements attached to the opposed reinforced or beaded edges of a pair of stringer tapes, it is the general practice to form the reinforced or beaded edge along one edge of the tape by sewing two separate cords thereto with one disposed on each side of the tape. These cords are usually sewed to the tape in such a manner so as to provide a slight radius of curvature in the sewed tape or concavity at the beaded edge, the purpose of which is to obtain ultimately a straight and flat stringer after the fastener elements have been attached or clamped to the edge thereof, the beaded edge being stretched or lengthened somewhat by clamping of the fastener elements thereto. Such curvature in the tape is usually obtained by maintaining the cords under tension as they are being sewed to the tape. While such tensioning of the cords did produce a curved tape, it was difficult to control in order to obtain the desired curvature. In other words, it was difficult and virtually impossible to obtain a uniform curvature in the tape merely by tensioning the cords.

It is the primary object of the present invention to provide apparatus or means for controlling accurately the amount of cord being delivered to the sewing machine relative to the amount of tape being delivered thereto so as to obtain a uniform curvature in the sewed tape.

Accordingly, it is the general object of the invention to provide an improved apparatus or attachment for sewing machines which controls and measures the length of the two cords being delivered to the machine relative to the length of tape being delivered thereto so that the proper lengths of cord are sewed to the tape for any given length thereof to obtain the desired curvature in the tape.

It is another object of this invention to provide means incorporated with such apparatus for varying the amount of cord being delivered to the machine relative to the tape delivery whereby the radius of curvature of the sewed tape may be varied within a relatively narrow range, as desired.

It is a further object of the present invention to provide such apparatus which is simple and

2

inexpensive in its construction, and which can be conveniently incorporated with a conventional sewing machine at a nominal cost and which will not interfere with the operation thereof.

It is still another object of the invention to provide such apparatus which requires little or no attention from the operator after it has once been set in operation and, at the same time, such apparatus which is efficient and effective in its use.

Various other objects and advantages of this invention will be more apparent in the course of the following specification, and will be particularly pointed out in the appended claims.

In the accompanying drawings, there is shown for the purpose of illustration, an embodiment which my invention may assume in practice.

In these drawings:

Fig. 1 is a plan view of the improved apparatus of the present invention;

Fig. 2 is a front elevational view thereof;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is an enlarged rear view, in detail, of the tape and cord guiding means positioned adjacent the needle, as shown in Fig. 1;

Fig. 7 is a sectional view taken on line 7—7 of Fig 1; and

Fig. 8 is a plan view of the stringer tape to which my invention relates.

Referring more particularly to the drawings, the improved apparatus of my invention comprises a rectangular-shaped base 2 having an extension 3 arranged to one side thereof. The base 2 is preferably hollow having a shoulder 4 positioned at each corner thereof extending into the hollow portion and disposed slightly below the top of the base upon which shoulders the main base 5 of the sewing machine is adapted to rest. On the extension 3, there is arranged in suitable bearings carried by a plurality of upwardly extending brackets 7a, 7b, and 7c, a longitudinally extending, hollow shaft 8 which is disposed substantially parallel to the base 2 and the sewing machine. There is arranged in the hollow portion of the shaft 8, a solid shaft 9 on one end of which there is securely arranged a knob 10. The knob 10 carries a key 12 which engages in one position with a keyway 13 arranged in the end of the shaft 8, as shown in Fig.

1 of the drawings. The opposite end of the shaft 9 fits disengagingly into a coupling 14 carried by a shaft 15 of a gear box 16 mounted on the extension 3. Adjacent this end of the shaft 9, there is secured thereto a collar 17 which abuts against the adjacent end of the coupling 14, and there is secured to the shaft 8 at a spaced distance from the collar 16, an adjustable collar 17a. Between the collars 17 and 17a, there is disposed around the shafts 8 and 9, a compression coil spring 18 for the purpose of maintaining normally the shaft 9 in engagement with the coupling 14. There is carried by another shaft 19 arranged with the gear box 16, a pulley 20 over and around which there is disposed a chain or belt 21 which is also disposed over a pulley 22 which, in turn, is connected to the main drive shaft of the sewing machine, which is shown in broken lines. By such an arrangement, it will be seen that the shafts 8 and 9 are driven by the main shaft of the sewing machine by means of the belt 21, the pulleys 20 and 22, and the gear box 16.

