Oct. 1, 1968 K. L. JARRETT 3,403,648

ATTACHMENT FOR SEWING MACHINE

Filed Sept. 22, 1966 4 Sheets-Sheet 1

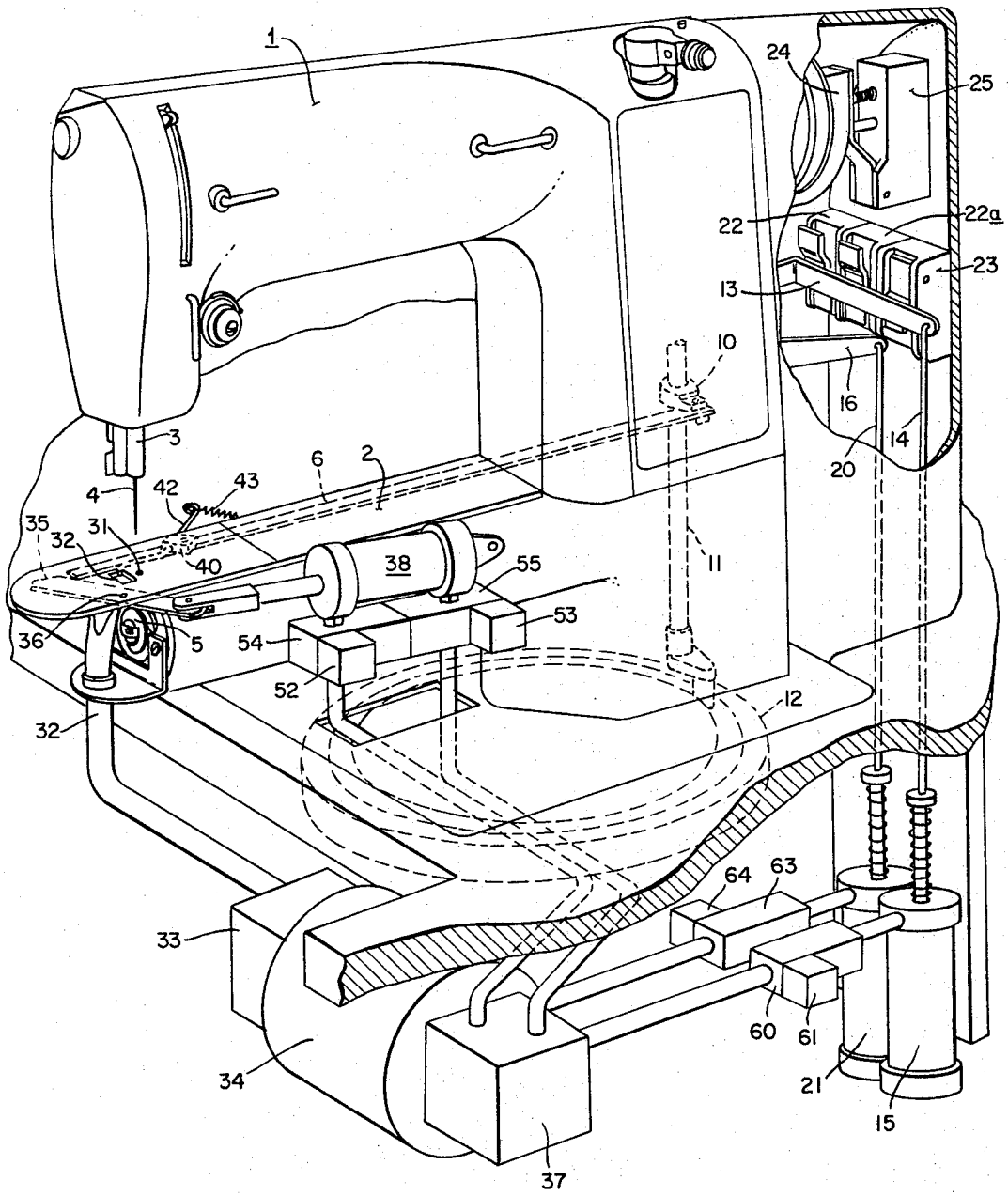


Fig. 1

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ATTACHMENT FOR SEWING MACHINE

