

[54] **LUBRICATING DEVICE FOR ROTARY
HOOKS IN CYCLICALLY OPERABLE
SEWING MACHINES**

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[51] Int. Cl..... **D05b 71/02**

[58] Field of Search 112/256, 258, 181, 228,
112/260

[56] **References Cited**

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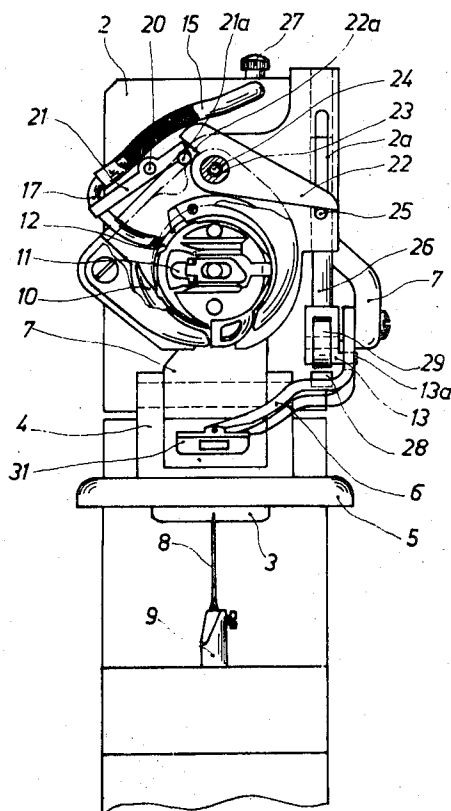
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[57]

ABSTRACT

A lubricating device for lubricating the raceway of a double stitch rotary hook particularly in stitch group sewing machines comprising a rotating rotary hook which is mounted either in an arm which is pivoted above the work support in which there is a needle arranged below the support or where the rotary hook is mounted below the support and the needle is above the support. The arrangement includes a lubricating conduit leading out of a lubricating tank and containing a filler of capillary material for conducting the lubricant through the material to the other end of the conduit. The conduit is mounted on the sewing machine housing so as to be movable toward and away from the double stitch rotary hook. The sewing machine includes means for mounting the conduit so that it is moved into a position in which the filler of capillary material comes into contact with the raceway of the double stitch rotary hook when the machine is in a non operative or still position but it moves to a position spaced from the rotary hook raceway when the machine is operating and the shuttle is rotating.