As more clearly shown in Figs. 1, 2, and 5 of the drawings, intermediate the lengths of the shaft 8, there is secured thereto a roller 23 having an enlarged knurled portion 24 arranged around the periphery thereof. There is carried by the bracket 7b adjacent thereto, a lever 25 having one end thereof pivotally attached to the bracket, as at 26. On the other end of the lever 25, there is arranged a roller 27 having an enlarged knurled portion 28 arranged around the periphery thereof which cooperates with the knurled portion 24 of the roller 23 to pull the sewed tape through the machine in a manner hereinafter to be described. There is arranged securely with the roller 27, a gear 29 which meshes with a gear 30 arranged with the roller 23. The roller 27 is rotated by the roller 23 upon rotation thereof through the action of the gears 29 and 30. The gear 29 is maintained in meshing engagement with the gear 30 through the action of a coil spring 31 which extends between the end of the lever 25 and the bracket 7b. There is provided a lever arm 32 which is rotatably mounted on the shaft 8 intermediate its length. On one end of the lever 32, there is arranged a pin 33 which rests on the upper side of the lever 25. It is the purpose of this lever arm 32 to move the lever 25 about its pivotal connection at 26 against the action of the spring 31 so as to move the roller 27 and gear 29 out of engagement with the roller 23 and the gear 30 for the purpose of initially threading the tape between these rollers. There is provided a U-shaped member 23a which is attached to the extension 3 having the end thereof terminating adjacent the periphery of the roller 23 for the purpose of stripping the sewed tape from this roller.

As shown in Figs. 1, 2, and 3, there is also secured to the shaft 8 adjacent the end thereof and at a spaced distance from the roller 23, another similar roller 34 having an enlarged knurled portion 35 arranged around the periphery thereof. There is pivotally attached, as at 37, to the bracket 7a adjacent thereto, a lever 38 on the upper end of which there is rotatably mounted an idle roller 39 which contacts tangentially the roller 34. The roller 39 is held in contact with the roller 34 by means of a coil spring 40 which extends between the end of the lever 38 and the bracket 7a. There is movably mounted on the shaft 8, a lever 47 having a pin 48 positioned in one end thereof which rests against the upper side of the lever 38. It is the purpose of this lever arm to move the lever 38, together with the roller 39 carried thereby, out of contact with the roller 34 against the action of the spring 40 for the purpose of threading the tape in between and around the rollers 39 and 34. There is positioned above the roller 39, a tape guide member 41 which is slotted longitudinally thereof, as at 42, through which one end of the slot the tape passes to the roller 39 in a manner to be described. There is also provided in the slot 42, a pair of machine screws 43 for adjusting the member 41 longitudinally of the roller 39 which are threaded into a bracket 44 which is attached to the bracket 7a by means of machine screws 45 disposed in a slotted hole 46 arranged therein. The slotted hole 46 is provided for adjustment of the bracket 44, together with the bracket 41 carried thereby transversely of the rollers 39 and 34.

There is also securely mounted on the shaft 8 intermediate the length thereof at a point between the brackets 7b and 7c, a roller 50 which is preferably frusto-conical in shape, as more clearly shown in Figs. 1, 2, and 4 of the drawings. There is pivotally attached to the bracket 7c, as at 51, a lever 52 having a roller 53 rotatably mounted in the upper end thereof which is also preferably frusto-conical in shape. The roller 53 is held in tangential contact with the roller 50 by means of a coil spring 54 having one end attached to the upper end of the lever 52 and the other end attached to the bracket 7c. There is provided a lever 55 which is rotatably mounted intermediate its length on the shaft 8. There is disposed on one end of the lever 55, a pin 56 which bears against the upper side of the lever 52. This lever is provided for moving the lever 52, together with the roller 53 carried thereby, out of contact with the roller 50 for the purpose of threading the cords around the last mentioned roller.