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Fig. 2

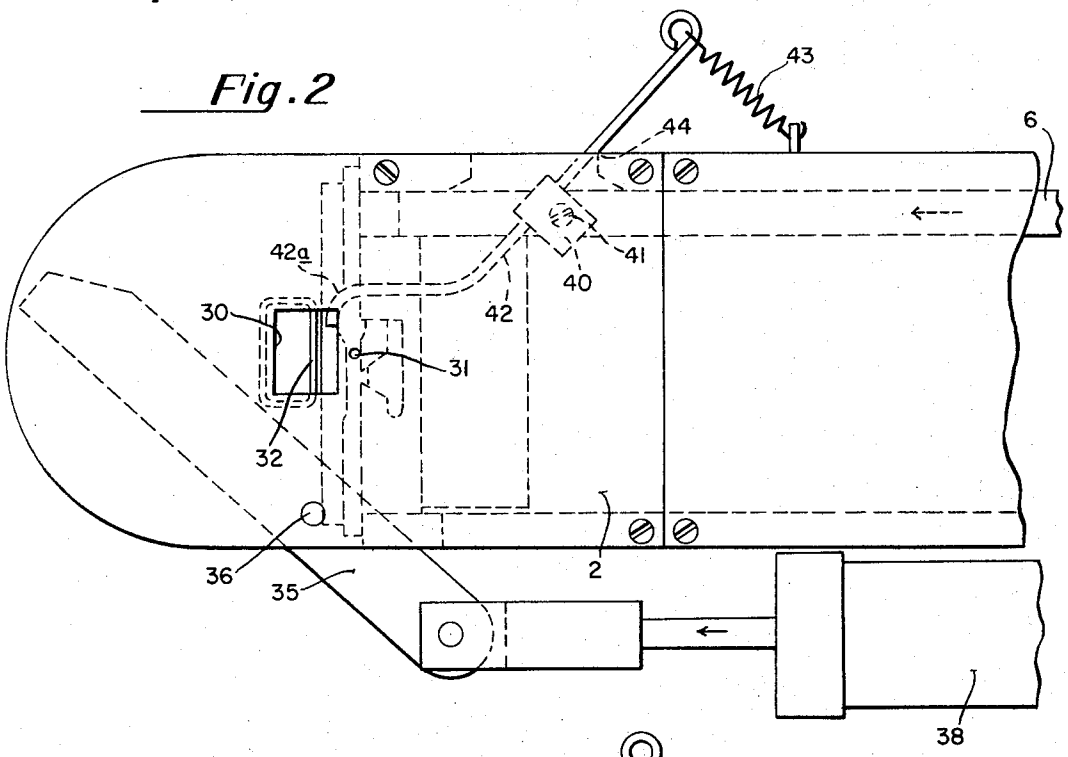
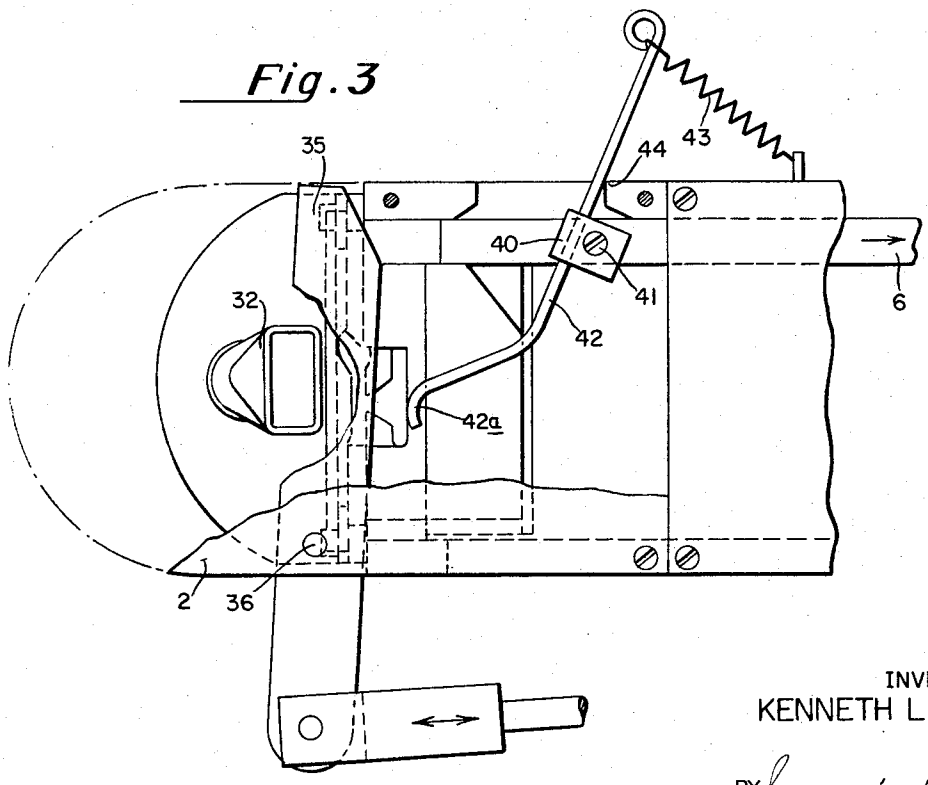


Fig. 3



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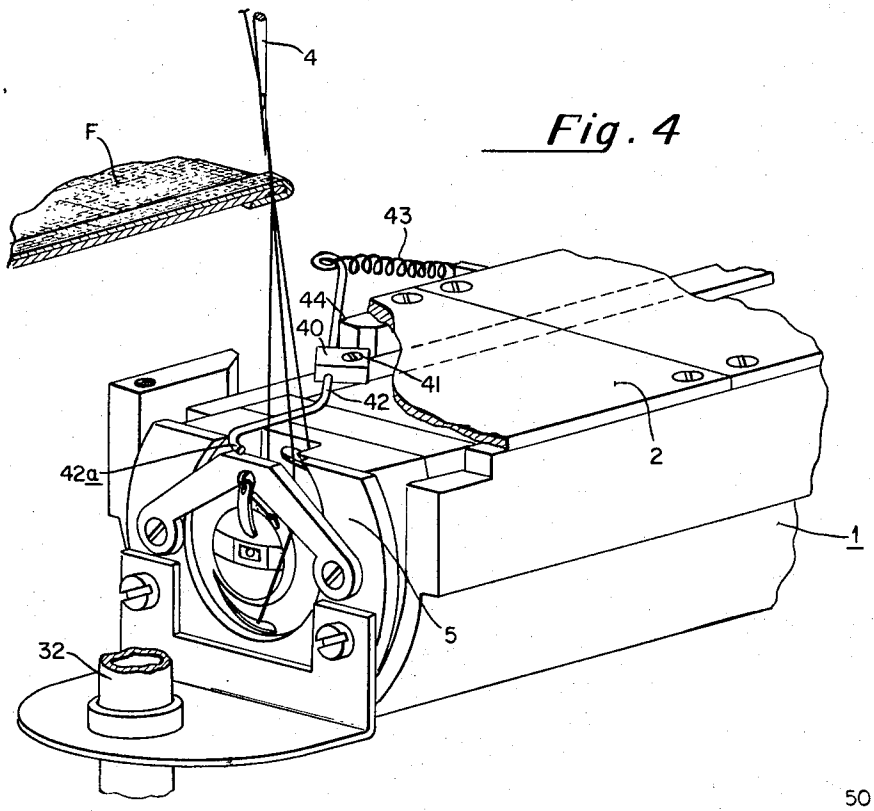


Fig. 4

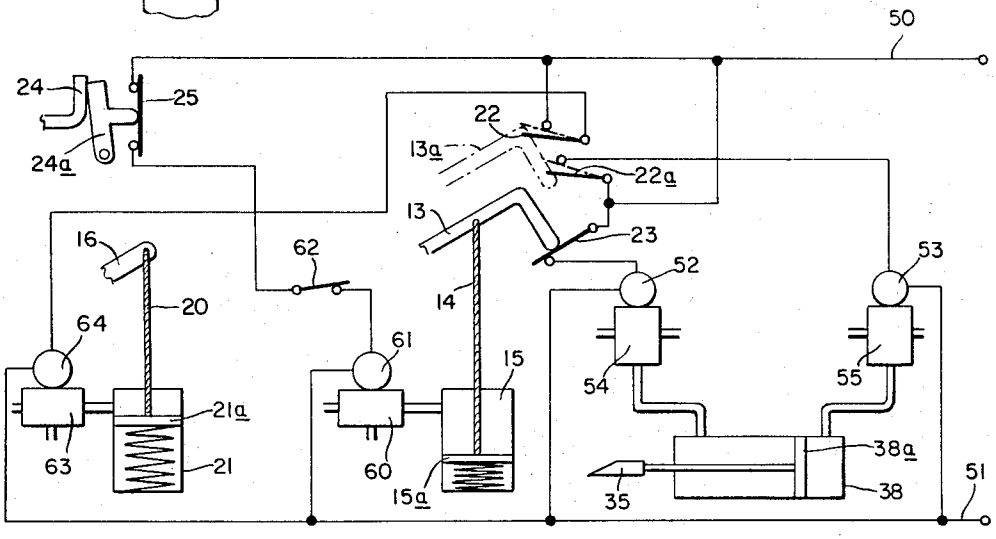


Fig. 5

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ATTACHMENT FOR SEWING MACHINE