8 Claims, 4 Drawing Figures



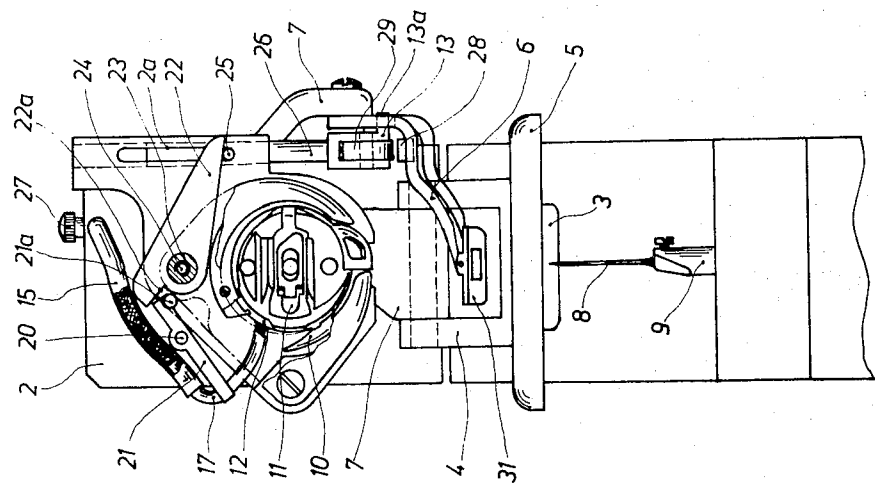


Fig. 1

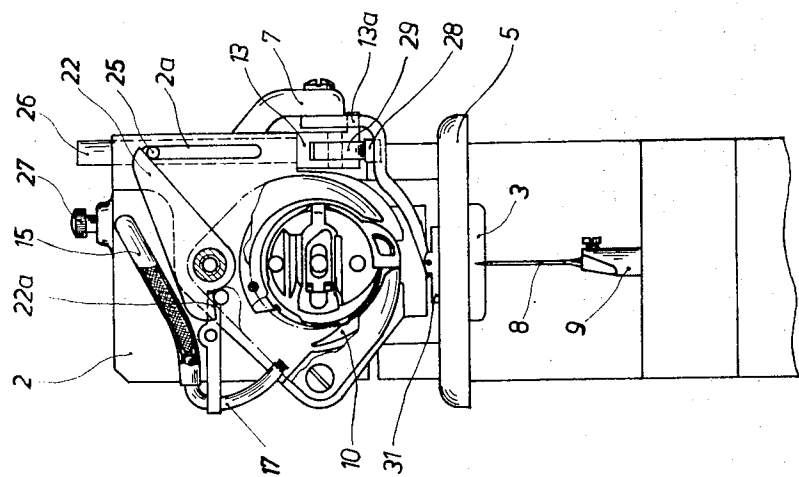


Fig. 2

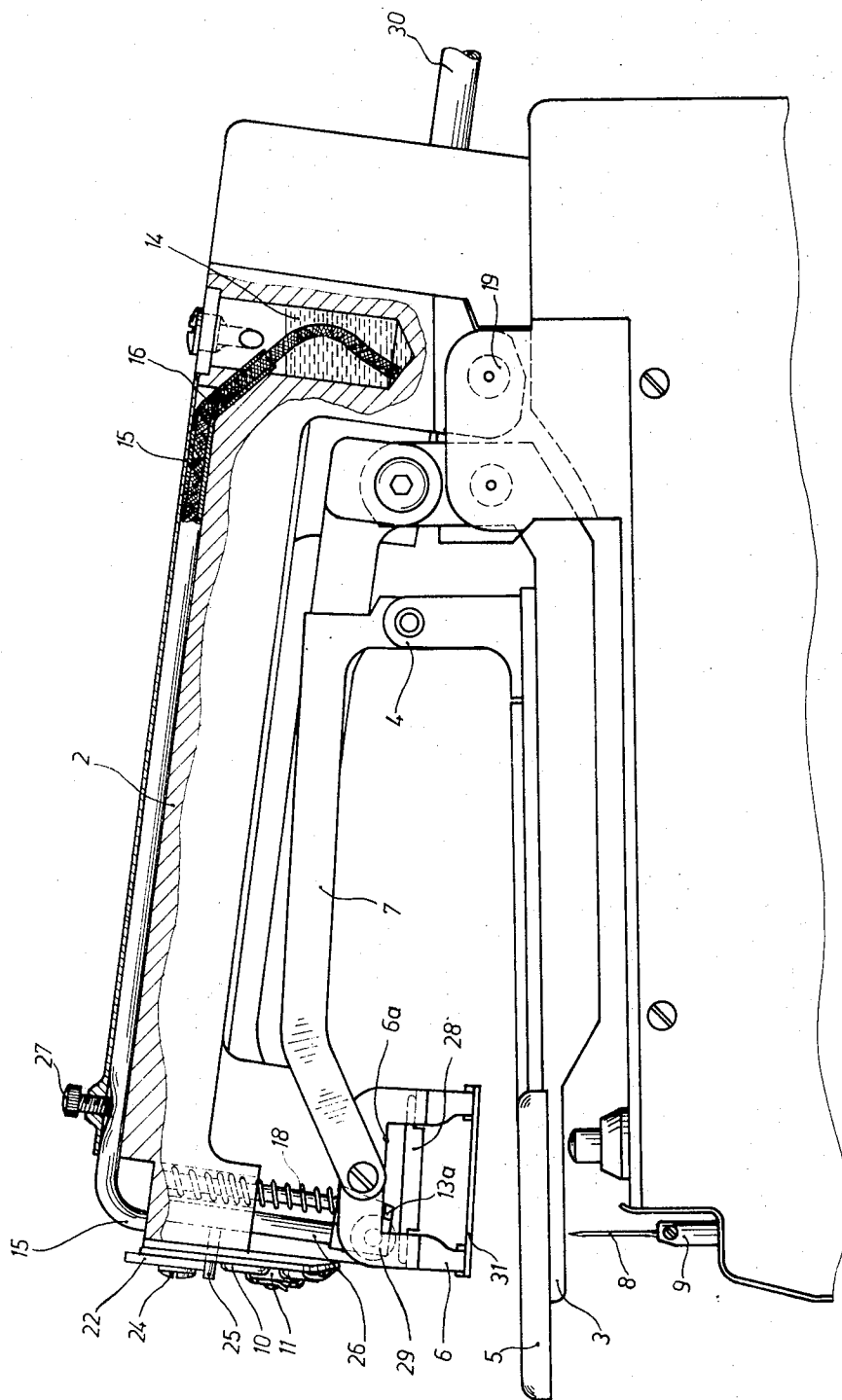


Fig. 3

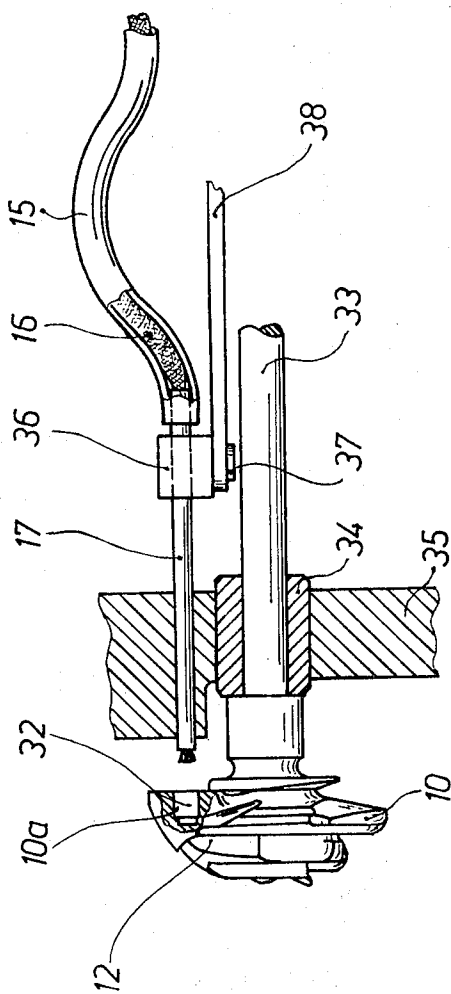


Fig. 4

LUBRICATING DEVICE FOR ROTARY HOOKS IN CYCLICALLY OPERABLE SEWING MACHINES

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates in general to the construction of sewing machines and in particular to a new and useful lubricating device for rotating double stitch rotary hooks which comprises means for directing lubricant to the raceway of a rotary hook when the machine is non operative or standing still but which is displaced away from the rotary hook when the machine is operating.

2. DESCRIPTION OF THE PRIOR ART

The present invention relates to a lubricating device for rotating double stitch rotary hooks in cyclically operating sewing machines, such as button hole machines, latch sewing machines or button sewing machines, in which a stitching operation consisting of a relatively small number of stitches is regularly followed by a down time of the machine. The lubrication of rotating double stitch rotary hooks is a particularly difficult technical problem because at a rotary hook speed of 10,000 rpm and more which is usual in modern sewing machines, a sufficient lubricant supply is indispensable. In addition, any lubricant escaping from the rotary hook raceway is capable of polluting the sewing material and this must be securely avoided.

In the lubrication of rotating double stitch rotary hooks, it is known to control the lubricant flow from a storage place to the rotary hook raceway proportionally to the speed and also to completely stop this supply. Moreover, it is usual in the known devices to provide catching means in the rotary hook raceway by which excess lubricant which becomes centrifuged by the rotary hook is caught and returned to the storage tank to avoid the pollution of the sewing material.