There is arranged directly above the roller 50, a plate-like member 57 which extends between and rests upon the brackets 7b and 7c and is secured thereto by means of the machine screws 58. There is arranged in the member 57, an angular elongated slotted hole 59 through which an adjusting bolt 60 extends for adjusting a plate-like guide member 61 therealong longitudinally of the roller 50. The guide member 61 is preferably L-shaped having a pair of guiding eyes or apertures 62 arranged in the upwardly extending leg 63 thereof. Centrally of the horizontally disposed or other leg portion, there is arranged therethrough a guiding eye or aperture 64 which is positioned substantially in tangential alignment with the outer periphery of the roller 50. It is the purpose of this adjustable guide 61 to deliver the cords to the proper position along the periphery of the roller 50 for a purpose and in a manner hereinafter to be described.

On the outer end of the base plate 5 of the sewing machine directly opposite the needle 65, there is arranged a plate-like member 66a on which there is mounted another plate-like member 67 having a lip or shelf portion 68 which extends into a horizontally arranged, slotted opening 69 arranged in a guide member 70 disposed directly below the needle 65. There is also arranged in the guide 70, a vertically disposed, slotted hole 71 which communicates with the slotted opening 69 in the side thereof with the lip or shelf portion 68 of the member 67 disposed in the slot 71 for a purpose hereinafter to be described. There is mounted on the member 67, a

movable T-shaped guide member 72 which is attached to the plate 67 by means of a thumb screw 73 and which has a cross bar portion 72a which rests on the tape to guide and keep it flat. The plate-like member 66a is attached to the top of the base 5 by means of a pair of machine screws 74 which are disposed in the open end slotted holes 75 in the outer edge of the plate. There is positioned on the plate 66a rearwardly of the plate 67, another plate 66 to the side of which there is mounted on the base 5, a bracket member 76 provided with an adjusting screw 77 which extends between the bracket and the outer edge of the member 66 for adjusting the plates 66 and 66a away from and toward the needle 65 for the purpose of adjusting the guides carried thereby. There is attached to the bottom of the member 66 rearwardly of the needle 65 and the plate 67, an outwardly extending member 78 having an upwardly extending flange portion 79 arranged at the end thereof. There is mounted on top of the plate 66 and extending over the member 78, an adjustable finger-like guide member 80 having one end thereof adjustably secured to the plate 66 by means of a stud 81. There is arranged with the stud 81, a spring 82 which acts upon the guide member 80 to maintain the outer end thereof in contact with the member 78 and yieldably in engagement with the flange 79 carried thereby, as more clearly shown in Fig. 6.

There is positioned on the base 5 of the sewing machine forwardly of the needle 65 and the plate 66, an adjustable guide member 82 which has a slotted hole 83 arranged therein in which a machine screw 84 extends which is threaded into the base 5 for adjusting the guide. In the inner end of the guide 82, as shown in Fig. 3, there is provided a rectangular-shaped opening 85 through which the tape is guided to the needle.

On top of the base 5 of the sewing machine on the side opposite that from the shaft 8 and the rollers 23 and 34 carried thereby, there is mounted a bracket member 86 on which there is mounted an idle roller 87 on an angularly arranged axis 88. There is also rotatably mounted on top of the base 5, a pair of idle guide rollers 89 and 90 having a pair of spaced-apart circumferential grooves 89a and 90a, respectively, arranged therein in which the cords are adapted to be disposed. The guide roller 89 is positioned opposite the frusto-conical shaped roller 50, and the other guide roller is positioned to one side and at a spaced distance therefrom at a point on the base between the rollers 23 and 34, as shown in Fig. 1.

