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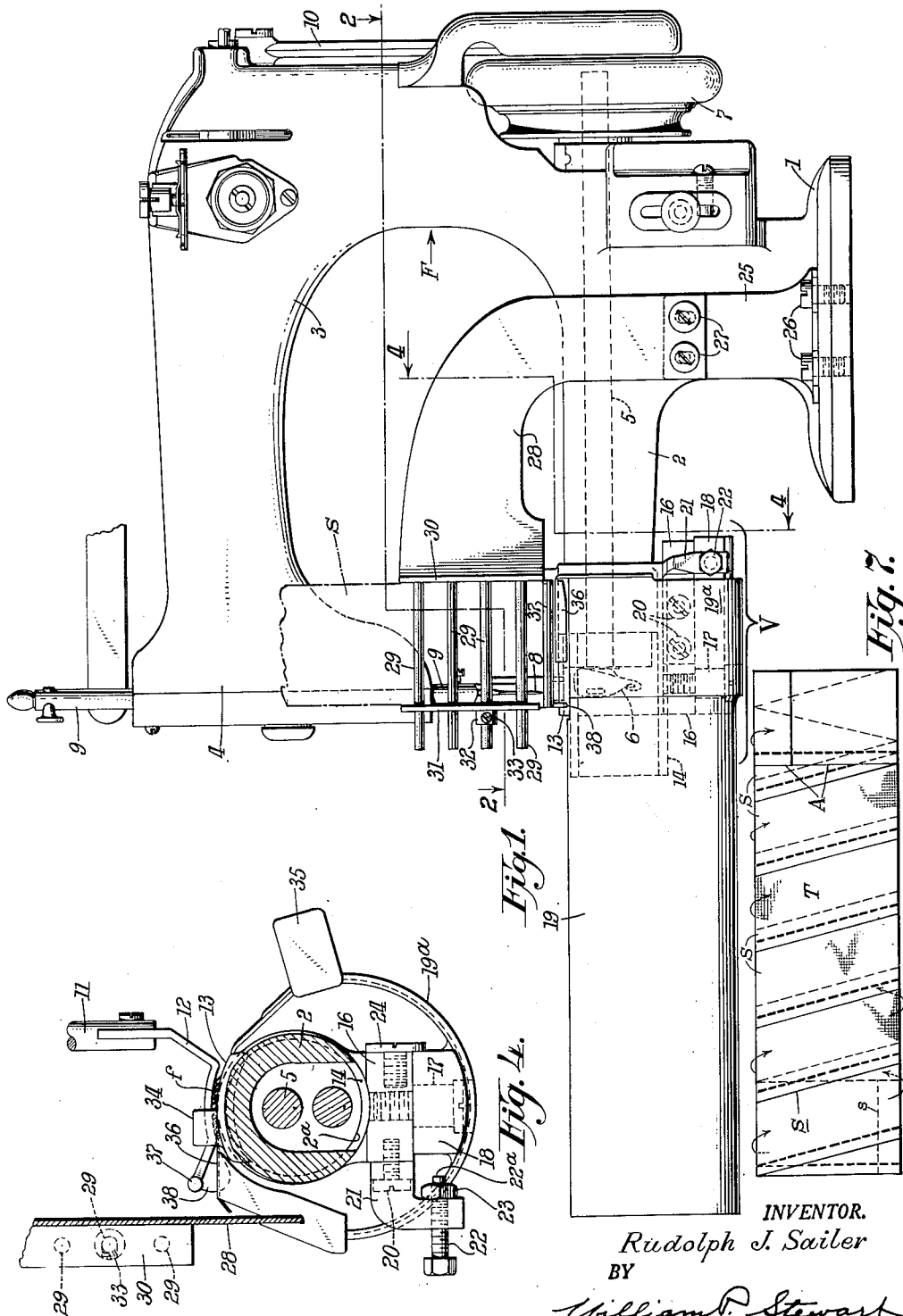
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SEWING MACHINES FOR MAKING FABRIC TUBES