Known devices for a quantitatively regulated lubricant supply into the shuttle raceway are based on the principle that a certain quantity of lubricant is proportional to the corresponding time of operation of the machine. However, these known devices are no longer satisfactory in cases where in cyclically operating stitch group sewing machines, the down time intervals alternate with operation intervals in a rapid and regular succession and where, in addition, the operational interval is relatively short. In such cyclic operations, the risk of an insufficient supply of the lubricant is smaller but there is a danger of a lubricant excess and of a pollution of the material. The danger is particularly great in such sewing machines in which, for reasons of the sewing technique, the rotary hook is located in a rotary hook arm provided above the sewing material.

SUMMARY OF THE INVENTION

The present invention provides a lubrication particularly for rotating double stitch rotary hooks, which is adapted to the special conditions of a cyclically operating sewing machine so that an overdosing in lubrication is securely avoided.

The invention is based on the experience that an extremely small quantity of lubricant applied to the rotary hook raceway in spots or places during the standstill of the machine is sufficient to assure an impeccable operation during a number of rotary hook revolutions which is relatively small but adequate for the production of group stitches.

Thus, the essence of the invention is to be seen in that during the still time of the machine, a small quantity of a lubricant is supplied spotwise to the rotary hook raceway and upon the start of the machine, the communication between the rotary hook raceway and the lubricant storage tank is completely interrupted.