The operation of my improved apparatus will now be described. The tape T is initially positioned in the apparatus and sewing machine by threading it down through the slot 42 in the member 41, down around the idle roller 39, up and around the roller 34, through the slot 85 in the guide member 82, through the slot 69 in the member 70 positioned directly below the needle 65, over the end of the guide member 78, around the idle roller 87, and back over and down around the roller 23, so as to be positioned between this roller and the roller 27 and out of the machine. It will be understood that the tape is positioned in the machine under normal tension; in other words, when the tape is positioned in the machine, as above described, and threaded through the various guides and rollers, that portion of the tape extending from the roller 34 through the machine to the roller 23 is placed under tension. The two cords C which are adapted to be sewed to the tape T are then positioned in the apparatus by threading them through the eyes 62 in the adjustable guide member 61, down through the aperture 64 therein, down around the frusto-conical shaped roller 50 so that the cords are positioned between this roller and the frusto-conical shaped roller 53, around the idle guide rollers 89 and 90 so that one of the cords is positioned in each of the circumferential grooves 89a and 90a, respectively, arranged in these rollers, and through the slot 69 in the member 70 with one of the cords being disposed on top of the tape and the other positioned therebelow at the edge thereof, as shown in Fig. 7. The cords C are then disposed along the tape and threaded around the idle roller 87 and back down around the idle roller 23 and out of the machine.

The guide member 61 is then adjusted along the member 57 by means of the adjusting nut 60 so that the cords C will be delivered to the desired point on the periphery of the frusto-conical shaped roller 50 to obtain the desired tension in both of the cords. In other words, the member 61 is adjusted so that the proper length of both of the cords C is delivered to the sewing machine relative to the amount of tape T being delivered thereto in order to obtain the desired curvature in the sewed tape.

After both the tape and cords are positioned in the apparatus and machine, as above described, the sewing machine is set in operation. When the machine is operating, it will be seen that the shafts 8 and 9 will be rotated thereby due to the action of the belt 21, the pulleys 20 and 22, and the gear box 16. Upon rotation of the shaft 8, it will be seen that all of the rollers secured thereto, namely, rollers 34, 23, and 50, will be rotated thereby. As the roller 23 is rotated, it will be seen that both the tape T and the cords C are pulled through the various guides and the machine from the roller 34 thereby maintaining the tape and cords under tension with the tension on the cords being the greater depending upon the curvature desired in the finished tape. This is due to the fact that the cords C are positioned on that portion of the frusto-conical roller 50 having a greater diameter than the roller 34. In other words, the peripheral speed of the position that the cords C assume on the roller 50 is greater than that of the position the tape T assumes on the roller 34. It will be understood that the roller 34 delivers the tape T to the machine from the source of supply, while the frusto-conical shaped roller 50 delivers the cords C to the machine from its source of supply.

During the sewing operation, it will be seen that both of the cords are sewn to the edge of the tape by the needle 65 at the guide 70, as shown in Fig. 7, to form a curved stringer tape, as shown in Fig. 8, with the cords C sewn thereto by means of the stitches S. It will be understood that the frusto-conical shaped roller 50 actually measures the lengths of the two cords being delivered to the machine, and that the amount being delivered thereto for any given length of tape may be adjusted and controlled by means of the adjustable guide member 61 in order to secure the desired curvature in the finished stringer tape. In the construction shown, the tension applied to the tape T between the rollers 34 and 23 remains constant while that applied to the cords is variable due to the frusto-

conical roller 50, but it may be desirable, however, to have an arrangement whereby the peripheral speed of the roller 34 may be varied so as to vary the tension of the tape T as it passes into the machine. In other words, it might be practical to vary the tension of the tape rather than that of the cords, as shown, but both are within the teachings of the present invention

If it is desired to rotate the shafts 8 and 9 manually for the purpose of threading the tape and cords into the machine or for any other purpose, the shaft 9 may be disconnected from gear box 16 and the source of power merely by pulling the shaft 9 outward y by means of the handle 10 so as to disconnect the shaft 9 from the shaft 15 at the coupling 14. To connect the shaft 9 with the power drive, the handle 10 is released so as to permit the shaft 9 to move inwardly with the key 12 passing into the keyway 13 of the shaft 8 due to the action of the spring 18.