Filed Aug. 18, 1947

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

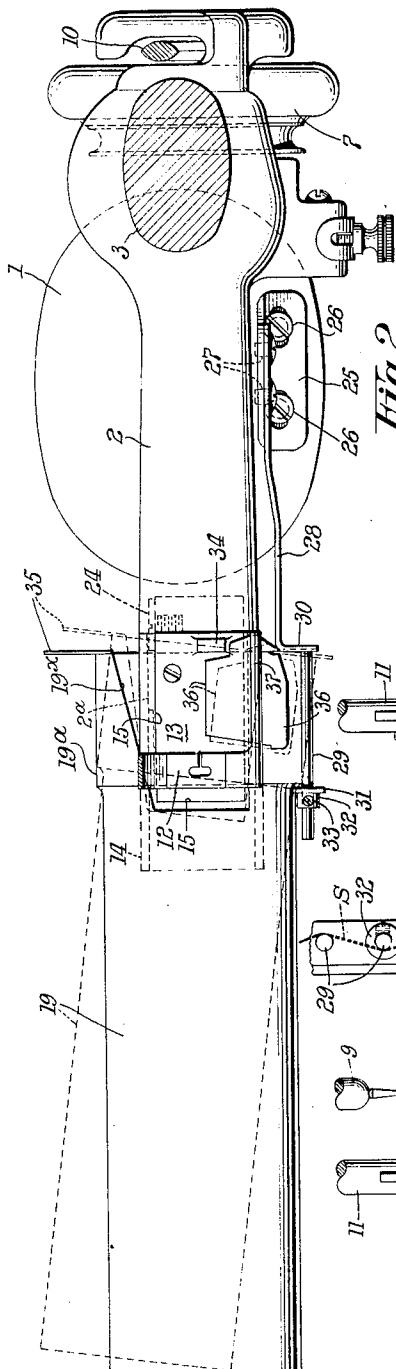


Fig. 2.

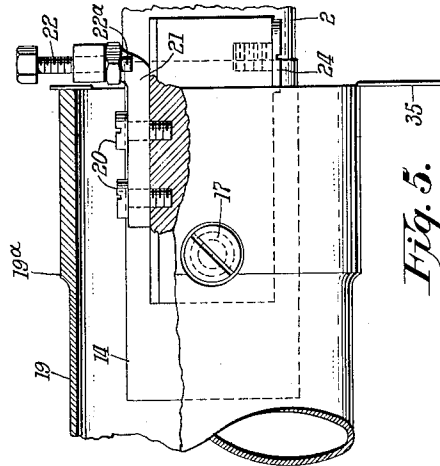


Fig. 5.

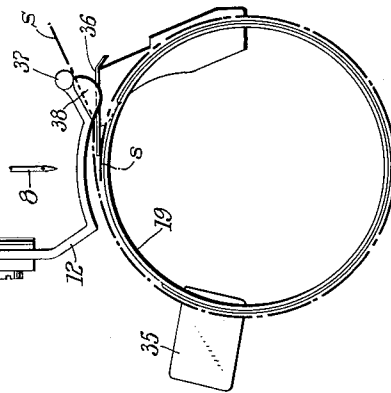


Fig. 6.

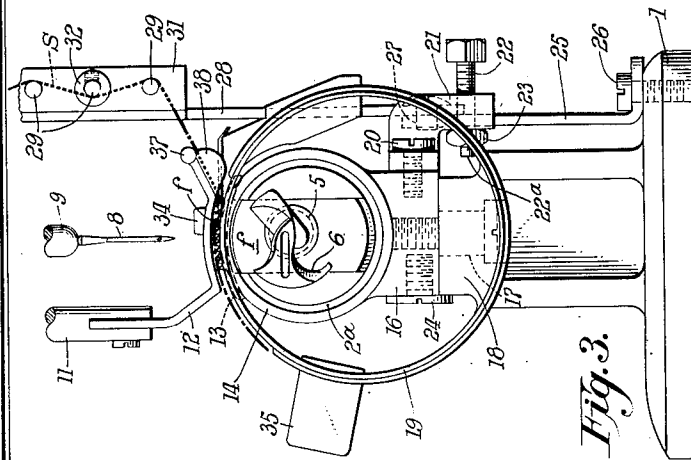


Fig. 3.

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SEWING MACHINES FOR MAKING FABRIC TUBES

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9 Claims. (Cl. 112—63)

1

This invention relates to the manufacture of helically wound and helically stitched fabric tubes, such as are used, for example, as valves in vacuum cleaner dust bags, and it has as its primary object to provide improved means for making such tubes.