In view of the fact that in cyclically operating sewing machines, such as stitch group sewing machines, the program control assures that the double stitch rotary hook always stops in the same predeterminable position, an arrangement in accordance with the invention provides that the open end of the lubricant conduit is mounted on the housing of the sewing machine so as to be movable in respect to the double stitch rotary hook and may be brought, by means of an actuating mechanism depending on the program control, into a position in which the central capillary lubricator contacts the raceway of the double stitch rotary hook.

Consequently, during the stillstand of the sewing machine, the open end of the lubricant conduit is in contact with the raceway of the rotary hook while during the operation of the machine, it is retained in a position spaced from the rotary hook raceway and not interfering with the rotation of the rotary hook, the positioning of the lubricant conduit being derived directly or indirectly from the program control of the sewing machine. The contact between the capillary lubricator inserted into the lubricant conduit produces the transport of the lubricant from a storage tank to the free end of the lubricant conduit, the cross-section of the latter and thereby the rate of the oil flow being made variable in the usual manner, by means of a simple set-screw provided in the lubricant conduit.

In stitch group sewing machines having the rotary hook disposed above the sewing material and comprising a material holder with a clamping frame whose motion is dependent on the pivotal movement of the rotary hook arm, a simple constructional solution for the displacement of the end portion of the lubricant conduit is that this end portion is connected to one arm of a lever which is pivotally mounted on the rotary hook arm and whose other arm is operationally connected, through an intermediate member, to an engagement pin receiving its motion from the pivotal movement of the clamping frame.

It is of course not absolutely necessary from the standpoint of the invention that the end portion of the lubricant conduit be effective directly onto the outer surface of the rotary hook raceway. According to the construction of the sewing machine, other supply variants are also possible. For example, in another inventive arrangement, the end portion of the lubricant conduit may be made effective at the stop time of the machine from the back side of the rotary hook, by means of an opening provided in the rotary hook wall. In this case, the displacement of the lubricant conduit may be a simple straight-line motion permitting a particularly advantageous seating of the conduit in the machine housing, and a recess is advantageously provided in the rotary hook body behind the opening, in which the lubricant supplied through the conduit is deposited and, during the operational time, transferred to the raceway of the rotary hook in a manner known in itself.

Accordingly it is an object of the invention to provide an improved device for lubricating rotary hooks which includes a conduit having a filler material therein which is directed at one end to a lubricant supply tank and has

an opposite end which is movable into and out of engagement with a rotary hook and wherein the sewing machine includes a mechanism for moving the conduit so as to displace it into engagement with the rotary hook during the still period and out of engagement therewith during the operating period of the rotary hook.

A further object of the invention is to provide a sewing machine lubricating device which is simple in design, rugged in construction and economical to manufacture.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial elevational view of a button hole machine in a rest position and provided with a lubrication device in accordance with the invention;

FIG. 2 is an end view similar to FIG. 1 with the machine being in an operational position;

FIG. 3 is a side elevational view, partly in section, of the button hole machine in rest position according to FIG. 1; and

FIG. 4 shows an axial sectional view of another embodiment of the inventive lubrication device.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular the invention embodied therein in FIGS. 1 to 3 comprises a button hole machine in which a needle 8 which is adapted to pierce the material to be treated is arranged below a material support platform and a double stitch rotary hook 10 is arranged above the support platform. The invention is particularly for machines of this type but it is also applicable for machines in which the rotary hook is mounted below and the needle mounted above and which is not shown in the drawings.

The button hole machine represented in FIGS. 1 to 3 comprises a double stitch rotary hook 10 including a bobbin case 11 located in a rotary hook arm 2 which is pivotally mounted on the housing 1 of the sewing machine on a horizontal shaft 19. The housing 1 of the sewing machine is provided with a material supporting arm 3 below which a needle bar 9 carrying a needle 8 and the needle bar drive (not shown) are disposed. The material is clamped between a supporting plate 5 reposing on a supporting arm 3 and a clamping frame 31 which is carried by a bracket 7 articulated to a leg 4. After a sewing operation is terminated, the rotary hook arm 2 is moved by means of a lever 30 about the shaft 19 from its working position, shown in FIG. 2, into its rest position, shown in FIGS. 1 and 3. The lever 30 is actuated by a programming device of the sewing machine (not shown) by either mechanical, electrical, pneumatic or hydraulic means.

