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LOOP FORMING DEVICE FOR STITCH FORMING MECHANISM

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Fig. 1.

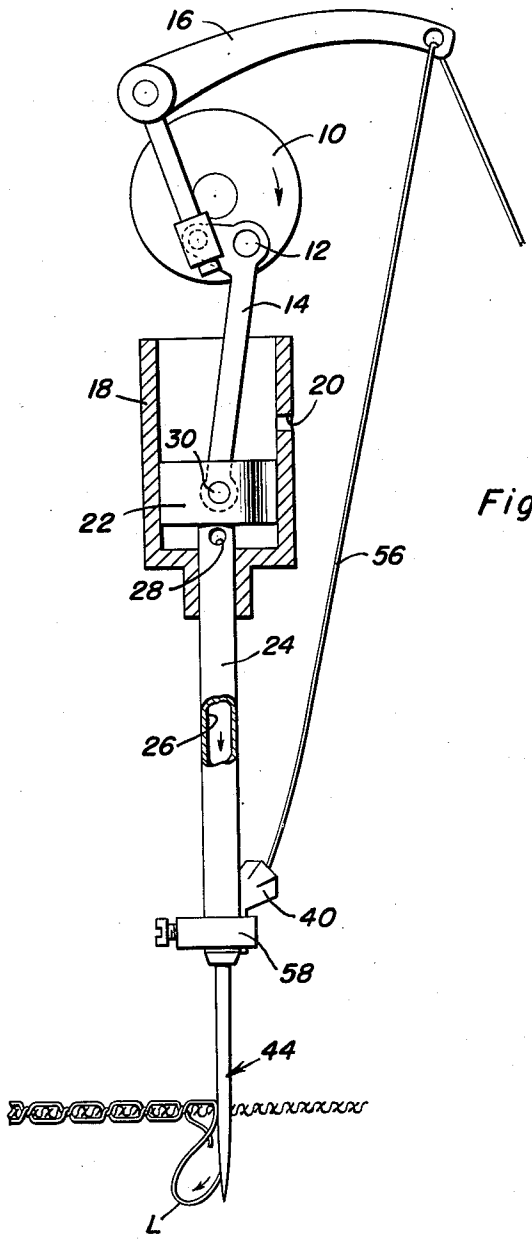
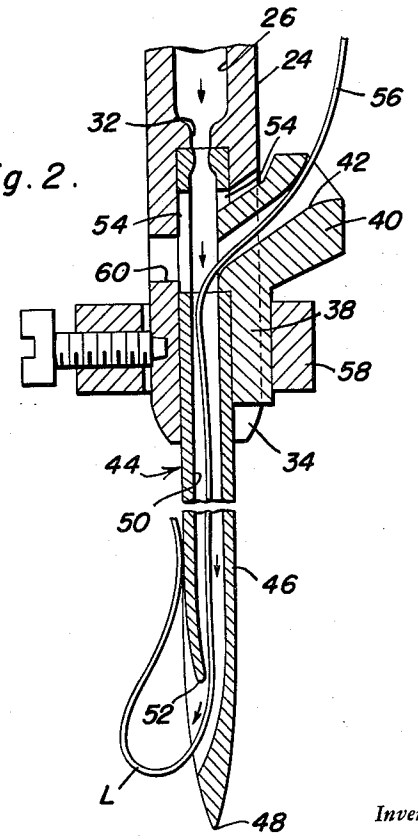


Fig. 2.



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LOOP FORMING DEVICE FOR STITCH FORMING MECHANISM

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5 Claims. (Cl. 112—218)

1

This invention relates to improvements in the art of sewing, and more particularly to sewing with a needle having an eye, adjacent its point, such as is commonly employed in machine stitching.

In the operation of a conventional sewing machine the formation of the loop of thread between the eye of the needle and the work requires that the needle be projected through the work for the full length of the stroke of the needle bar and that the needle start on its return stroke before a loop is formed which may be engaged by the loop taking mechanism of the machine. As a result the loops so formed lie in various different positions relative to the axis of the needle and may in some instances lie wholly out of the path of movement of the loop taking mechanism with the result that a faulty stitch is produced in the work.

The primary object of this invention is to improve the quality of work produced on a sewing machine.

Another object is to increase the speed of machine sewing.

A further object is properly to orient successive loops, formed between the point of the needle and the work, with relation to the loop taking mechanism of a sewing machine.

Still another object is to effect a cooling of the needle of a sewing machine during a high speed sewing operation.

