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C. J. SNYDER ETAL

3,371,632

THREAD CONTROL ATTACHMENT FOR SEWING MACHINES

Filed Dec. 17, 1965

FIG. 1.

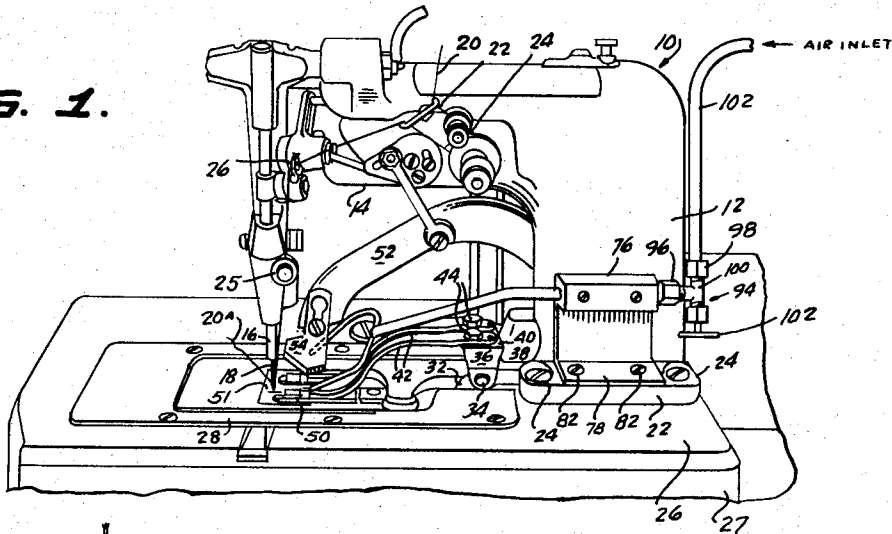


FIG. 2.

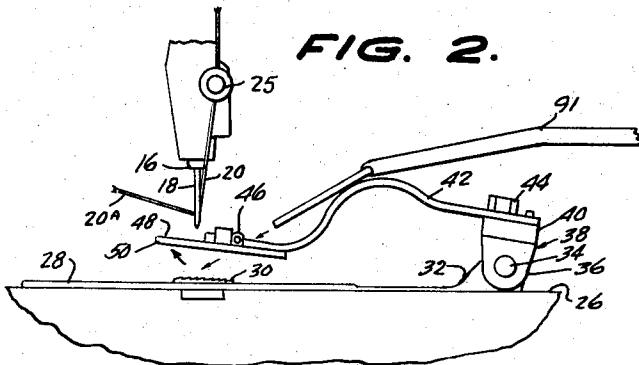


FIG. 3.

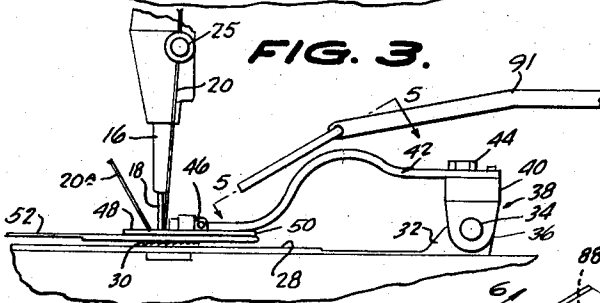


FIG. 4.

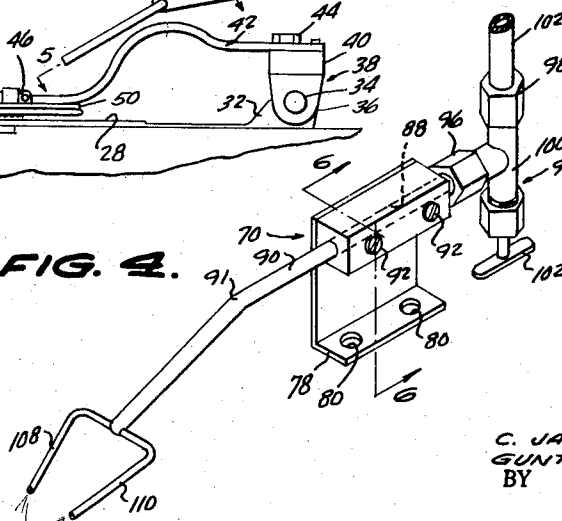


FIG. 5.

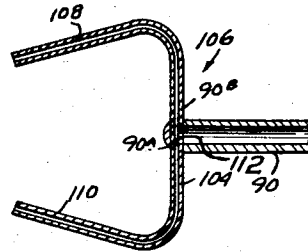
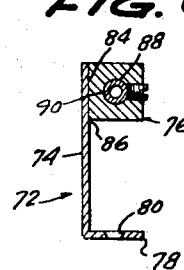


FIG. 6.



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THREAD CONTROL ATTACHMENT FOR SEWING MACHINES

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ABSTRACT OF THE DISCLOSURE

A sewing machine attachment wherein air is employed to keep the starting end of the thread out of the path of clamping arms or the like. The air is provided by a conduit connected at one end to a source of air under pressure and terminating at the other end in nozzle means positioned adjacent the sewing needle opening to direct air on opposite sides thereof.

This invention relates, in general, to an attachment for sewing machines and, more specifically, to sewing machines primarily employed in, but not limited to, the sewing of buttons to flexible fabric materials or for the sewing of buttonholes.

With the rapid advance of technology in all fields of endeavor, machine tools are overtaking and passing in many areas the work of skilled artisans. In the present era, automation is supplanting many of the formerly purely manual arts in order to meet the demand for mass production of goods of high quality and skilled workmanship at minimal costs to the ultimate consumer. But in accompaniment with the rapid advancement and the practical application of technology to the solution of demands for mass production at low cost, while still maintaining high-quality workmanship it frequently occurs, as in the art to which reference has been made supra, that some factor unappreciated at the time a major forward stride or advance in the art takes place still remains which materially reduces or impairs the efficiency of the machine designed to supplant manual labor which, in many cases, is most tedious. Under such circumstances, recourse is generally, and often necessarily, made to proven manual labor which is, even in the field of an unskilled mechanic, high priced relative to the desired retail price of the finished product, and such labor is frequently unreliable and involves the human factor which is seldom stable. In such situations, it is not infrequent that it becomes necessary to re-design the basic machines, and this comprises an uneconomical solution, or it is found necessary to provide attachments for the basic machines which, at their very best, are generally poor substitutes for craft work and which, at the same time frequently are dangerous to the operator since the attachment is seldom envisioned by the designer of the original or basic apparatus. All of these factors are not peculiar to the art of sewing machines and find ready factual basis, in particular, in those fields of employment wherein power-driven equipment having moving and exposed parts is utilized.

In the matter of the instant invention, economy of manufacture as well as the preservation of a high degree of personnel safety is the prime object of the invention as the same pertains to the sewing of finished buttonholes and in the finishing of the sewing of buttons to fabrics.

In the highly competitive field of clothing manufacture wherein high quality, low-cost garments are required by public demand, the finishing of mechanically-sewed buttons or buttonholes still constitutes a high-cost factor in the manufacture of such garments for all of the prior art button and buttonhole sewing machines make no provision for holding the starting thread away from the cloth

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being sewed by the machine and the machine hold-down clamps in such a manner as to positively prevent the starting thread to be engaged by the machine clamps and held against the finish side of the cloth to which the buttons are being sewed or in which buttonholes are being formed and finished so that in most instances when the sewing operation is completed, a trailing thread end portion remains on the right or finished side of the fabric. Such trailing ends must be removed manually or by trimming machines especially designed for such work, and in either case, the economy of manufacture is impaired. It is, therefore, another object of this invention to provide in a sewing machine, means for eliminating the information of trailing thread ends as buttons or buttonholes are sewed on or in fabric materials.

In the machine-sewing of buttons or in the machine-forming of buttonholes a "starting" thread must be provided, this thread designation generally denoting that portion of the sewing thread which extends from the sewing needle for a length of from one-half to one-and-one-half inches in length. This starting thread is a prerequisite in the starting of the sewing of buttons or buttonholes. With the sewing machine needle so threaded and with the fabric on which the buttons are to be secured or in which buttonholes are to be formed interposed between the needle and the sewing machine plate, a conventional fabric-clamping device is lowered by the operator to secure the fabric in proper position relative to the needle for the sewing operation. This clamping operation takes place at the beginning of each button or buttonhole sewing operation. Now the clamp means generally engage the material at diametrically-opposed sides of the needle and extend longitudinally therebeyond. In the optimum operation of the sewing machine, the free end of the starting thread is disposed in such position so as to preclude its engagement by the clamp mechanism as it is lowered toward the plate. Thus, as the machine starts to sew, the starting thread is drawn through the material and would not show on the right or finished side of the material when the sewing operation is completed. But this is the exception rather than the rule for in the far majority of such sewing operations, the starting thread becomes engaged below the clamping means and is held fixed against the fabric. This, of course, will show at the completion of the sewing operation. It is this thread portion which must be removed in the finishing of the garment that leads to higher labor costs and which the present invention is specifically designed to prevent being formed. Of course, with contemporaneous sewing machines the operator could manually manipulate the starting thread at the beginning of the button or buttonhole sewing operation so as to preclude its engagement with the clamping means, but this requires digital movement of the thread with the fingers in close proximity to an unguarded needle, giving rise to the ever-present danger of physical injury should the needle be inadvertently operated while the fingers of the operator are in its path of movement. The present invention has, as a further object thereof, the elimination of physical peril in the sewing of buttons or the making of buttonholes while, at the same time, carrying out this operation to a completed finish to the end that manual or mechanical trimming of the sewn thread is completely eliminated.

In the modern sewing machines and in those adapted for the sewing of buttons or the making of buttonholes, the starting thread after having been threaded through the needle eye usually depends therefrom and, in many instances, becomes superimposed on the fabric being sewed, and in the path of movement of the clamping means, all as described above. A finished button hole or a finished button-sewing operation may be made on machines of this type only if the starting thread is held

out of engagement by the clamp means. This requires that means be provided to hold the starting thread in a lateral or radial relation relative to the longitudinal axis of the needle and in a position displaced from the path of movement of the clamping means. The most obvious solution to the problem would be to provide a mechanical thread support, stringer or other device in proximity to the needle to properly position the starting thread in such a manner as to prevent the same from being engaged by the clamping means. Such means would inherently have the disadvantages of being cumbersome and of creating areas of blocked or obscured vision in the danger area, that is, in and adjacent the path of movement of the needle. Additionally, the machine operator would necessarily have to examine such mechanical means at the beginning of each sewing operation to determine if the device is functioning in its intended manner. These and other disadvantages inherent in the mechanical contrivances are completely obviated according to still another object of this invention wherein it is proposed to employ fluid means to hold the starting thread in its proper position.

This invention has, as a still further object thereof, the provision of an attachment for button and button-hole sewing machines, wherein the attachment comprises a guided stream of a gas under pressure for impingement against the starting thread of the sewing machine to hold the same out of the path of movement of the fabric-clamping mechanism at the start of the sewing operation.

It is yet another object of this invention to provide means for holding the starting thread of a button or button hole sewing machine in a lateral and upward position relative to its vertically-reciprocable needle, the means comprising a continuous unbroken stream or jet of compressed air which is caused to impinge against the starting thread, the impingement being occasioned by the deflection of the air stream or jet and in such manner as to cause the starting thread to radiate from the reciprocable needle and with but a minimum of jumping and oscillation.