During the pivotal movement of the rotary hook arm 2 from its working position, according to FIG. 2, into its rest position, according to FIG. 1, the clamping frame 31 is also lifted, with a small delay, from the material supporting plate 5 so that the material can be removed. For this purpose the following mechanism is associated with the clamping frame 31 and the rotary hook arm 2:

A rail 28 is located on the clamping frame 31 parallel to the lower contact surface of the same, and a pressure roller 29 is fixed to a guide rod 26 by means of a forked roller holder 13 and cooperates with the rail 28. The guide rod 26 is slidably mounted for vertical motion in the rotary hook arm 2. A pressure spring 18 disposed between the rotary hook arm 2 and the roller holder 13 urges the roller 29 into contact with the rail 28 of the clamping frame 31. A claw 13a provided on the roller holder 13 extends laterally into the zone of the material clamping device 6 and protrudes into the zone below the lower edge 6a of the same. The guide rod 26 carries an engaging pin 25 extending perpendicularly to the rod and cooperating with a guiding slot 2a provided in the rotary hook arm 2.

The arrangement operates as follows:

At the beginning of the pivotal movement of the rotary hook arm 2, the clamping frame 31 does not participate in the movement. Only after the movement of the rotary hook arm 2 has progressed with respect to the position shown in FIG. 2 so that the lower end of the guide slot 2a applies against the engagement pin 25, during the further movement, pin 25 and thereby also the clamping frame 31, are lifted and the sewn material may be removed.

The foregoing parts and operation of the sewing machine are not included in the subject matter of the invention; however, they are necessary to understand the invention. In the sewing machine of this type, the lubricating device for the rotating double stitch rotary hook in accordance with the invention comprises the following mechanism:

The free end portion of a correspondingly designed lubricant conduit 15 is secured to an arm of a two-armed lever 21 which is rotatably mounted on the rotary hook arm 2 by means of a pivot 20 and whose other end is provided with a stop pin 21a. This pin 21a extends into the path of motion of an intermediate member 22 which is pivoted on a journal 23 fixed to the rotary hook arm and laterally guided by a limit screw 24. As shown particularly in FIGS. 1 and 2, on one end portion of the intermediate member 22, a nose 22a is provided for cooperation with the pin 21a, while the other end portion of the intermediate member 22 extends into the path of motion of the engagement pin 25. The other end of the lubricant conduit 15 which may consist of a flexible material, is connected to a lubricant tank 14. The transport of the lubricant is effected, in a well known manner, through a wick 16 inserted in the lubricant conduit 15 and extending into the lubricant tank 14 by the capillary action. A lubricant regulating screw 27 permits the variation of the cross-section of the lubricant conduit for controlling the flow rate. At the open end 17 of the lubricant conduit 15, the wick protrudes out of the conduit.

The lubricant device operates as follows:

During the stillstand or stopping of the machine, the relative position of the parts is illustrated in FIG. 1. The end portion 17 of the lubricant conduit 15 extends close to the raceway 12 of the rotary hook so that the protruding wick 16 contacts the rotary hook raceway and deposits a small dosed quantity of lubricant on the contact spot. As soon as, upon the starting of the machine, the rotary hook arm 2 is moved from its rest position according to FIG. 1 down to its operative position according to FIG. 2, first the clamping frame 31 comes into a clamping contact with the material sup-

porting plate 5 and the position of the lubricant conduit 15 is unchanged. The further downward motion of the rotary hook arm 2 is followed neither by the clamping frame 31 nor by the engagement pin 25 so that now the intermediate member 22 receives a counter clockwise motion (FIGS. 1 and 2) by which the lubricant conduit 15 is urged laterally outwardly in a position shown in FIG. 2 in which the free end portion 15 of the lubricant conduit 17 is spaced from the raceway 12 of the rotary hook.

Once the sewing operation is terminated, an inverse movement of the described parts takes place. The return motion of the intermediate member 22 and of the lever 21 into the so-called rest position according to FIG. 1 is effected preferably by their own weight or, if necessary, by means of return springs. It is important that in its laterally removed position according to FIG. 2, i.e., in the operational position of the machine, the lubricant conduit 15 is securely arrested as it may be obtained by the cooperation of pin 21a with nose 22a of the intermediate member 22 in the present example.

