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DEVICE FOR THREADING THE NEEDLE IN SEWING MACHINES

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2 Sheets-Sheet 2

Fig. 5

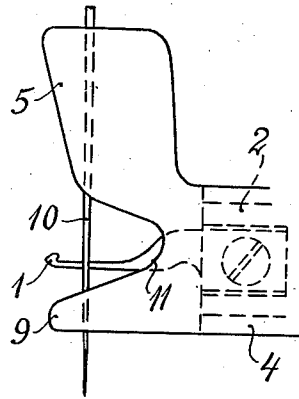


Fig. 6

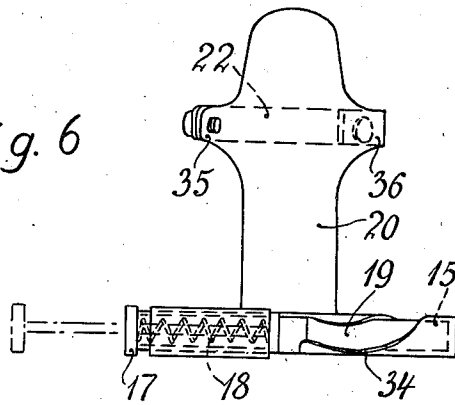


Fig. 7

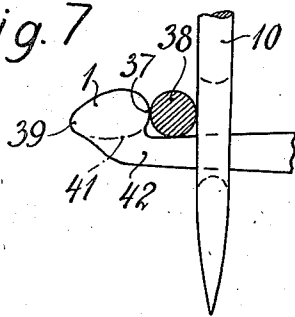


Fig. 8

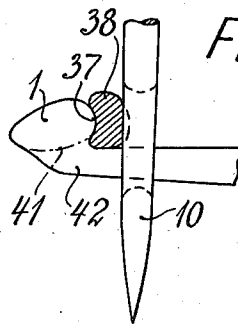
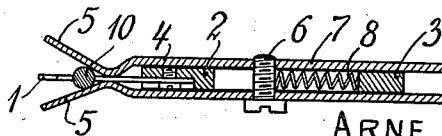


Fig. 4



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DEVICE FOR THREADING THE NEEDLE IN
SEWING MACHINESArne Brun and Jacob Andersen Honne, Oslo,
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12 Claims. (Cl. 112—225)

This invention relates to devices with thread catching hook for threading the needle of sewing machines of the kind which is adapted to be mounted on the machine or to form a part thereof in such a manner that a hook carrying arm with a sort of guiding member is brought into threading position by passing the hook by means of the guiding member through the needle eye in order to catch and pass the thread through said eye. In accordance with the invention the hook carrying arm is provided with a guiding member which so surrounds the said arm or is so movable thereon that the guiding member, when the carrying arm by a simple manual operation is caused to move into threading position, firstly abuts against the hook and is then moved on the carrying arm, so that the hook is pushed forward and guided in through the needle eye. Thereby a spring mounted on the guiding member is tightened and after the threading motion brings the guiding member back into initial position on the carrying arm, the latter during its automatic return swinging into resting position carrying the hook with the thread through the needle eye and then automatically releasing the thread or tilting it off from the hook, when the thread has been passed a suitable distance through the needle eye.

It is known in threading devices to form a sort of guiding member with diverging branches which form a V-shaped engagement groove for the needle, whereby the hook is guided into a definite position laterally relatively to the needle. According to the invention both diverging branches are preferably mounted on a sleeve-shaped guiding member riding on the carrying arm, the branches being so shaped as to form simultaneously sliding edges guiding the thread into a position to be caught by the hook. The invention further comprises an arrangement, whereby the movement of the carrying arm towards the threading position is so regulated that the guiding member and subsequently also the hook reaches on to the needle, when this is exactly in such a vertical position that the hook can pass through the needle eye and cannot abut or be pressed against the needle proper, whereby the hook might be disturbed. This arrangement also, according to this invention, withdraws the hook from the eye automatically by the influence of the needle holder or a simultaneously therewith moved member of the machine on the carrying arm, when the needle holder with the needle is moved in the machine. This arrangement may consist of an adjustable abutment

which has a camlike shape or the shape of an inclined plane, said abutment being actuated by the needle fastening screw or another member movable simultaneously therewith. But the arrangement may obviously also consist of a corresponding abutment or a device with gear wheels or the like mounted on the needle holder, needle bar or another member movable simultaneously therewith so as to actuate the carrying arm similarly.