As a result of my invention, it will be seen that there is provided a simple and inexpensive means or apparatus which can be easily incorporated with a conventional type sewing machine for measuring accurately and controlling the amount of cord being sewed to the tape so that the radius of curvature in the sewed stringer tape can be accurately and efficiently controlled.

While I have shown and described an embodiment which my invention may assume in practice, it will be understood that this embodiment is merely for the purpose of illustration and description, and that other forms may be devised within the scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. In combination with a sewing machine having a reciprocable needle for sewing a pair of cords to opposed sides of a flexible tape at one edge thereof, means positioned rearwardly of said needle for pulling the tape together with the cords sewed thereto through said machine relative to said needle, rotatable means positioned forwardly of said needle around which the tape passes for retarding the delivery of the tape to the machine whereby that portion of the tape under said needle between said pulling means and said retarding means is under a constant tension, rotatable means positioned forwardly of said needle around which the cords pass for controlling and measuring the length of the cords being delivered to the machine at said needle so that the proper lengths of cord are delivered to the machine and sewed to the tape for any given length thereof.

2. In combination with a sewing machine having a reciprocable needle for sewing a pair of cords to opposed sides of a flexible tape at one edge thereof, rotatable means positioned rearwardly of said needle for pulling the tape together with cords sewed thereto through said machine relative to said needle, rotatable means positioned forwardly of said needle around which the tape passes for retarding the delivery of the tape to the machine whereby that portion of the tape positioned between said pulling means and said retarding means is under a constant tension as it passes through the machine rotatable means positioned forwardly of said needle around which the cords pass for retarding the delivery of the cords to the machine whereby the cords likewise are under a constant tension, means arranged with said last mentioned means for adjusting the amount of retardation of said cords relative to that of said tape whereby the proper lengths of cord are delivered to the machine and sewed to the tape for any given length thereof, and means for guiding the tape and cords to position in under said needle for the sewing together thereof.

3. The combination as defined in claim 2, wherein the means positioned forwardly of the needle for retarding the delivery of the cords to the machine consists of a frusto-conical shaped roller around which the cords pass, means for maintaining the cords in engagement with the periphery of said roller, and means adjustable longitudinally of the roller for delivering the cords to the periphery of said roller at any desired point therealong.

4. The combination as defined in claim 2, wherein the means positioned forwardly of the needle for retarding the delivery of the cords to the machine consists of a frusto-conical shaped roller around which the cords pass, a similar frusto-conical roller oppositely disposed from said first mentioned roller and arranged in tangential contact therewith for maintaining the cords in engagement with the periphery of said first mentioned roller, and a means adjustable longitudinally of said rollers for delivering the cords to the periphery of said first mentioned roller at any desired point therealong.

5. In combination with a sewing machine having a reciprocable needle for sewing a pair of cords to opposed sides of a flexible tape at one edge thereof, an elongated shaft positioned substantially parallel to said machine at one side thereof, a roller securely arranged on said shaft over and around which the tape together with cords sewed thereto is disposed, said roller adapted to pull the tape and cords through said machine relative to said needle when said shaft is rotated, a similar roller securely arranged on said shaft opposite said needle over and around which the tape is disposed for retarding the delivery of the tape to said needle when said shaft is rotated, guide means positioned on the opposite side of the machine from said shaft for reversing the path of the tape with the tape passing from said last mentioned roller, in under said needle, around said guide means and to said first mentioned roller, said rollers being constructed and arranged so that that portion of the tape extending in under said needle and around said guide means is under constant tension due to the retarding action of said last mentioned roller, and means for delivering the cords to said machine including means for controlling and measuring the lengths of the cord being delivered thereto at said needle so that the proper lengths of cord are delivered to the machine and sewed to the tape for any given length thereof.