The above and other objects may be attained by employing this invention which embodies among its features, feeding sewing thread through the eye of a needle at a speed which exceeds the speed of movement of the needle and immediately after the eye of the needle passes through the work during the penetrating stroke of the needle.

Other features include so orienting the thread so fed relative to the needle that the loop formed between the work and the needle lies in the path of movement of the loop taking mechanism of the sewing machine.

Still other features include directing an air blast axially through the major portion of a sewing machine needle to feed the thread and effect a cooling of the needle as the stitching thread is fed through the needle.

In the drawings:

Figure 1 is a diagrammatic end view of parts of a sewing machine equipped with apparatus designed for carrying out my invention, and;

Figure 2 is a fragmentary enlarged sectional view through the lower end of the needle bar and the sewing machine needle.

Referring to the drawings in detail the sewing machine head is equipped with a conventional rotary crank disc 10 carrying the conventional eccentric pin 12 which is coupled to my

2

improved needle bar through the medium of a conventional connecting rod 14, and operating in conjunction with the rotary disc 10 and connecting rod 14 is the conventional thread take-up or tensioning and slackening arm 16. This is disclosed, for example, in the U. S. patent to A. Rontke, No. 989,538, April 11, 1911.

In accordance with the present invention, a cylinder 18 is mounted on the machine head adjacent the rotary disc 10, said cylinder 18 being provided intermediate its ends with a port 20. Slidably mounted in the cylinder 18 is a piston 22 carrying a special needle bar 24. The needle bar 24 is fixed to the piston 22 to reciprocate therewith and is provided with a longitudinal internal bore 26, the upper end of which communicates with the interior of the cylinder 18 below piston 22 through diametrically opposed ports 28 which open into the longitudinal bore 26 so that as the piston 22 reciprocates within the cylinder 18 air will be expelled from the interior of the cylinder through the ports 28 and into the bore 26 of the needle bar 24. The lower end of the connecting rod 14 is pivotally connected as at 30 to the piston 22 so that the piston will be reciprocated within the cylinder in timed relation with the rotation of the disc 10. The stroke of the piston within the cylinder is such that when moving upwardly it passes beyond the port 20 so that air may be admitted through said port and subsequently with the down stroke of the piston ejected through the ports 28 into the interior of the needle bar 26. The needle bar is provided adjacent its lower end with an axial constricted passage 32, so that the air passing downwardly therethrough will be ejected therefrom in the form of a relatively high speed jet for a purpose to be more fully hereinafter explained. Entering the end of the needle bar, and opening through one side thereof into the bore 26 is an elongated slot 34 in which is seated a thread guide 38 having an upwardly and outwardly extending arm 40 which is provided with an upwardly and outwardly extending passage 42, the upper end of which is flared as illustrated in Figure 2 to present a smooth surface over which thread entering the passage 42 may pass into the interior of the needle bar.

Entering the lower end of the bore in the needle bar 24 is a machine needle designated generally 44 which comprises an elongated cylindrical body 46 having at one end a conventional needle point 48. The body 46 is provided with a longitudinal bore 50 which extends through the upper end of the needle in alignment with the constricted passage 32 of the needle bar 24, while the lower end of the passage 50 terminates in a lateral passage 52 which forms the eye of the needle. The body 46 of the needle is provided adjacent its upper end with diametrically op-

posed longitudinally extending elongated slots 54, into one of which the passage 42 opens, so as to enable the strand 56 of sewing thread to enter into the passage 50 of the needle 44, and pass outwardly through the eye 52 as suggested in Figure 2. The parts, namely the thread guide 38 and the needle 44 are held in proper position on the needle bar by a suitable clamp 58, and formed in the needle bar 24 diametrically opposite the slot 34 in substantial alignment with the inner end of the passage 42 in the thread guide 38 is an opening 60, to serve as a vent through which air may escape should any back pressure be built up in the needle.

In operation the needle mounted in the needle bar as illustrated in Figure 2 is reciprocated in the conventional manner by the needle bar 24 and as the needle bar reciprocates, the piston 22 moving in the cylinder 18 will compress the air admitted to the cylinder through the port 20 and eject it through the ports 28 into the interior of the needle bar 24. As the point of the needle 44 penetrates the work, and immediately after the eye of the needle passes through the work, the air directed through the constricted passage 32 will rush downwardly through the axial passage 50 in the needle, so that as the arm 16 moves downwardly to slacken the thread 56 between the thread guide 40 and the arm 16, the air will drag the slackened thread 56 through the passage 50 and eject it through the eye 52 substantially radial to the needle 44, and with the thread anchored in the work as suggested in Figure 1. A loop L will be formed which because of the direction of the air blast issuing through the eye 52 is directed into the path of the loop taking mechanism of the machine immediately below the work. Obviously the formation of the loop L will begin as soon as the eye 52 passes through the work.

Owing to the speed at which the air passing through the constricted opening 32 enters the needle 44 it will feed the thread 56 through the needle 44 at a speed which exceeds the speed of movement of the needle during its penetrating stroke and consequently the loop L will form substantially as soon as the eye 52 of the needle passes through the work, so that the loop taking mechanism may be operated in timed relation with the formation of the loop L to take the loop while the needle is still advancing through the work. By employing this device it is obvious that the depth to which the needle passes below the work may be materially diminished and consequently by proper timing of the needle with the loop taking mechanism, the speed of operation of the machine may be materially increased. Moreover due to the fact that the loop L is oriented under the influence of the air issuing through the eye 52, it is obvious that the quality of work may be improved. The air blast passing through the passage 50 in the needle 44 will also serve to cool the needle during high speed sewing operations, thus increasing the useful life of the needle.

Conventional takeups play out a slack in the thread at the moment when the eye or thread opening passes through the material. Ordinarily only part of the slack in the thread thus provided is pulled below the material by the advancing needle, and then this part is kinked into a loop by the retraction of the needle. However, in the present new method, all of the slack payed out by the takeup is drawn below the material through the passage in the needle by the jet of

air. The slack thread emerging from the opening in the needle immediately takes on the form of a growing loop between the lower side of the material and the opening 52, and when sufficient slack has been payed out by the conventional takeup 20 to give the loop the desired size, it is picked up by the usual looper or other conventional loop manipulating mechanism. The process of blowing the slack, provided in the needle thread by the takeup, down through the needle to form a loop below the material, gives more positive results than the conventional method of drawing some of the slack through the fabric by the advancing needle, and then kinking it into a loop by retraction of the needle.

While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that minor changes in the details of construction and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

Having described the invention, what is claimed as new is:

1. In a sewing machine having a loop taker, the combination with a vertically reciprocable needle bar, a needle carried by the needle bar and reciprocable thereby, said needle having an axial bore for passing a thread through the needle and terminating in a lateral eye-forming passage near the needle point extension of a loop of the thread out of said needle, and means for automatically forcing a fluid blast through the bore and the passage of the needle to feed the thread therethrough at a speed which exceeds the speed of movement of the needle so as to form a loop in the thread outwardly of said passage for taking by said loop taker, said means comprising a pump including a stationary cylinder, a piston reciprocable in the cylinder and connected to the upper end of the needle bar, and means connected to said piston to reciprocate the same and the needle bar, said needle bar having an axial bore communicating at its upper end with the cylinder below the piston and at its lower end with the bore of the needle.

2. In a sewing machine having a loop taker, the combination with a vertically reciprocable needle bar, a needle carried by the needle bar and reciprocable thereby, said needle having an axial bore for passing a thread through the needle and terminating in a lateral eye-forming passage near the needle point for extension of a loop of the thread out of the needle, and means for automatically forcing a fluid blast through the bore and the passage of the needle to feed the thread therethrough at a speed which exceeds the speed of movement of the needle so as to form a loop in the thread outwardly of said passage for taking by said loop taker, said means comprising a pump including a stationary cylinder, a piston reciprocable in the cylinder and connected to the upper end of the needle bar, and means connected to said piston to reciprocate the same and the needle bar, said needle bar having an axial bore communicating at its upper end with the cylinder below the piston and at its lower end with the bore of the needle, and a lateral thread guide carried by the lower end of the needle bar for leading the thread into the bore of the needle.

3. In a sewing machine, a vertically reciprocating hollow needle bar, a hollow needle carried thereby and reciprocating therewith and provided with an eye, and an air compressor com-

municating with the interior of said bar to force air under pressure through said bar and needle to feed a thread through the needle and out of said eye, said compressor including a piston connected to said needle bar to reciprocate the same, and operating means for reciprocating said piston.

4. In a sewing machine, a vertically reciprocating hollow needle bar, a hollow needle carried thereby and reciprocating therewith and provided with an eye, an air compressor communicating with the interior of said bar to force air under pressure through said bar and needle to feed a thread through the needle and out of said eye, said compressor including a piston connected to said needle bar to reciprocate the same, a thread take-up mechanism, and a connection between said take-up mechanism and said piston for operating said piston in timed relation to operation of said take-up mechanism.

5. The combination according to claim 3 including a lateral thread guide carried by said bar and leading into said needle for leading a thread into the needle.

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