Filed Sept. 22, 1966 4 Sheets-Sheet 4

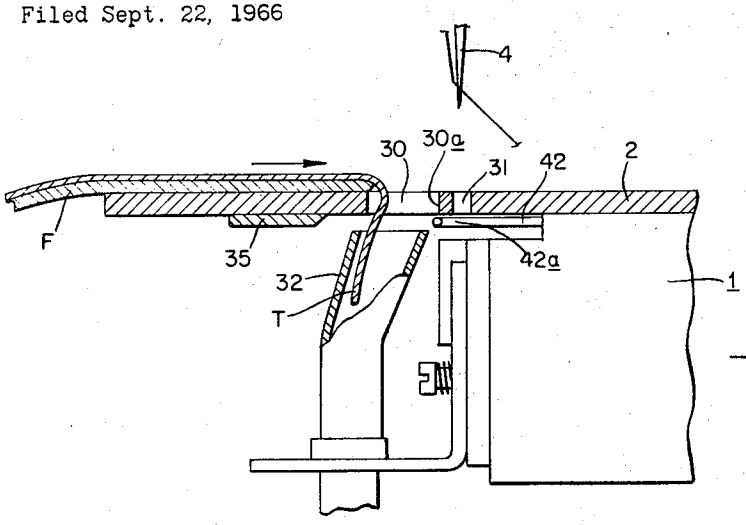


Fig. 6

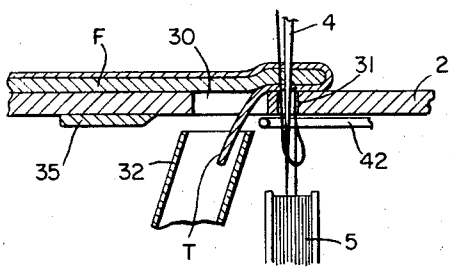


Fig. 7

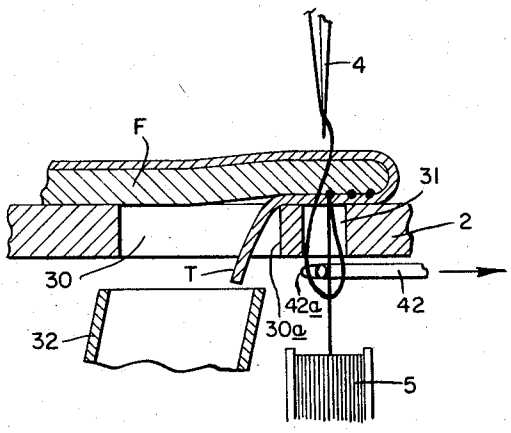


Fig. 8

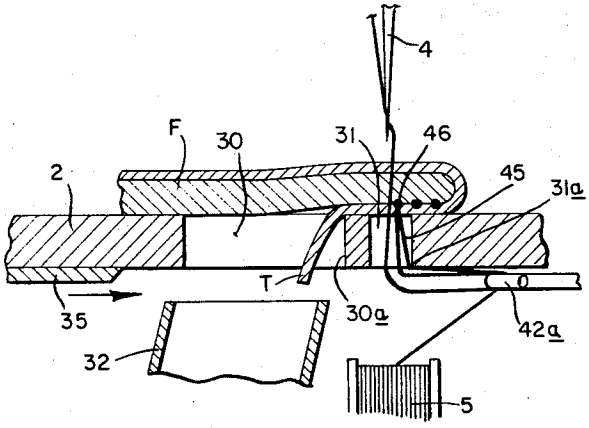


Fig. 9

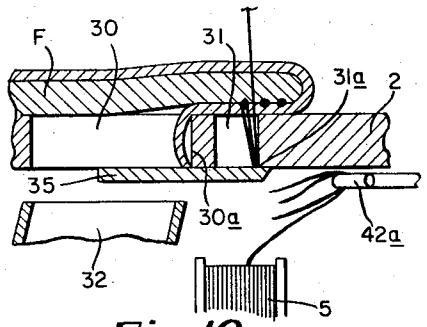


Fig. 10

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3,403,648

ATTACHMENT FOR SEWING MACHINE

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Filed Sept. 22, 1966, Ser. No. 581,354
6 Claims. (Cl. 112—130)

ABSTRACT OF THE DISCLOSURE

Means for conventional bar tacking sewing machines to provide for the fabric and tail to be inserted under the needle and clamp and in doing so for the tail to be automatically folded under the fabric and the portion of the tail not tacked held so that it can be cut off right after the tacking operation.

This invention relates to commercial sewing machines and in particular relates to improvements providing for automatic bar tacking and severing of tails.

Current bar tacking and severing operations in the needle trade contemplate the use of separate and distinct machines located at different places and used by different operators. The practice requires maximum use of labor both in the operation of separate machines and in transporting fabrics to the bar tacking machine and thence to the cutting or severing machine.

The principal object of the invention is to eliminate separate operators and multiple machines and handling operations for bar tacking and severing work and thereby save considerable sums in the cost of labor and equipment.

Another object of the invention is to provide certain improvements for a conventional bar tacking machine which conditions the machine so that it can be used by a single operator to automatically effect bar tacking and severing.

Another object of the invention is to provide improvements in conventional bar tacking machines whereby a single machine is arranged to automatically effect bar tacking and severing in a manner to insure maximum uniformity and quality in these operations.

For the above purposes the invention contemplates several structural modifications and additions to conventional bar tacking machines which provide for the fabric and tail to be placed in position under the needle and clamp and in the process of doing so the tail being automatically folded under the fabric and with the portion of the tail not to be tacked, held in tension so as to be cut or severed after the bar tacking operation is performed, and in conjunction with the foregoing, the invention provides for pulling a loop in the thread adjacent the bobbin and holding the same in tension for severing practically simultaneously with the severing of the tail.

With the above in mind, then, I will explain the preferred embodiment of the invention in connection with the following drawings wherein:

FIGURE 1 is a perspective view of a typical commercial bar tacking machine having the invention incorporated therein;

FIGURE 2 is a plan view of the needle plate of the machine in FIGURE 1 and showing the position of various components for the sewing or bar tacking operation;

FIGURE 3 is a view similar to FIGURE 2 showing the components at the time of the severing or cutting operation;

FIGURE 4 is an exploded perspective view showing the bobbin threads just before being pulled into a loop;

FIGURE 5 is a schematic representation of certain electric and hydraulic components; and

FIGURES 6, 7, 8, 9 and 10 are schematic diagrams illustrating how the fabric and tail are inserted into the

machine so that the tail is automatically folded, tacked and cut.

The machine illustrated in FIGURE 1 is a machine typifying a conventional commercial bar tacking machine such as the Singer 269W produced by the Singer Manufacturing Company. As will be apparent to those skilled in the art, certain of the standard components found on the above-mentioned machine have been eliminated in the drawing. This has been done so that the modifications and additions of the invention can be clearly illustrated. For example, it will be noted that I have eliminated the arch clamp and feed plate carrier bar together with the frame and arch clamp foot shanks which ordinarily would be disposed over the needle plate.

The housing or covers of the machine are generally identified by the numeral **1**, the needle plate by the numeral **2**, the needle bar by the numeral **3** and the needle by the numeral **4**. The machine bobbin is indicated at **5** (also see FIGURE 4) and a modified knife bar by the numeral **6**. The knife bar is reciprocated by the driving lever **10** rotated by the knife bar actuating rock shaft **11** which is driven by the feed and knife driving cam **12**.

The needle **4** is reciprocated for the sewing or tacking operation in the conventional manner. Also it will be understood that the arch clamp is reciprocated vertically to engage and disengage with the fabric supported on the needle plate.

The machine foot lifter lever has been modified to include an L-shaped extension **13** which is connected by a cable **14** to an air cylinder **15**. The machine starting lever **16** is connected by a cable **20** to an air cylinder **21**. Foot lifter arm **13** operates knife switches **22** and **22***a* which are actuated when the arm is in the up position and also operates a knife switch **23** which is actuated when the arm is in the down position. The machine pulley engaging arm **24** attached to the starting lever assembly operates the starting switch **25**.

The needle plate **2** is modified as by having an aperture **30** which forms a tail opening. This aperture is located closely adjacent the needle aperture **31**.

Below the needle plate is a tube **32**, the open mouth of which extends upwardly closely adjacent the opening **30**. The tube **32** is connected to a vacuum pump **33** operated by a motor **34**. The pump draws air through the opening **30**, and through the tube, the velocity of the air is maintained so that a partial vacuum is created with the charging of the air through the opening **30** and down through the mouth of the tube.

Underneath the needle plate is a knife **35** which is connected to the needle plate by the pivot **36** which provides for the knife to be swung back and forth under the plate. The mouth of the tube **32** is spaced from the needle plate to permit the knife motion. In the cutting or severing operation the knife moves from the position shown in FIGURE 2, past the opening **30**, past the needle aperture **31** to the position indicated in FIGURE 3. The reciprocating motion of the knife is provided by an air cylinder **38**.

The reciprocating knife bar **6** mounts a thread looping device (FIGURES 2, 3 and 4) which includes a block **40** mounted on the bar **6** by the pivot **41** and carrying a thread hook **42** which is biased clockwise by the spring **43**, the limit of motion being determined by the abutment **44** on the machine frame. In the position shown in FIGURE 2 (and FIGURE 7), the end **42***a* of the thread hook is spaced away from the needle aperture **31**. When the knife bar **6** is moved to the right the engagement of the hook **42** with the abutment **44** causes the hook and block to pivot in a counter-clockwise direction. The end **42***a* of the hook sweeps past the needle aperture **31** and thereby engages thread extending down from the needle to the bobbin (see FIGURE 8) and as the hook continues to

move to the position shown in FIGURE 3, a loop is pulled in the thread (see FIGURE 9).

The sewing action of the needle, the clamping action of the arch clamp, the cutting action of the knife and the looping function of the thread hook are all coordinated so that they operate in proper sequence for bar tacking and severing. The general sequence of operation of the above elements will be explained below and the functional manner in which the elements are integrated in the machine will be explained thereafter.

Referring to FIGURE 6, I have shown somewhat diagrammatically and in exploded form, the needle plate **2**, the needle **4**, the needle aperture **31**, the tail opening **30**, the tube **32** and the knife **35**.

Assume the operator has two pieces of fabric which are joined and having a tail to be bar tacked and severed. The tail may comprise a chain or a composite of both chain and reinforcing tape. The operator can lay the fabric and tail on the far end (left) of the needle plate **2** and then start to move the fabric and tail (to the right) toward the tail opening **30** with the tail projecting forwardly. When the tail reaches the tail opening **30** the drawing action of the air rushing through the opening **30** will draw the tail T through the opening into the tube as shown. The velocity of the air is controlled so that a substantial tension force is imposed on the tail.

As the fabric F and tail T are moved across the opening **30** toward the needle aperture **31** the tail engages the edge **30***a* of the tail opening and with continued movement of the fabric the tension on the tail causes the tail to fold under the fabric. When the fabric has been moved sufficiently to the right, i.e., so that it covers the surface of the needle plate between the tail opening and the needle aperture and the area immediately adjacent the needle aperture the same is in position for bar tacking. A gauge (not shown) is preferably used to determine the desired position. A typical position is shown in FIGURE 7. The surface of the needle plate between the tail opening and the needle aperture and the area immediately adjacent the needle aperture supports the fabric and tail for the tacking operation.

The fabric and tail can be put into position under the needle without first laying the fabric and tail on the end of the needle plate. The operator holds the fabric and tail above the needle plate and moves the same over the tail opening in a direction towards the support surface. When the tail arrives at the opening it will be sucked down and as the fabric and tail are placed on the support surface the folding-under action takes place.

After the fabric and the folded-under tail are correctly oriented on the support surface under the needle the sewing or tacking operation is commenced. The needle operates in the conventional manner usually making 21 stitches. During the sewing operation the tail remains projecting into the mouth of the tube as indicated in FIGURE 7.

After the sewing or tacking is completed the needle is moved vertically and then the knife plate **6** is moved to the right so as to sweep the thread hook to the position indicated in FIGURE 3 and in doing so the hook picks up the thread extending up from the bobbin (see FIGURE 8) and pulls the same into a loop as indicated in FIGURE 9.

The thread is pulled to a position so that considerable tension is imposed on the threads particularly in the portion **45** which extends from the end **42***a* of the hook (FIGURE 9) up through the needle aperture **31** to tacked section **46** on the fabric.

After the thread has been pulled into the loop the knife mechanism is operated so that it first engages the tail to sever the same and then engages and severs the threads.

For the most part when the knife is moved to the right and engages the tail, it positions the same up against the lower part of the edge **30***a* and this provides an anvil for severing. The drawing action of the air on the tail holds the tail in sufficient tension so that when the tail is against the edge **30***a* a clean and positive cut is made. In many instances, however, for example, where the tail comprises only a chain, the tension on the tail is sufficient so that the knife begins the severing operation upon contact and completes the same before the tail can be forced against the lower part of the edge **30***a*.

The tension in the portion **45** of the threads is sufficient so that the knife can cleanly and positively sever the same. During the severing operation of the tail the lower part **31***a* of the needle aperture **31** functions as an anvil.

Tails which have been severed are immediately drawn down through the tube and caught in a screen adjacent the pump **33** so that the tails are periodically removed from the screen.

The general sequence of operation of the elements described above and the manner in which they are integrated into the bar tacking machine will be explained below in connection with FIGURE 5.

In FIGURE 5 the power lines are designated by **50** and **51**. The switches **22***a* and **23** which control the operation of the knife cylinder **38** are shown connected to the power line **50** and, respectively, to the solenoids **52** and **53**, both of which are connected to the power line **51**. The solenoid **52** operates a valve **54** controlling the air to the front end of the knife cylinder **38**. The solenoid **53** operates a valve **55** controlling the air to the back of cylinder **38**. Depending on the air supply the piston **38***a* is moved to the back or front. The pump **34** (FIGURE 1) drives the air supply **37**.

The down position of the foot lifter arm is diagrammatically indicated by the full lines **13** and the up position by the dotted lines **13***a*. In the lower position of the arm the switch **23** is normally closed to energize solenoid **52** so that the valve **54** admits air to the front of the cylinder **38** to move the piston **38***a* to the right to put the knife in the retracted or noncutting position. When the arm **13** moves to the up position the switch **23** will be opened and the switches **22** and **22***a* closed. With the opening of switch **23** the front end of the cylinder **38** is connected to exhaust by the valve **54**. With the closure of switch **22***a* the solenoid **53** is energized which causes the valve **55** to admit air to the back of the cylinder and to move the piston to the left thereby causing the knife to move to the cutting position.

The foot lifter arm **13** is under the control of the air cylinder **15** whose piston **15***a* is connected to the cable **14**. The air supply to the cylinder **15** is controlled by the valve **60** under the control of the solenoid **61** which is connected via the foot pedal switch **62** and the starting switch **25** to the power line **50**. In the position shown the switches **25** and **62** are closed to energize the solenoid **61** which causes the valve **60** to admit air to the cylinder **15** to move the piston **15***a* downwardly and thereby move the arm **13** to the down position.

As will be understood by those skilled in the art, the arm **13** has a fulcrum connection with the arch clamp so that in the down position of the arm the clamp is spaced upwardly away from the needle plate. When the arm **13** is in the up position the arch clamp is down against the fabric and holds the same on the needle plate.

The starting switch **25** is under the control of the machine pulley engaging arm **24**. A mechanical connection **24***a* between the switch and the arm controls the open or closed position of the switch as a function of the arm position. The arm **24** is connected to the starting lever assembly (not shown) which, in the down position is rocked in a direction toward the front of the machine so that the switch **25** is closed. When the lever is rocked in the opposite direction the motion of the arm **24** (through the mechanical connection) opens the switch **25**. The rocking motion of the starting lever assembly is controlled by the usual machine components (not shown). The starting lever arm **16** is controlled by the air cylinder **21**. The air supply for the cylinder **21** is under the control of the

valve 63 operated by the solenoid 64 connected to the switch 22. As shown the switch 22 is open so that the solenoid 64 is deenergized and the spring-loaded piston 21*a* is in the up position. The starting lever arm 16 is in the up position.

When the switch 22 is closed by the lifter arm 13 moved to the up position, the solenoid 64 is energized and the valve 67 operated to admit air to the cylinder 21. This moves the piston 21*a* downwardly which moves the starting lever arm 16 to the down position to start the machine.

When the components described above are in the position shown in FIGURE 5 the machine is in the standby position. The power is on and the vaccum pump 33 is drawing air through the tail opening 30 and tube 32. The air pump 37 is ready to supply air.

After the operator has positioned a fabric and tail under the needle in the manner described heretofore, a foot pedal (not shown) is actuated. This opens the foot switch 62.

With the opening of the switch 62 the solenoid 61 and valve 60 connect the cylinder 15 to exhaust and the spring-loaded piston 15*a* moves upwardly so that the arm 13 moves toward the upward position.

The foot is held momentarily on the pedal to permit the arm 13 to move all the way. In the up position the arm 13 closes the switches 22 and 22*a*.

The closing of the switch 22 causes the solenoid 64 and valve 63 to admit air to the cylinder 21. This causes the starting lever to move down. The machine starts and the starting lever assembly is rocked inwardly. This opens the switch 25. (The foot now can be removed from the foot pedal as the circuit to the solenoid 61 is open.) With the rocking of the starter lever assembly certain switches (not shown) in the machine are actuated to start the bar tacking cycle.

Also when the arm 13 moves upwardly the arch clamp is moved downwardly against the fabric on the needle plate.

The closing of the switch 22*a* energizes the solenoid 53 which operates the valve 55 to admit air to the back end of the cylinder 38. The piston 38*a* then moves toward the front end of the cylinder and causes the knife to swing into cutting position.

The timing of the bar tacking operation and the movement of the knife are coordinated so that the tacking is completed and the needle moved upwardly just before the knife moves in to sever the tail and thread.

When the bar tacking cycle has been completed the machine causes the starting lever assembly to rock and cause the arm 24 to close the switch 25. Since the foot pedal switch 22 is also closed, solenoid 61 is energized. The valve 60 admits air to the air cylinder 15 and causes the foot lifter 13 to move downwardly. This opens switches 22 and 22*a*.

The opening of switch 22*a* deenergizes the solenoid 53 and causes the valve 55 to connect the back end of the cylinder 38 to exhaust.

The opening of the switch 22 deenergizes the solenoid 64 which operates the valve 63 to cause the cylinder 21 to be connected to exhaust. The spring-loaded piston 21*a* moves upwardly to effect upward movement of the starting lever.