It is formerly known to use for guiding the hook carrying arm a helical surface causing a horizontal displacement of the arm and simultaneously a swinging movement thereof so that the arm with the hook is moved from inoperative position behind the overhanging sewing machine arm down towards the needle under the last-named arm, or vice versa. According to the invention a piston or shaft member carrying the arm is movable under spring pressure in a fixed sleeve having a helical groove, wherein the arm is guided during its displacement and swinging movement, the piston having a projecting handle which is preferably turnably attached to the piston and serves to displace same in the sleeve so as to cause the motion of the arm down into ready threading position. According to the invention the helical groove may also be made with an extra curve in a direction towards the needle holder, whereby the carrying arm with the hook during its movement from threading position into resting position receives a rapid return stroke towards the needle so as to assist in performing the intended operation of releasing the thread from the hook immediately after the threading proper.

As the invention intends to provide, as mentioned above, an automatic threading and an automatic release of the thread after the threading, the invention necessarily comprises also the use of a new shape of thread catching member or hook proper for this purpose which constitutes a part of the device deciding for the automatic operation. Said member thus constitutes a peculiarly shaped catching hook proper.

An embodiment of the invention is illustrated in the annexed drawings. Fig. 1 shows the device mounted on a sewing machine in threading position. Fig. 2 shows the device proper in resting position (dotted lines in Fig. 1) seen in the direction of the arrow in Fig. 1. Fig. 3 shows a longitudinal section in a larger scale of the threading members proper with the guiding member and the hook in initial position. Fig. 3a is a view corresponding to a portion of Fig. 3 and

showing a modification. Fig. 4 shows in a smaller scale a section on the line IV—IV of Fig. 3 with the hook in threading position, i. e. passed through the needle eye. Fig. 5 shows in the same scale as Fig. 3 a portion of an elevation with the hook in threading position. Fig. 6 shows the device in resting position seen from below, the blade spring and the carrying arm being removed. Fig. 7 shows in an enlarged scale the main shape of the thread carrying member (hook) constructed for this invention, said member being passed through the needle eye and a thread being placed between hook and needle. Fig. 8 is a view similar to Fig. 7, but the catching part proper of the hook has been pulled in against the needle and the thread clamped between the catching part and the needle.

The hook 1 is removably attached to a foot or holder 2, which may be provided with or form an angularly bent end portion of a swingable arm 3. The hook projects somewhat in front of the foot or carrying member 2 which is surrounded by a displaceable guiding sleeve or socket 4 having two or two pairs of outwardly directed wings or fork branches 5, 9 at the end surrounding the hook proper 1.

A screw 6 passed transversely through the sleeve 4 projects through a longitudinal slot 7 in the foot or holder 2, so that the screw and slot limit the displacement of the sleeve on the foot. A spring 8 arranged in the rear part of this slot 7 in the foot tends to press forward the sleeve 4 into the position shown in Fig. 3, wherein the hook 1 is located between the root portions of both wings 5, 9 and is thereby held sufficiently withdrawn to prevent injuring thereof.

The arm 3 is made as one part of a swinging arm and is attached adjustably to another part 12 (Fig. 1) by a screw 13 and a longitudinal slot 14. The arm part 12 is attached to a piston 15 (Fig. 2) which is movable to and fro in a horizontal cylinder 16 by means of a handle 17. A spring 18 tends to press the piston 15 with arm portion 12 to the right hand end of the sleeve as shown in Fig. 2. The arm portion 12 projects out from the sleeve through a helical groove 19 having preferably a varying pitch.

The sleeve 16 is carried by a curved attaching rail 20 which at either side is formed with a bow 21 or clamp 35 and 36 which together with the rail form a semicircular clamping bow serving in turn together with a counterbow 22 (Figs. 2 and 6) to attach the rail and thereby the whole device to the overhanging sewing machine arm 23, so that the sleeve 16 is located horizontally under the arm 23 at the inside of the machine head 24 as shown in Fig. 1.

A blade spring 26 which may be attached to the rail 20 and provided with a straight end portion 27 will engage the upper portion of the carrying arm 12 when in operative position, and will then maintain the arm under a constant spring pressure in a direction against the needle 10 (see Fig. 1).

The needle bar 28 or a member movable simultaneously therewith, for instance the needle clamping screw 29, co-operates automatically with an arrangement on the carrying arm 3, 12. The arm portion 3 carries in the illustrated example an adjustable abutment 30 which projects forwards under the needle bar or the needle clamping screw and is so adjusted by a screw 31 and a slot 32 that an inclined plane 33 on the abutment 30 will move the arm 3 laterally (to

the right in Fig. 1), when the needle holder 28 with needle 10 is moved downwards from its uppermost position.

The helical groove 19, as shown in Fig. 6, is made with a special curve portion 34 for a purpose to be explained later on.

In order to obtain a safe automatic operation of the device, a specially constructed catching member is required which is made in harmony with the other device members. This catching member or hook must not only possess a certain ability of holding fast the thread during the threading but must also be so made that on the one hand it presents no sharp point or hook to enter into the thread fibres and prevent the automatic release of the thread and on the other hand it allows a very easy pulling of the hook with the caught thread proper through very small needle eyes, so as to enable the complete automatic threading by the device which is the aim of the invention.

According to this purpose the thread catching member proper (catching hook) must not only be made sufficiently thin but also be made suitably, as shown in Figs. 7 and 8, as an elliptically shaped body with a shape approximately as a somewhat pointed egg as indicated by the dash-and-dot arcs 41. From one longitudinal side of this body, viz: from both end points of the arc 41, there projects a relatively wide stalk or bar 42 curved abruptly off and following nearly the extended longitudinal axis of the elliptic body which thus forms together with the bar a sort of reconstructed catching hook. The catching edge 37 of the hook will thereby form a rearwardly directed convex portion or pointed blunt projection engaging the thread 38 preferably in level with its thickest portion, whereas the forward hook end 39 presents a pointed although rounded portion which is guided safely in through the needle eye. This shape of catching hook is specially important in an automatic threading device as intended, because a hook so shaped cannot abut against the needle eye edges during its introduction into the eye and further may not hook fast during its movement out from the needle eye together with the thread. The catching edge 37 of the hook may obviously be somewhat varied, for instance made with a more convex shape or with a more abrupt angular termination, if it has still a rounded end portion on its operating catching portion and not a sharp point or hook.

The device operates in the following manner:

The arm 3, 12 is in resting position as indicated by dotted lines in Fig. 1. The handle 17 is pulled out (to the left in Fig. 2). Thereby the arm 3, 12 receives simultaneously with its displacement in horizontal direction also by means of the groove 19 a swinging motion downwards, so that the arm at a uniform velocity of the piston obtains a gradually decreasing angular velocity. During the last part of the movement of the handle the arm portion 12 engages an inclined face 25 of the blade spring 26 and finally slides forwards under the straight end portion 27 of the spring, so that the arm as mentioned above is maintained spring pressed in its lowermost position with a slight pressure against the needle 10.

Thus in the illustrated arrangement the arm 3, 12 may, by pulling the handle 17, be swung from its upper resting position down into its position opposite the needle and be maintained there under a pressure from the spring 26. When

then the needle 10 is moved upwards towards its topmost position, for instance by the operator laying his right hand upon and turns the fly wheel of the sewing machine. the arm 3, 12 with the hook will, by the pressure of the spring 26 and in a sliding of the adjusted inclined plane 33 along the attaching screw 29, slide in against the needle, and the hook 1, when the needle has reached its top position, is guided automatically and exactly through the needle eye into threading position as shown in Fig. 5, such guiding being controlled in horizontal direction by the inclined plane 33 and laterally by the sleeve 4 which during the contact of the wings 5 on both sides of the needle is displaced on the foot 2.

When now the thread is moved by hand downwards along the exterior faces of the upper portion of the wings 5, it is guided in against the groove or recess 11 in the wings and is caused to place itself safely between the catching edge 37 of the hook 1 and the needle 10 (see 38 in Fig. 7). When then the needle is again moved downwards, the needle clamping screw 29 actuates the inclined face 33 to automatically swing the carrying arm 3, 12 with the hook 1 to the right in Fig. 1, so that the arm in swinging in the sleeve 16 is forced into the helical groove 19, whereby it is displaced with the piston 15 in the sleeve 16. The arm therefore leaves the spring 26 and is, still automatically, moved by the action of the spring 18 back into uppermost position. During this movement the arm firstly automatically pulls the hook 1 with the thread 38 out through the needle eye and will then automatically release the thread.

When the device by the said pull on the handle 17 has been put in action, and when then the needle is brought up into top position and back again, a quite automatic operation of the device is obtained, because the device is caused, under automatically horizontal and vertical guiding control of the hook, to adjust itself in threading position and will then during the further movement of the needle again move back into resting position after finished threading of the needle and release of the thread, the guiding member 4 being by the pressure of the spring 8 passed back into initial position on the foot 2, as soon as the hook leaves the needle eye during its return swinging movement.

If the needle is not in its top position, the arm 3, 12 by the pressure of the spring 26 is moved laterally (to the left), when the needle holder with the needle is moved upwards into the chosen threading position.

In order to be sure that the thread is released from the hook shortly after having been pulled through the needle eye, a short rapid return stroke, thus in a direction towards the needle, is imparted to the hook or to the guiding member. The thread which by the pulling through the needle eye has become taut and therefore presses to the left on the hook at 37 (Fig. 7), is thereby suddenly slackened and as a consequence thereof is rolling up above the rounded hook portion above the point 37. When the hook immediately thereafter is again pulled back (to the right in Fig. 7), the thread will safely tilt off from the hook, so that the latter may now freely swing back and up into resting position.

This return stroke of the arm 3, 12 with the hook is obtained by the extra curved portion 34 of the helical groove 19. In order to be sure that the thread in the said manner is released from

the hook by the return stroke, the guiding member 4 may have such an inclined shape next to the hook in the recess 11 that it assists in tilting the thread off from the hook.

A tilting off of the thread from the hook may also be obtained by means of the two lowermost wings 9 of the guiding member 4, if these are shaped as indicated in Fig. 3a, consequently like inclined planes which have such a position relatively to the hook 1, that they during its movement together with the thread through the needle eye contact with the thread and moves it gently upwards above the catching edge 37 and then off from the hook.

The sleeve 16 may of course be mounted in another manner than that shown and in new machines it may constitute a part of their mechanisms, for instance of the head arm 23 or of the machine head 28. The arm 12, 3 may of course also be adapted to move into the parts 23 and 24, for instance into a groove or recess in same without being moved laterally. In such case the sleeve 16 with helical groove is arranged movably, or another similar guide is arranged for the arm 3, 12 during its movement into threading position.

Besides, all members will operate in corresponding manner and with the same result, either the catching portion of the hook 1 is directed upwards as shown or downwards.

We claim:—

1. In combination with a sewing machine, a needle threading device comprising a threading hook which may be passed through the needle eye, a hook carrying arm pivotally attached to a stationary portion of the machine so arranged as to move in forward direction, passing the hook through the eye and letting the hook catch the thread, and then to move back in the opposite direction, pulling the thread through the eye, a hook guiding member movably mounted on the hook carrying arm, a spring arranged between the arm and guiding member to tend to push the latter forwards on the arm, and guiding means proper provided in such a manner on said guiding member that they during the forward movement of the arm with hook and guiding member forwards towards the needle firstly engage the needle and stop against same to adjust the arm with hook properly relatively to the needle, then during further movement of arm and hook lie stationary and yield relatively thereto to guide the hook safely through the eye, the spring being simultaneously tightened, whereupon during backward movement of the arm finally the spring returns the guiding member on the arm whereby the hook with the caught thread is pulled through the eye during such backward movement of the guiding member into initial position on the hook carrying arm.

2. A needle threading device according to claim 1, wherein the guiding member is formed with diverging branches forming a V-shaped groove to enter into contact with the needle to fix a definite position of the hook relatively to the needle, said branches being simultaneously formed with slide edges to guide the thread into position to be caught by the hook.

3. In combination with a sewing machine, a needle threading device comprising a threading hook which may be passed through the needle eye, a hook carrying arm so arranged as to move in forward direction, passing the hook through the eye and letting the hook catch the thread,

and then to move back in the opposite direction, pulling the thread through the eye, a hook guiding member movably mounted on the hook carrying arm, a spring arranged between arm and guiding member to tend to push the latter forwards on the arm, and guiding means proper provided in such a manner on said guiding member that they during the movement of the arm with hook and guiding member forwardly towards the needle firstly engage the needle and stop against same to adjust the arm with hook properly relatively to the needle, then during further movement of arm and hook lie stationary and yield relatively thereto to guide the hook safely through the eye, the spring being simultaneously tightened, whereupon during backward movement of the arm finally the spring returns the guiding member on the arm whereby the hook with the caught thread is pulled through the eye during such backward movement of the guiding member into initial position on the hook carrying arm, a moving apparatus for the hook carrying arm being provided comprising a sleeve attached stationary on the sewing machine and formed with a helical groove, a piston movably and turnably mounted in the sleeve, a spring acting on the sleeve, so as to press against the piston longitudinally, the hook carrying arm being attached to the piston and passing therefrom out through the helical groove which has such a shape that during a longitudinal movement of the piston with arm in the sleeve the piston and arm are also swung about the piston axis, whereby the arm from an upper inoperative position behind the head-arm of the machine is displaced horizontally and is simultaneously swung down into operative position with the hook in proper position to the needle.

4. A needle threading device according to claim 3, wherein the piston has a projecting handle serving to move the piston in the sleeve manually to cause the movement of the arm down against the needle.

5. A needle threading device according to claim 3, wherein at one end of the helical groove means are provided to hold the hook carrying arm stationary under spring-pressure in threading position relatively to the needle.

6. A needle threading device according to claim 1, wherein the guiding member has diverging branches providing a V-shaped groove to enter into contact with the needle to fix a definite position of the hook relatively to the needle, said branches being provided with slide edges to guide the thread into position to be caught by the hook and also with inclined faces of such a shape and location as to enter into contact with the thread from below and to push it off from the hook during the withdrawal of the hook with the thread from through the needle.

7. In combination with a sewing machine, a needle threading device comprising a threading hook which may be passed through the needle eye, a hook carrying arm so arranged as to move in forward direction the hook through the eye and letting the hook catch the thread and then to move back in the opposite direction, pulling

the thread through the eye, a guiding member movably mounted on the hook carrying arm to guide the hook relatively to the needle, means for imparting to the hook carrying arm a movement towards the needle to pass the hook through the needle eye and then a return movement back into resting position, and means to impart to the arm and hook, after the same has been withdrawn from through the needle eye together with the thread, a rapid stroke towards the needle to release the thread from the hook, before the latter and the arm continue their return motion into resting position.

8. A needle threading device according to claim 3, wherein the helical groove is formed with a curved portion of such a shape and location as to impart to the hook carrying arm and hook, after the same has been withdrawn from through the needle eye together with the thread, a rapid stroke towards the needle to release the thread from the hook, before the latter and the arm continue their return motion into resting position.

9. In combination with a sewing machine, a needle threading device comprising a threading hook which may be passed through the needle eye, a hook carrying arm so arranged as to move the hook through the eye, let the hook catch the thread and pull it through the eye, a guiding member movably mounted on the hook carrying arm, the thread catching hook being formed with a convexly rounded portion at its rear operative part so as to engage the thread during the pulling thereof through the needle eye.

10. A needle threading device according to claim 9, wherein the guiding member has branches projecting forwardly on both sides of the hook and provided each with a top edge forming an inclined plane of such a location as to enter into contact with the thread from below and to push it upwards off from the hook, when the latter has pulled the thread through the needle eye and is moving forth in relation to the said inclined plane towards resting position.

11. A needle threading device according to claim 1, wherein a cam-like member is attached adjustably to the hook-carrying arm in such a position relatively to a member movable in the machine simultaneously with the needle that said member cooperates with the cam to guide the hook through the needle eye in a pre-determined height position of the needle and to move the arm and hook back from its position through the needle eye.

12. A needle threading device according to claim 1, wherein a long inclined cam-like plane is attached adjustably to the hook-carrying arm in such a position relatively to a screw clamping the needle to the needle bar that said screw cooperates with and slides on the inclined plane to guide the hook through the needle eye in a predetermined height position of the needle and to move the arm and hook back from its position through the needle eye.

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