6. The combination as defined in claim 5, wherein the means for controlling and measuring the lengths of cord being delivered to the machine at the needle consists of a frusto-conical shaped rotatable roller over and around which the cords are disposed, and means adjustable longitudinally of said roller for delivering the cords to the periphery thereof at any desired point therealong.

7. The combination as defined in claim 5, wherein the means for controlling and measuring the lengths of cord being delivered to the machine at the needle consists of a frusto-conical shaped roller securely arranged on said shaft including means arranged therewith maintaining the cords in engagement with said roller, and means adjustable longitudinally of said roller

for delivering the cords to the periphery thereof at any desired point therealong.

8. In combination with a sewing machine having a reciprocable needle for sewing a pair of cords to opposed sides of a flexible tape at one edge thereof, an elongated shaft positioned substantially parallel to said machine at one side thereof, a roller securely arranged on said shaft over and around which the tape together with cords sewed thereto is disposed, said roller adapted to pull the tape and cords through said machine relative to said needle when said shaft is rotated, a similar roller securely arranged on said shaft substantially opposite said needle over and around which the tape is disposed for retarding the delivery of the tape to said needle when said shaft is rotated, an idle roller positioned on the opposite side of the machine from said shaft around which the tape is disposed for reversing the path thereof as it passes thereto from said needle, means positioned adjacent said needle for positioning and guiding the cords and tape as they pass thereunder, a frusto-conical shaped roller securely arranged on said shaft over and around which the cords are delivered to said machine, said roller adapted to retard the delivery of the cords and to measure the lengths thereof being delivered to said machine at said needle so that proper lengths of cord are delivered and sewed to the tape for any given length thereof, a similar frusto-conical shaped roller disposed opposite that from said first mentioned roller and in tangential contact therewith, said last mentioned roller adapted to maintain said cords in engagement with the periphery of said first mentioned roller, and means adjustable longitudinally of said rollers for guiding and delivering the cords to the periphery of the first mentioned conical roller at any desired point therealong.

9. In combination with a sewing machine having a reciprocable needle for sewing cords to the edge of a flexible tape, rotatable means around which the tape passes for delivering the tape together with the cords sewed thereto from said machine, rotatable means positioned forwardly of said needle around which the tape passes for maintaining the tape taut and under constant tension as it is delivered to said machine, and at least one roller positioned forwardly of said needle over and around which the cords pass whereby the proper lengths of cord are measured and

delivered to the machine and sewed to the tape for any given length thereof.

10. The combination as defined in claim 9, wherein the roller around which the cords pass is frusto-conical in shape.

11. In combination with a sewing machine having a reciprocable needle for sewing cords to the edge of a flexible tape, rotatable means around which the tape passes for delivering the tape together with the cords sewed thereto from said machine, rotatable means positioned forwardly of said needle around which the tape passes for maintaining the tape taut and under constant tension as it is delivered to said machine, and a pair of rollers positioned forwardly of said needle disposed directly opposite each other around and between which the cords pass whereby the proper lengths of cord are measured and delivered to the machine and sewed to the tape for any given length thereof.

12. The combination as defined in claim 11, wherein the pair of rollers around which the cord passes are both frusto-conical in shape.

13. In combination with a sewing machine having a reciprocable needle for sewing a pair of cords to opposed sides of a flexible tape at one edge thereof, means for delivering cords to said machine, cylindrical means around which the tape passes as it is being delivered to the machine, means for simultaneously measuring and controlling the lengths of cord being delivered to the machine relative to the length of tape being delivered thereto whereby the proper lengths of cord are delivered to the machine and sewed to the tape for any given length thereof, and rotatable means for pulling the tape, together with the cords sewed thereto, from said measuring and delivering means through said machine relative to said needle whereby the tape is constantly under a predetermined tension.

ROBERT M. GIBBONS, JR.

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