Many variations are of course possible within the scope of the invention concerning the design of the means serving to displace the lubricant conduit 15 with respect to the rotary hook 10 and as to how their drive is derived from the program control devices of the sewing machine. FIG. 4 shows an embodiment in accordance with the invention which is applicable even when the rotary hook is provided below the material to be sewn. In the embodiment according to FIG. 4, the end portion 17 of the lubricant conduit 15 is straight-lined and slidably seated in a guide which is provided in a bearing rib 35 of the housing close to the bearing bush 34 of the rotary hook shaft. In this case, the lubricant conduit 15 is secured to an articulated block 36 which is connected, through a hinge pin 37, to a control lever 38 driven by a gear forming part of the stoppage mechanism of the sewing machine (not shown). In the example according to FIG. 4, an opening 10a is provided in the back of rotary hook 10, the position of the opening 10a on the rotary hook 10 being such that in a predetermined rest position of the rotary hook, the opening 10a faces the end 17 of the lubricant conduit 15. Behind the opening 10a, a pocket-like recess 32 is provided in the rotary hook and passages (not shown) leading to the raceway of the rotary hook extend therefrom. When the machine is stopped, end 17 of the lubricant conduit 15 is introduced into the recess 32 of the rotary hook and after the contact with the wall is established, a small quantity of lubricant is there deposited which, owing to the following centrifugal action produced during the operation of the machine, is transported to the raceway of the rotary hook. The recess 32 may also be filled with a capillary material.

Careful tests have shown that the quantity of the lubricant introduced in a manner according to the invention is so small that an excess of lubricant which could be centrifuged toward the material to be sewn does not appear and that, on the other hand, the introduced quantity is sufficient for an impeccable lubrication even at the highest speed practicable with stitch group sewing machines.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be un-

derstood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A lubricating device for the raceway, particularly of a double stitch rotary hook in a stitch group sewing machine, comprises a sewing machine housing, a lubricating tank mounted on said housing, a lubricating conduit containing a filler of capillary material extending from said tank along said housing, a double stitch rotary hook rotatably mounted on said housing, said housing including a portion movable into and out of engagement with the material to be stitched and means connected between said portion and said conduit for shifting said conduit into engagement with said rotary hook when said rotary hook is not rotating and for moving it out of engagement with said rotary hook when said rotary hook is rotating.

2. In a sewing machine comprising a frame, support means on said frame for supporting material to be sewn, a rotary hook rotatably mounted on said frame on one side of said support means, a needle mounted on said frame for reciprocation toward and away from said rotary hook on the opposite side of said support means, the improvement comprising, lubricant conduit means including a lubricant applicator with lubricant thereon, displacement means connected to said lubricant conduit means for displacing said applicator to and away from said rotary hook, operating means on said frame including a movable member for placing said machine in an operative position wherein said rotary hook is rotatable, and means connected to said movable member and to said displacement means to displace said applicator into engagement with said rotary hook when said machine is in a non operative position and to withdraw said applicator away from said rotary hook when said machine is in an operative position.

3. In a sewing machine according to claim 2, wherein said needle is mounted below said support, said rotary hook being rotatably mounted above said support.

4. In a sewing machine according to claim 2, wherein said frame includes a support arm pivotally mounted about a horizontal axis, said lubricant conduit means including a lubricant tank on said support arm, a conduit having a filler therein extending from said tank through said conduit and projecting outwardly from the opposite end for engagement with said rotary hook.

5. In a sewing machine according to claim 4, wherein said displacement means includes a presser member on said arm adapted to engage the material on said support and being displaceable on said arm in response to engagement with the material, and lever means between said presser frame and said conduit for displacing said conduit with said filler out of engagement with said rotary hook when said presser member is in engaged position, said operating means comprising said arm being movable with said presser into an operating position.

6. In a sewing machine according to claim 5, wherein said presser member comprises a presser frame pivotally mounted at the end of said support arm, a roller member mounted on said support arm for upward and downward movement, spring means biasing said roller member in a downward position into engagement with said orresser frame, said roller member being moved upwardly when said presser frame is engaged with the material on said support means, and a lever member con-

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nected to said roller and being displaceable by upward movement thereof to displace said conduit with said filler in respect to said rotary hook.

7. In a sewing machine according to claim 2, wherein said lubricant conduit means comprises an applicator for lubricant mounted on said frame for displacement toward and away from said rotary hook means, said operating means comprising a movable member con-

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nected to said applicator.

8. In a sewing machine according to claim 2, wherein said rotary hook includes a recess opening to one side of said rotary hook for receiving lubricant, said lubricant applicator comprising a conduit having a filler therein which projects outwardly from one end thereof and which is engageable in said recess.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,837,307 Dated September 24, 1974

Inventor(s) Gunter Tolle

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet item [30] "Oct. 12, 1973" should
read -- Oct. 12, 1972. --.

Signed and Sealed this

eleventh Day of *May* 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks