

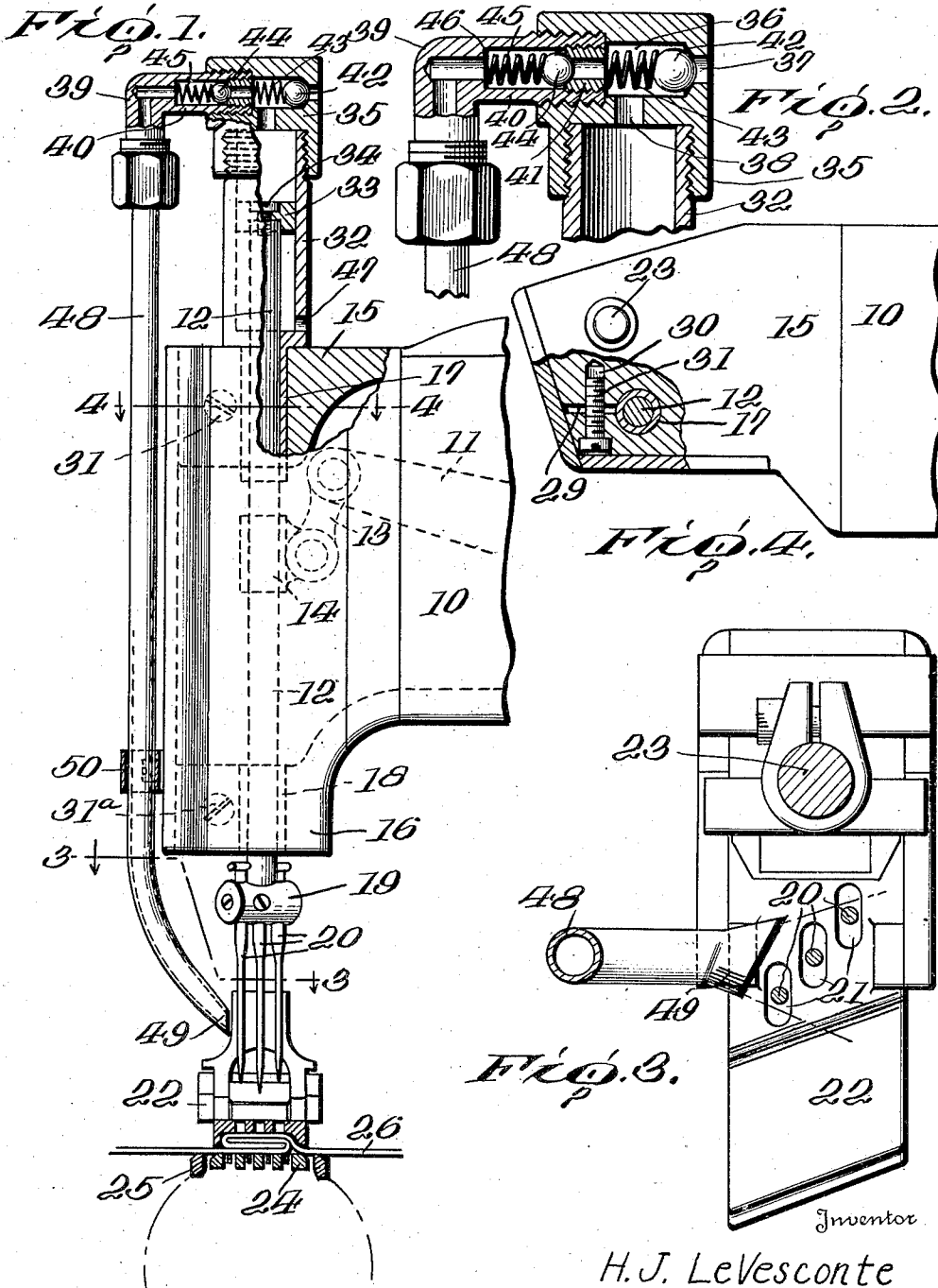
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NEEDLE COOLING DEVICE FOR SEWING MACHINES

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NEEDLE COOLING DEVICE FOR SEWING MACHINES

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The present invention relates to sewing machines, and more particularly to improved means for cooling the sewing machine needles in order to prevent the same from becoming overheated.

5 An object of the invention is to provide, in a sewing machine, an improved needle cooling mechanism of simplified construction wherein an air pumping mechanism is adapted to be operated by the reciprocation of the needle bar to direct a blast of air against the sewing needles.

10 A further object of the invention is to provide an improved needle cooling mechanism of simplified construction wherein an air pumping mechanism is adapted to be operated by the reciprocation of the needle bar to direct a blast of air across the path of the sewing needles.

15 A further object of the invention is to provide an improved pumping mechanism which is adapted to force a blast of air across the needle of a sewing machine wherein the needle bar serves as the piston rod.

20 A still further object of the invention is to provide an improved air pump for cooling the needles of a sewing machine wherein the pump cylinder is formed as an integral part of and an extension of a needle bar bushing whereby to properly fix the pump cylinder in alignment with the needle bar.

25 A still further object of the invention is to provide, in a sewing machine, an improved air pumping unit wherein the pump cylinder is formed as an integral part of the needle bar bushing and wherein the needle bar carries a piston head which is adapted to reciprocate within the pump cylinder.

30 The invention still further aims to provide an improved needle cooling unit, of the type referred to, which may be readily applied to any sewing machine, but which is particularly useful in high speed machines and those which are adapted to operate upon heavy fabrics, paper, or the like, wherein there is a pronounced tendency of the needle to become overheated.

35 The invention further provides a needle cooling unit, of the type referred to, which is of simple construction, which is inexpensively manufactured and easily installed, and which will effectually cool the needles in order to preserve their temper and prevent the burning off of the thread.

40 These and other objects of the invention will be obvious and will be hereinafter more fully described.

In the drawing:—

Figure 1 is an elevation showing the cooling mechanism as applied to a sewing machine.

Fig. 2 is a sectional view, in detail, showing the cylinder head and control valves.

Fig. 3 is a top plan view showing the nozzle in position to direct a blast of air against the needles.

Fig. 4 is a top plan view, partly in section, showing the manner of securing the pumping unit to the needle head.

Heretofore, considerable difficulty has been encountered in the operation of high speed sewing machines and machines used for sewing heavy fabrics, paper, or the like, in that the sewing needles tend to become overheated which results in causing them to lose their temper. This heating of the needles is caused by the frictional resistance offered by the fabric to the passage of the needles therethrough and often results in the burning off of the thread. When the needles become overheated, they become roughened and the points become dulled so that the frictional resistance increases. It is apparent therefore that by keeping the needles cool, the points will be preserved and the surfaces will retain their smoothness which facts will keep the resistance at a minimum and so preserve the life of the needles. In order to increase production, it is highly desirable to keep the sewing machines operating full time without having to stop the machines to allow the needles to cool, or to replace dulled or broken needles, or to thread a needle where the thread has been burned off. For this purpose, the present invention provides a simplified and efficient cooling mechanism which may be quickly installed in a sewing machine without the necessity of any machining of the parts. The cooling unit comprises a pump mechanism wherein the needle bar carries a plunger and is adapted to act as the piston and reciprocate within the pump cylinder whereby to force a blast of air through a connection tube against the needles when they are above the work. In this manner, the needles are sufficiently cooled to permit the machine to operate continuously. The pumping unit is particularly advantageous in that it may be readily applied to a machine already on the market and also in the fact that the pump cylinder may be made of varying capacities without changing the manner of mounting the unit on the sewing machine.

Referring more in detail to the accompanying drawing, the overhanging arm 10 of a sewing machine is in the form of a hollow housing which

encloses the needle bar operating lever 11 which is operatively connected to the needle bar 12 by the usual link 13 and collar connection 14. The overhanging arm 10 terminates in upper and lower lugs or bearing blocks 15, 16 respectively which are provided with means for clamping therein suitable sleeve bushings 17, 18 within which the needle bar reciprocates. The needle bar 12 carries a clamping member 19 which is adapted to receive the sewing machine needles 20 which in the illustrated embodiment of the invention are arranged in a line oblique to the line of feed and which pass through suitable openings 21 in the presser foot 22 which, in turn, is secured to the presser bar 23. The feed dog 24 operates between the slots in the throat plate 25 to feed the fabric 26 to and away from the sewing mechanism.

The upper lug or bearing block 15 is provided with a vertical opening from which extends a vertical slot 29 (Fig. 4). An opening 30 in the lug 15 intersects the slot at right angles to the plane thereof and is adapted to receive a bolt 31. A similar arrangement is provided in the lower lug 16 and the sleeve bushing 18 is inserted in the vertical opening and is firmly clamped therein by tightening the bolt 31. The upper bushing 17 is similarly inserted in the vertical opening in the lug 15 and is clamped therein by the bolt 31. This bushing 17 is provided with an integral cylinder portion 32 which extends above the lug 15 and the lower end of the cylinder rests upon said lugs. The needle bar 12 passes through the bushing 17 and extends into the cylinder 32. A piston head 33 is secured by a screw 34 to the upper end of the needle bar and is adapted to form, together with the needle bar, a piston which reciprocates within the cylinder 32. The upper end of the cylinder 32 is externally threaded to receive the threaded end of the cylinder head 35. The cylinder head 35 is provided with a chamber 36 which communicates with a port 37 which is open to the atmosphere and a port 38 which communicates with the interior of the cylinder 33. The opposite end of the chamber 36 is internally threaded to receive the threaded end of an angle pipe 39. The angle pipe is provided with a recessed portion 40 which is internally threaded to receive a sleeve 41 at the end thereof. A ball check valve 42 is adapted to normally close the port 37 by the action of a coil spring 43 one end of which rests upon the sleeve 41. The opening through the sleeve 41 is normally closed by a ball check valve 44 which is held by a spring 45, one end of which rests upon the ledge 46 of the recessed portion 40. The cylinder 32 is provided with an opening 47 at the lower end thereof. This opening serves as an air vent and also affords easy access to the interior of the cylinder whereby the bushing and piston may be oiled. Secured to the angle pipe 39 is a downwardly extending tube 48 which is provided with a nozzle 49 which is expanded in order to direct a blast of air laterally against the needles 20. The tube may be supported by a bracket 50 secured to the sewing head. It will be particularly noted that the open end of the nozzle 49 is disposed in a plane which is parallel to the longitudinal axes of the needles 20, or as illustrated in the present embodiment of the invention, the open end of the nozzle is disposed at a vertical plane, so that the blast of air issuing therefrom will be directed across the needles so as to afford, in this manner, a maximum cooling effect.

In the operation of the device, the downward

movement of the needle bar 12 and the piston 31 will create a vacuum in the chamber 36 in the cylinder head. The pressure in the chamber 36 will thereby be less than atmospheric pressure whereby the check valve 44 will be closed and check valve 42 will be opened to permit air to enter the cylinder 32 through the port 38. Upon the return or upward movement of the needle bar 12, the piston 33 will force the air into the chamber 36, thus closing the valve 42 and opening the valve 44 whereby the air is urged through the angle pipe 39 and tube 48 and directed by the nozzle 49 against the needles when the needle bar is on the upward stroke and the said needles are receding from the work. This operation is repeated so that upon each upward stroke of the needle bar, a blast of air is directed against the needles in order to cool the same. From the foregoing description, it will be noted that the blast of air is only directed against the needles at a time when it is possible to obtain a cooling effect, that is, when the needles are out of the work and that the volume of air discharged against the needles per unit of time is directly proportionate to the speed of the sewing machine and similarly the velocity of the air issuing from the nozzle is directly proportionate to the speed of the sewing machine so that the cooling effect on the needles is increased as the speed of the machine is increased. It will be understood that the nozzle 49 may be arranged in various positions depending upon the arrangement of the needles in order to insure a proper cooling effect by directing the blast of air laterally against the needles.

To install the pumping unit on a sewing machine, it is only necessary to loosen the bolt 31 and remove the usual bushing and then insert the sleeve portion 17 of the cylinder 32 in place thereof and tighten the bolt 31. After the piston head 33 is secured to the needle bar, the cylinder head 35, with the control valves and angle pipe 39 attached thereto, may be screwed to the cylinder 32. The tube 48 is then properly fastened to the downwardly extending part of the angle pipe 39 and positioned so that the nozzle 49 will direct the air, which is forced therethrough, against the needles to cool the same. The bracket member 50 is adapted to additionally support the tube in proper position.

It is, of course, to be understood that minor changes in details of construction and arrangement of parts may be made without departing from the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sewing machine, a needle head, a needle bar reciprocating therein, a needle carried by said needle bar, and means for directing a blast of air across the needle for cooling the same, said means including a pump cylinder, a piston therein connected to said needle bar in axial alignment therewith, a cylinder head carrying control valves and a pipe connected to said cylinder head and terminating in a nozzle adjacent said needle, said control valves adapted to permit a blast of air to be discharged from said nozzle laterally against the needle on the upstroke of the needle bar.

2. In a sewing machine, a needle head, a needle bar reciprocating therein, a needle carried by said needle bar, and means for directing a blast of air across the needle for cooling the same, said means including a tubular member having a nozzle adjacent the needle, a pump cylinder formed as an

integral part of the needle bar bushing and located in axial alignment therewith, a piston therein connected to said needle bar in axial alignment therewith, and a cylinder head carrying control valves and connected to said tubular member, said valves adapted to permit the discharge of air from said nozzle across the needle on the upstroke of said needle bar.

3. In a sewing machine, a needle head, a needle bar reciprocating therein, a needle carried by said needle bar, a cylinder mounted on said needle

head and having an inwardly offset depending sleeve portion extending into the needle head and serving as a bushing for said needle bar, a piston head carried by said needle bar and operating within said cylinder, valve means for permitting the discharge of air from said cylinder on the upstroke of the needle bar, and conduit means for directing the blast of air laterally against said needle for cooling the same as it recedes from the work.

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