Another object is to provide improved means associated with a sewing machine for causing the machine to produce, in a single continuous operation, a helically wound and helically stitched fabric tube as above described.

Still another object of the invention is to provide improved means for forming a helically wound and stitched tube, of any desired length, having finished end portions which are reinforced and square with respect to the axis of the tube.

A still further object is to provide improved means for forming from a fabric strip a helically wound and stitched tube, of any desired length, having finished end portions which are square with the axis of the tube and which comprise a plurality of spirally wound superimposed layers of the strip.

Still another object is to provide improved means for forming a helically wound and stitched tube and to provide readily adjustable means for varying the pitch of the helix.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a side elevation of a single thread chain-stitch sewing machine embodying features of the present invention.

Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a left end view of the lower portion of the machine illustrated in Fig. 1.

Fig. 4 is a vertical sectional view taken substantially on the line 4—4 of Fig. 1.

Fig. 5 is an under side view, partly in section of that portion of the machine indicated by the brace V in Fig. 1.

Fig. 6 is a diagrammatic view illustrating the manner in which the fabric strip is wound about an arbor and held to initiate a tube-sewing operation.

Fig. 7 is a side view of a helically wound and stitched fabric tube made by the improved machine.

Referring more specifically to the drawings, the invention comprises a single thread chain-stitch sewing machine comprising a frame F including

2

a base 1, a cylindrical bed 2 having a reduced end portion 2^a, an overhanging bracket-arm 3 and a bracket-arm head 4.

Journalled lengthwise within the bed 2 is a main shaft 5 which carries, at its front end, a rotary chain-stitch looper 6 and, at its rear end, a combined belt and hand wheel 7, by means of which the shaft is rotated from any suitable source of power. Cooperating with the looper, in the formation of stitches, is an eye-pointed needle 8 secured in the lower end of a needle-bar 9 reciprocably mounted in the head 4 and actuated from the main shaft 5 through any suitable mechanism, a portion of which is designated as 10. Also mounted in the head 4 is a spring-depressed presser-bar 11 which carries, at its lower end, a presser-foot 12, normally adapted to bear upon a slotted throat-plate 13 carried by the bed 2. A conventional work-feeding mechanism, including a four-motoned feed-dog 14, adapted to operate through the slots in the throat-plate 13, is mounted in the hollow bed 2 and is operated from the main shaft 5 of the machine. This feeding mechanism cooperates with the overlying presser-foot to effect feeding of the work across the bed 2.

Slidably fitted upon the reduced end portion 2^a of the bed 2 is an end cap 15 which has a cut-out 16 in its upper surface to fit about the throat-plate 13. Secured to the bottom of the end cap 15 is a stop block 17, to the under side of which is pivoted, substantially in alignment with the axis of the needle 8, as by a shoulder screw 18, a pivot block 19, secured within one end of a member 20. The member 20 is preferably, but not necessarily, of cylindrical form and constitutes an arbor about which the fabric strip is wound, as hereinafter will be described. By reason of this pivotal mounting of the arbor 20 on the end cap 15, the arbor may be manually turned from a position in which its axis is substantially coaxial with the axis of the bed 2, as illustrated in full lines in Fig. 2, to various positions in which its axis is at an acute angle to the axis of said bed, as illustrated, for example, in dotted lines in Fig. 2. The member 20 is cut away, as at 20^x, to prevent interference with the end cap 15 when the member is turned to its dotted line position.

Secured to one side of the stop block 17, as by screws 21, is a bracket 22 into which is adjustably threaded a stop-screw 23 adapted to have its end 23^a contact the block 17, thereby to limit the swinging movement of the arbor 20 in one direction. The screw may be secured in any

position of adjustment by a lock nut 23. A screw 24 threaded into the opposite side of the block 16 has its head projecting below the bottom of the block and adapted to engage one side of the pivot block 18 when the arbor 19 is swung to a position in which it is in axial alignment with the bed 2.

A standard 25, adjustably secured to the base 1, by screws 26, has adjustably mounted on its upper end, by screws 27, a bracket 28, which carries a plurality of horizontally disposed strip-guiding and tensioning rods 29 between which a fabric strip S is threaded in its passage to the stitch-forming mechanism. The bracket 28 is formed with an offset flange 30 which forms a guide for the right edge of the strip S. The other edge of the strip is guided by a plate 31 carried by a collar 32 adjustably secured upon one of the rods 29, by a set screw 33. Other guides 34 and 35 for the right edge of the strip S are provided, respectively, by the throat-plate 13 and the tube 19.

The right end portion 19^a of the tube 19, that is that portion thereof below and to the right of the presser-foot, is of slightly greater diameter than the remainder of the tube and carries a horizontally disposed hold-down plate 36 which is spaced slightly above the upper surface of the throat-plate 13. This enlargement of that portion of the arbor obviates all possibility of the tube binding upon the arbor as it is fed therealong.

The fabric strip S which is to be sewn into the form of a tube T, as shown in Fig. 7, is led from any suitable source of supply and, as above stated, is threaded between the rods 29 which, together with the flange 30 and plate 31, guide and tension the strip. The presser-foot 12 also is provided with a horizontally disposed guide rod 37 and a vertically disposed guide flange 38 which assist in guiding the strip S to the stitch-forming mechanism. By reason of the adjustment of the standard 25 on the base 1 and the adjustment of the plate 31 on the rods 29, strips S of various widths may be used to form the tube.

To produce the tube T, the arbor 19 is shifted to the position shown in full lines in Fig. 2, the presser-foot is raised, and the strip S is passed beneath the presser-foot 12 and wrapped once around the enlarged end portion 19^a of the arbor 19. The free end portion s of the strip is inserted between the hold-down plate 36 and the throat-plate 13, as indicated in Fig. 6. The presser-foot is then lowered upon the strip and the sewing machine is started. As hereinbefore indicated, it is desirable to have the end portions of the finished tube reinforced and square with the axis of the tube, therefore the machine is operated with the arbor in the position shown in full lines in Fig. 2 until one or more spirally wound layers of the strip have been stitched together. This produces a portion of the ultimate tube in which the layers are wound spirally, but not helically. After this portion of the tube has been formed, the arbor is turned about its pivot 17 to an angular position, such for example as shown in dotted lines in Fig. 2. During continued operation of the sewing machine the feeding mechanism causes the sewn portion of the tube to be rotated about the arbor and to be advanced lengthwise thereof. This results in the formation of a helically wound and helically stitched tube, as shown in Fig. 7.

When the tube has been formed to the desired length, the arbor 19 is again turned to the position shown in full lines in Fig. 2 and the sewing is continued with the strip wound spirally, but not helically, as in the beginning. When the desired number of turns have been stitched with the end of the tube square with the axis of the tube, as indicated at A in Fig. 7, the machine is stopped, the strip S is severed in advance of the presser-foot and the machine is again operated to sew down the final inch or so of the strip.

It will be understood that the pitch of the helix of the wound strip and the amount of overlap of the layers will be determined by the angle to which the arbor 19 is adjusted.

As used in this specification and in the appended claims, the term "cylindrical," as applied to the bed 2, is intended to include all forms of work-supporting beds which are relatively long and thin and which are supported from one end only.

The term "spirally" is used to designate the wrapping of the end portions of the tube, wherein the convolutions of the strip S are laid one directly upon the other, without any axial advance, while the term "helically" designates the nature of the winding of the strip between the end portions and in which the convolutions of the strip extend around the axis of the tube and also lengthwise thereof.

Having thus set forth the nature of the invention, what I claim herein is:

1. In combination with a sewing machine having a frame including a cylindrical bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; an arbor supported on a free end of said bed and extending outwardly therefrom at an angle thereto, and means to direct a strip of material to the stitch-forming and work-feeding mechanisms and helically about said arbor, with the opposite marginal portions of the strip in overlapping relationship to cause the machine to sew together the overlapped marginal portions of the strip as the strip is fed helically along said arbor.

2. In combination with a sewing machine having a frame including a cylindrical bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; a hollow cylindrical arbor pivotally supported on and surrounding a free end of said bed and extending outwardly therefrom at an acute angle thereto, and means to direct a strip of material to the stitch-forming and work-feeding mechanisms and helically about said arbor, with the opposite marginal portions of the strip in overlapping relationship, to cause the machine to sew together the overlapped marginal portions of the strip as the strip is fed helically along said arbor.

3. In combination with a sewing machine having a frame including a cylindrical bed, an end cap fitted on the free end of the bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; a tubular arbor pivotally mounted on said end cap and extending outwardly therefrom, means to position said arbor with its axis in substantial alignment with the longitudinal axis of said bed, means to direct a strip of material to the stitch-forming and work-feeding mechanisms and spirally about said arbor to cause the machine to sew together the superimposed spirally wound layers of the strip, and means to position said arbor with its axis at an acute angle to the longitudinal axis of said bed

5

to cause said strip to be wound helically about said arbor with the opposite marginal portions of the strip in overlapping relationship at the point of stitch formation.

4. In combination with a sewing machine having a frame including a horizontally disposed bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; an arbor pivotally supported on a free end of said bed and extending outwardly therefrom, stop means to align the axis of said arbor with the axis of said bed, means to direct a strip of material to the stitch-forming and work-feeding mechanisms and spirally about said arbor to cause the machine to sew together the superimposed spirally wound layers of the strip, and adjustable stop means acting on said arbor to limit the swinging of the arbor about its pivot to position the arbor at an acute angle to the longitudinal axis of said bed.

5. In combination with a sewing machine having a frame including a relatively long and thin bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; a cylindrical arbor having an enlarged end portion supported on a free end of said bed and a reduced portion extending therefrom, a hold-down plate carried by said enlarged end portion forwardly of said stitch-forming mechanism, means to direct a strip of material to the stitch-forming and work-feeding mechanisms and more than once about the enlarged portion of the arbor with the free end of the strip located beneath said hold-down plate to cause the machine to sew together the superimposed plies of the strip, and means to adjust the arbor to a position at an acute angle to the longitudinal axis of said bed whereby continued operation of the machine causes the strip to be wound helically about said arbor with the opposite marginal portions in overlapping relationship and united by a seam formed by said stitch-forming mechanism.

6. In combination with a sewing machine having a frame including a cylindrical bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; a cylindrical arbor supported on a free end of said bed and extending outwardly therefrom at an angle thereto, a strip guide constructed and arranged to direct a strip of material to the stitch-forming and work-feeding mechanisms at an acute angle to the longitudinal axis of said arbor to cause the machine to sew together the overlapped marginal portions of the strip as the strip is fed helically along said arbor, and means to adjust said strip-guide to accommodate strips of various widths.

7. In combination with a sewing machine hav-

6

ing a frame including a cylindrical bed, an end cap fitted on the free end of said bed, stitch-forming mechanism, and a work-feeding mechanism for feeding work across said bed; a cylindrical arbor pivotally mounted on said end cap and extending outwardly from said end cap, said arbor being shiftable from a position in which it is aligned with said bed to a position in which it is at an acute angle thereto, and means to direct a strip of material to the stitch-forming and work-feeding mechanisms and around said arbor to cause the machine to sew together the superimposed spirally wound layers of said strip when said arbor is in alignment with said bed and to sew together the overlapped opposite marginal portions of the helically wound strip when the arbor is set at an acute angle to the bed.

8. In a sewing machine adapted to sew together the opposite overlapped margins of a helically wound strip and including a stitch-forming mechanism having a reciprocating needle and a cooperating loop-taker, and a work-feeding mechanism; an arbor about which the strip is helically wound by the action of said feeding mechanism, means pivotally supporting said arbor on an axis substantially in alignment with the axis of said needle, and stop means acting on said arbor to limit the pivotal movement thereof.

9. In a sewing machine having a cylindrical bed, stitch-forming mechanism including a reciprocating needle and a cooperating loop-taker, and work-feeding mechanism for feeding work across said bed; an arbor pivotally supported on said bed on an axis substantially in alignment with the axis of said needle, said arbor being constructed and arranged to be shifted to one position in which it is aligned with said bed and to another position in which it is at an acute angle thereto, guide means to direct a strip of material to said stitch-forming and work-feeding mechanisms and spirally about said arbor when the arbor is in a position in alignment with said bed and helically about the arbor when the arbor is in a position at an acute angle thereof, and adjustable stop means to vary the angular position of said arbor.

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