This invention contemplates, as a still further object thereof, the provision of an attachment for button or buttonhole sewing machines, as generally described above, the attachment being non-complex in construction and assembly, inexpensive to manufacture and maintain, and which is rugged and durable in use.

Other and further objects and advantages of the instant invention will become more evident from a consideration of the following specification when read in conjunction with the annexed drawing, in which:

FIGURE 1 is a perspective view of a conventional button or buttonhole sewing machine together with the attachment, according to this invention, for holding the starting thread laterally away from and upwardly relative to the machine's vertically-reciprocable needle;

FIGURE 2 is an enlarged fragmentary side elevational view of the sewing machine and the attachment of FIGURE 1, and illustrating the relative positions of the clamping means and starting thread just prior to the initiation of the sewing operation, the clamping means being illustrated in its inoperative open and up position, and the airstream or jet attachment being activated to cause a deflected portion thereof to impinge on and to hold the starting thread in a deflected laterally-extending position away from the reciprocable needle and an adjacent portion of the clamping means;

FIGURE 3 is a fragmentary side elevational view similar to FIGURE 2, but showing the position of the starting thread as activated by the attachment after the clamping means has been lowered to its operative position;

FIGURE 4 is an enlarged perspective view of the airstream or jet attachment, per se, according to this invention;

FIGURE 5 is an enlarged fragmentary cross-sectional

view, FIGURE 5 being taken on the inclined plane of line 5—5 of FIGURE 3, looking in the direction of the arrows; and

FIGURE 6 is a detail cross-sectional view, FIGURE 6 being taken substantially on the plane of line 6—6 of FIGURE 4, looking in the direction of the arrows.

Referring now more specifically to the drawing, reference numeral 10 designates, in general, a conventional button or button hole sewing machine with the attachment constructed in accordance with the teachings of this invention mounted thereon. The sewing machine 10 includes the usual standard 12 integrally-connected at its upper end with one end of the conventional normally horizontal overhanging arm 14 on the other end of which is carried a reciprocating needle guide rod 16. Since the means for effecting the operation of the needle guide rod 16 are old and well-known in this art, and since the same do not form any part of this invention, the means for effecting the reciprocation of the needle guide rod 16 is not shown and will not be described.

The lower end of the guide rod 16 has a sewing needle 18 releasably-connected thereto, the needle 18 in its lower end being threaded by thread 20 taken from a conventional source of supply and having a leading end threaded through the customary guides 22, 24 and 26, and the spread tension disc 25. The free end portion 20A of thread 20 which extends from the needle 18, after the eye thereof has been threaded, will hereinafter be designated as the "starting thread."

The lower end of the standard 12 is fixedly-secured by a laterally-offset bracket 22 and bolts 24 to the upper planar normally horizontal top side 26 of the main body portion 27 of the sewing machine 10. The machine plate 28 is carried on the top side 26, and a conventional material-feeder foot 30 extends through the plate 28 in the conventional manner.

Integral with the main body portion 27 and projecting above the planar top side 26 is an upwardly-extending lug 32 which carries a pivot pin 34 having a horizontal axis extending transversely of the main body portion 27. To the remotely-disposed ends of the pin 34 are connected the lower ends of a pair of upright side arms 36 (only one being shown) of an inverted U-shaped bracket 38. The upper ends of the side arms 36 are preferably integrally-connected with the remotely-disposed ends of the bight portion 40 of the bracket 38. Fixedly-secured to the upper side of the bight portion 40 adjacent the opposed ends thereof is one adjacent pair of ends of a pair of laterally-spaced, elongated flattened ogee-shaped support arms 42, the securing means comprising bolts 44. The other ends of the support arms 42 are secured by conventional means 46 to the upper sides 48 of material clamp plates 50, the clamp plates 50 extending on diametrically-opposed sides of an opening 51 formed in the plate 28.

The machine 10 also includes the vertically-oscillatory arcuately-shaped cutter arm 52 carrying a cutter blade 54 at the free end thereof, all in the conventional manner. For the purpose of this invention it need only be stated that means are provided for the machine operator to actuate, when desired, to move the clamp plates 50 from their upper inoperative position shown in FIGURE 2, to their lower operative position of FIGURE 3, wherein they are shown as being superimposed on fabric material 52 resting on the feeder foot 30 and the plate 28 as the sewing operation is carried out; and that conventional means (not shown) is also provided to actuate the cutter arm 54 when required, and in the usual manner.

All of the above-described elements and their respective functions are old and well-known in this art and since the same do not constitute a part of this invention except to provide a suitable background for the utility of the attachment constructed in accordance with the teachings of this invention, the same are but sketchily described above. It should be noted, however, that nowhere in this description of the conventional button or buttonhole sew-

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ing machine is mention made of means for supporting the starting thread of the aforementioned sewing machine needles in a laterally-offset position relative to the eye end of the needle and, preferably, at an upwardly and outwardly-diverging angle relative thereto. Such means are now specifically described.

Referring more specifically to FIGURES 1 and 4 to 6, inclusive, reference numeral 70 designates, in general, an attachment for a button and/or buttonhole sewing machine specifically designed to cause the starting thread for such machines to occupy a position wherein the same projects laterally from the sewing needle and upwardly and longitudinally away from the adjacent end of the fabric hold-down clamp to thereby avoid and prevent engagement thereby or entanglement therewith.

The attachment 70 includes a substantially C-shaped bracket 72 having a normally upright bight portion 74 (see FIGURE 6) from which laterally-project, at each respective end thereof, an elongated substantially rectangular arm 76, 78. The arm 78 is provided with a pair of longitudinally-spaced countersunk transversely-extending openings 80 which receive mounting bolts 82 therethrough and which are, in turn, threaded into tapped openings (not shown) formed in the flange 22. The arm 76 may comprise a separate elongated substantially rectangular bar 84 welded as at 86, or otherwise fixedly-secured to the upper end of the bight portion 74, or the same may be integrally-formed therewith, as desired, or found to be expedient. As is seen in FIGURES 5 and 6, the bar 84 is formed with a longitudinally-extending axial bore 88 which slidably and rotatably-receives therein one end of an elongated substantially hollow tubular cylindrical conduit 90. This end of the conduit 90 projects beyond both ends of the bar 84 and is held in adjusted position by means of a pair of set screws 92, 92.

A conventional combined T-shaped coupler and needle valve 94 has the stem end 96 thereof connected to the free end of the aforementioned one end of the conduit 90, and one end 98 of the cross arm 100 is connected to one end of an elongated hollow tubular conduit 102 having its other end connected with a source (not shown) of air under pressure. The other end of the cross arm 100 carries the usual needle valve and mounting means therefor (not shown), the valve setting being adjustably-controlled by the manually-operable handle 102.

Now as seen in FIGURES 1 to 3, inclusive, the bracket 72 must necessarily carry the tubular conduit 90 at an elevated position relative to the upper planar surface 26 of the main body 27 in order that the other end of the tubular member or conduit 90, as it extends toward the needle 18, mechanically clears the support arms 42 and the clamp plates 50 when the latter are in their upper inoperative positions shown in FIGURE 2. In this elevated position, air emitter from the discharge or other end of the tubular conduit 90 would serve no utilitarian function or purpose, and this element is, therefore, bent downwardly as at 91 toward the plate 28. The outer terminal end of the conduit 90 is closed as at 90A and is diametrically-bored as at 90B to receive therein the bight portion 104 of a U-shaped jet nozzle 106 having converging air jet arms 108, 110 projecting laterally and in the same direction from the remotely-disposed ends, respectively, of the bight portion 104. The bight portion 104 is formed with a centrally-located port 112 in open communication with the conduit 90 and is preferably friction fit therein or otherwise adjustably-mounted in such a manner as to afford the user angular adjustment of the jet arms 108, 110 relative to the plane of the plate 28.

The open discharge ends of the air jet arms 108, 110 are preferably adjusted so that the emitted airstreams impinge against and are deflected from the plate 28 in the direction of the arrows shown in FIGURE 2. As illustrated therein, and from reference to FIGURES 4 and 5 of the drawing, it will be understood that the airstream focus for impingement at that general area of the plate

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immediately adjacent the opening 51 and in such a manner that the deflected airstream carries the starting thread 20A laterally and upwardly away from the lower end of the needle 18 and longitudinally away from the adjacent ends of the clamp plates 50. This air support means is effective in or out of the presence of the fabric material 52 on which the sewing operation is being made. In either situation, however, the constant stream of air being deflected against the starting end 20A of the thread 20 is diffused in such a manner that the starting thread 20A moves toward either of the two positions shown in FIGURES 2 and 3, or other similar positions depending upon the presence or absence of the material 20, the type of deflecting surface encountered by the airstream, and, of course, the pressure of the air jetted from the nozzle 106. To obtain the maximum control by the jetted airstream, the internal diameter of the jet nozzle 106 is less than that of the tubular conduit 90, thereby requiring high-pressure air which permits the more accurate focus of the stream on the deflecting area.

The tubular conduit 90 and the jet nozzle means 106 may be formed of a rigid material or, if desired, the same may be formed of a material which will permit the easy bending or deforming thereof to enable the attachment 70 to be connected with any conventional button or buttonhole sewing machine, regardless of the mechanisms which may lie immediately adjacent the starting thread 20A.

The airstream is controlled, of course, by the manually-operable handle 102 and, once having been set, the needle valve may be left in its open position throughout the day or for such time as is necessary to carry out the button or buttonhole sewing operations. Thereafter, for purposes of economy, the handle 102 may be actuated to close the needle valve and cut off the supply of air to the arms 108, 110.

Having described and illustrated one embodiment of this invention in detail, it will be understood that the same is offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. In combination with a sewing machine having a vertically reciprocable threaded needle including a starting thread, fabric-support means disposed in the path of movement of said needle, said support means being provided with a needle opening, clamp means on one side of said needle movable toward and away from said support means and operable to hold said fabric on said support means, and means to hold said starting thread out of the path of movement of said clamping means, said thread holding means comprising a source of air under pressure located on said one side of said needle to direct said air on opposite sides of said needle opening towards said starting thread thereby causing said thread to project laterally upwardly from the other side of said needle away from said clamp means and support means.

2. The combination of claim 1, wherein said source includes a pair of air jet nozzles.

3. The combination of claim 1, wherein said source includes a hollow U-shaped conduit having a bight and an arm extending from each respective end of said bight, and an air jet nozzle carried by each of the respective free ends of said arms.

4. The combination of claim 1, wherein said source includes an elongated hollow conduit, a hollow U-shaped conduit having a bight and an arm extending from each respective end of said bight, and an air jet nozzle carried by each of the respective free ends of said arms, said bight being pivotally mounted on said elongated conduit and provided with a port in communication with said elongated conduit.

5. An attachment for a sewing machine having a vertically reciprocable threaded needle including a starting thread, a fabric support provided with a needle opening,

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and a fabric clamp, said attachment comprising an elongated hollow conduit having one end adapted to be connected to a source of air under pressure and having means on its other end adapted to be positioned on one side of said needle to direct said air on opposite sides of said needle opening thereby causing said thread to project laterally upwardly from the other side of said needle away from said clamp and support.

6. The attachment of claim 4 wherein said means includes a pair of air jet nozzles.

7. The attachment of claim 4 wherein said means includes a hollow U-shaped conduit terminating in a pair of air jet nozzles and pivotally mounted on said elongated conduit in communication therewith.

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8. The attachment of claim 7, and bracket means adapted to mount said attachment on said sewing machine.

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