When the arm 13 moves to the down position the switch 23 is closed and the solenoid 52 and valve 54 operate to admit air to the front end of the knife cylinder 38. The knife is moved to the noncutting position.

The machine now is again in standby, ready for another cycle which is initiated by pressing on the foot pedal and opening the switch 62.

I claim:

1. In a commercial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails comprising:

means on the machine needle plate adjacent and in advance of the needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediate adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail folded under the fabric and supported on said support surface to be drawn into the mouth of said tube by said air movement;

knife means for severing said tail, the knife means being disposed below said needle plate; and

mechanism moveably mounting said knife means for engaging and severing said tail which has been folded under the fabric on said support surface and which extends toward said tube and is held in sufficient tension by said air drawing action for the severing operation.

2. In a commercial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails comprising:

means on the machine needle plate adjacent and in advance of the needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediately adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail on the fabric to be drawn toward the mouth of said tube by said air movement and when the fabric and tail are moved over the opening in a direction toward the support surface, the air drawing action holding the tail in sufficient tension that with the placing of the fabric and tail on the support surface the tail engages the edge of the opening and is folded under the fabric;

knife means for serving said tail, the knife means being disposed below said needle plate; and

mechanism moveably mounting said knife means for engaging and severing said tail which has been folded under the fabric as aforesaid and extends toward said tube and is held in sufficient tension by said air drawing action for the severing operation.

3. In a commercial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails comprising:

means on the machine needle plate adjacent and in advance of needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediately adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail folded under the fabric and supported on said support surface to be drawn toward the mouth of said tube by said air movement and held in tension thereby;

knife means for severing said tail, the knife means being disposed below said needle plate; and

mechanism moveably mounting said knife means for engaging and severing the tail which has been folded under the fabric on said support surface as aforesaid.

4. In a commercial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails and threads comprising:

means on the machine needle plate adjacent and in advance of the needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediately adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail folded under the fabric and supported on said surface to be drawn toward the mouth of said tube by said air movement and held in tension thereby;

a thread hook moveably mounted below said needle plate for engaging the threads extending between the machine bobbin and the machine needle to pull the threads into a loop and hold the threads in tension;

knife means for severing said tail and thread, the knife means being disposed below said needle plate; and

means moveably mounting said knife for engaging and severing the tail which has been folded under the fabric on said support surface and which extends toward said tube and is held in sufficient tension by said air drawing action for the severing operation and also engaging and severing threads which have been pulled into said loop and held in sufficient tension for the severing operation.

5. In a commecial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails and threads comprising:

means on the machine needle plate adjacent and in advance of the needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediately adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail on the fabric to be drawn toward the mouth of said tube by said air movement and held in tension thereby and when a fabric and tail are moved over the opening in a direction toward the support surface, the air drawing action holding the tail in sufficient tension that with the placing of the fabric and tail on the support surface the tail engages the edge of the opening and is folded under the fabric;

a thread hook moveably mounted below said needle plate for engaging the threads extending between the machine bobbin and the machine needle to pull the threads into a loop and hold the threads in tension;

knife means for severing said tail and thread, the knife means being disposed below said needle plate; and

means moveably mounting said knife for engaging and severing said tail which has been folded under the fabric and as aforesaid extends toward said tube and is held in sufficient tension by said air drawing action for the severing operation and also engaging and severing threads which have been pulled into said loop and held in sufficient tension for the severing operation.

6. In a commercial sewing machine including a needle plate having a needle aperture therein, the improvement for bar tacking and severing tails and threads comprising:

means on the machine needle plate adjacent and in advance of the needle aperture forming a tail opening, the surface of the needle plate between the tail opening and the needle aperture together with the surface immediately adjacent the needle aperture forming a support surface for a fabric having a tail folded thereunder for a bar tacking operation;

tube means having a mouth disposed below said needle plate, the mouth of the tube being closely adjacent and open toward said tail opening;

means connected with said tube for drawing air through the tail opening and through the tube, the tail opening permitting a tail folded under the fabric and supported on said surface to be drawn toward the mouth of said tube by said air movement and held in tension thereby;

a thread hook moveably mounted below said needle plate for engaging the threads extending between the machine bobbin and the machine needle to pull the threads into a loop and hold the threads in tension;

knife means for severing said tail and sewing thread, the knife means being disposed below said needle plate; and

means moveably mounting said knife for engaging and severing said tail which has been folded under the fabric on said support surface as aforesaid and also engaging and severing threads which have been pulled into said loop and held in sufficient tension for the severing operation.

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