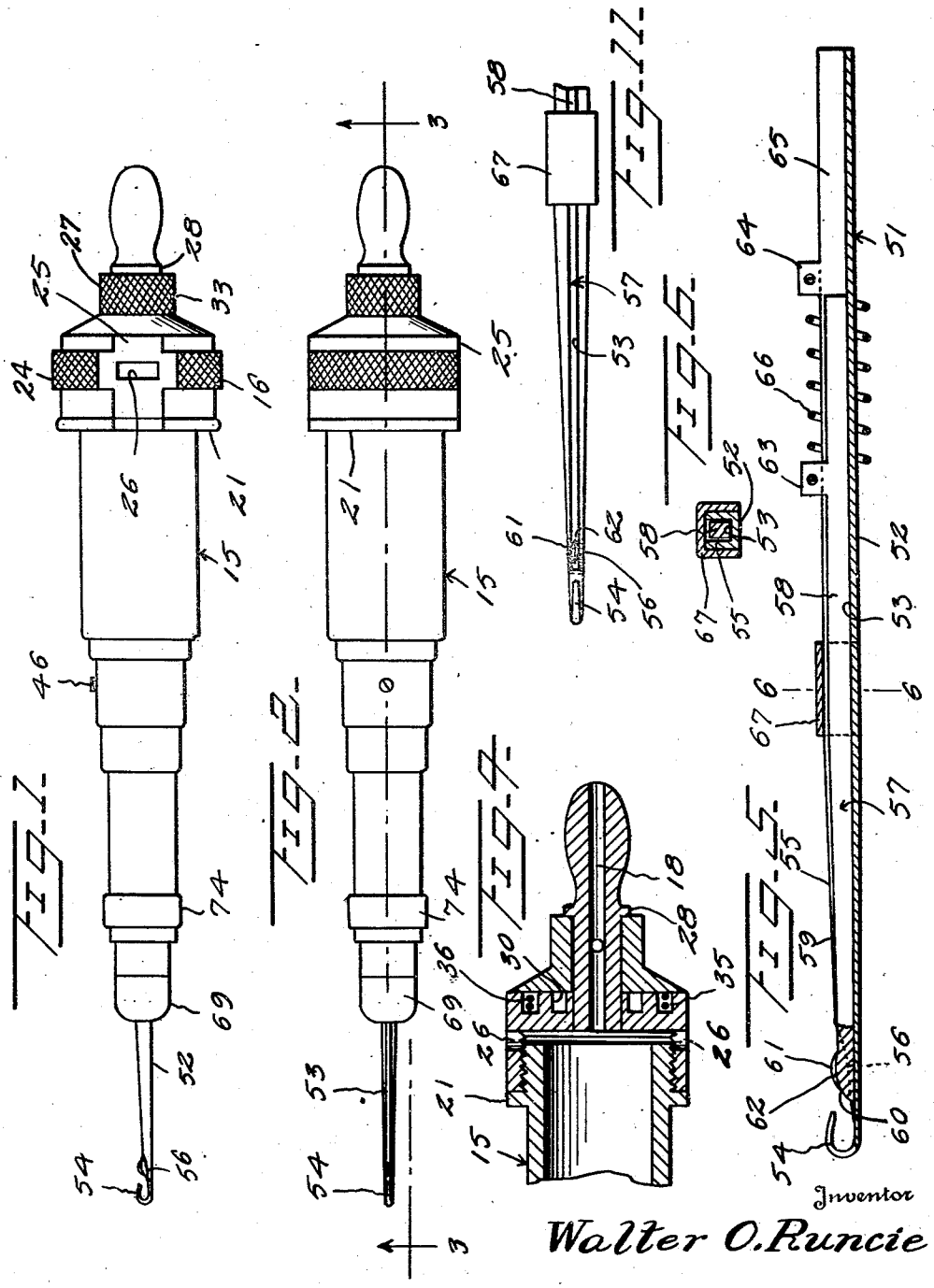
Feb. 4, 1947. W. O. RUNCIE 2,415,111

RELOOPING NEEDLE ASSEMBLY

Filed Aug. 5, 1944 2 Sheets-Sheet 1



Inventor
Walter O. Runcie

By Kimmel & Crowell
Attorneys

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RELOOPING NEEDLE ASSEMBLY

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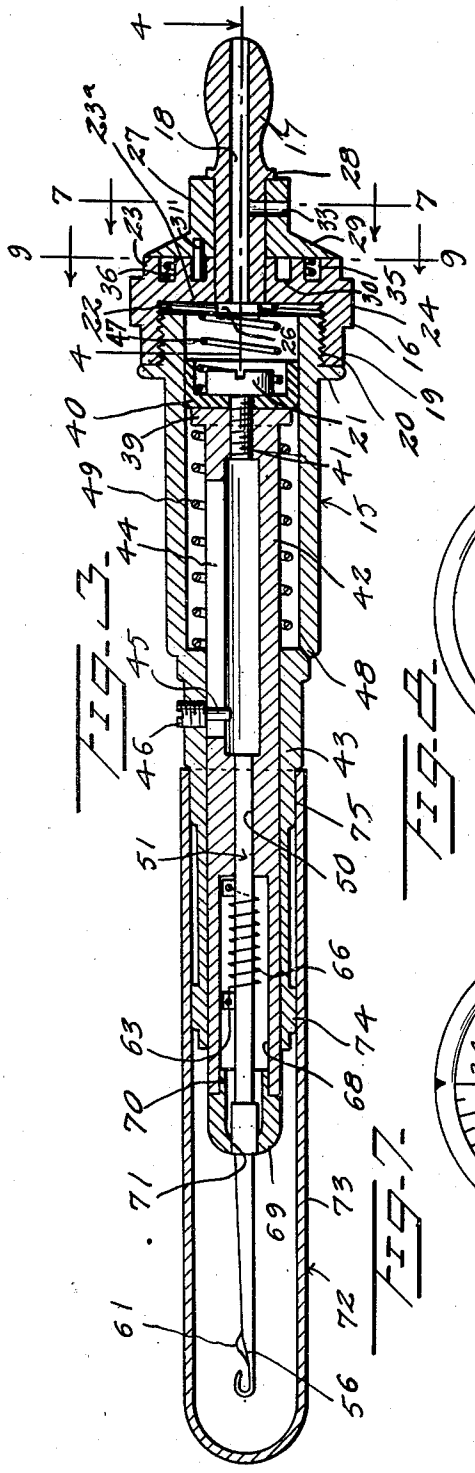


FIG. 7.

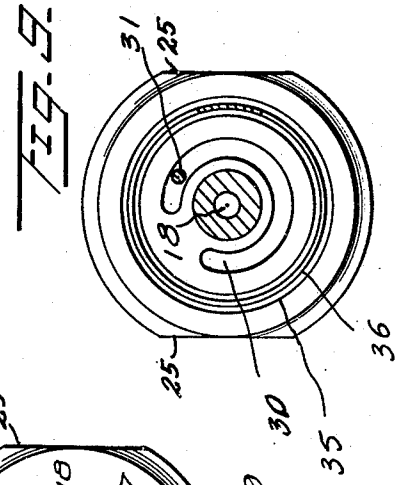


FIG. 5.

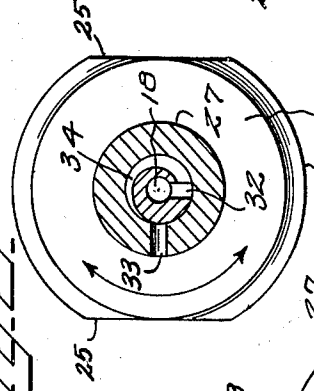


FIG. 8.

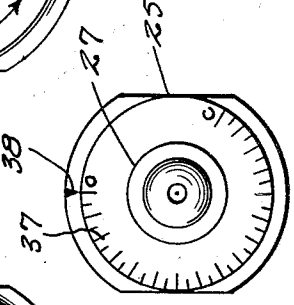


FIG. 9.

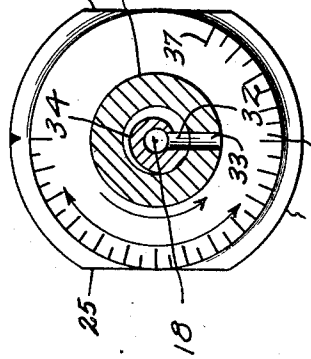


FIG. 10.

Inventor

Walter O. Runcie

By Kimmel & Crowell

Attorneys

Patented Feb. 4, 1947

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UNITED STATES PATENT OFFICE

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RELOOPING NEEDLE ASSEMBLY

Walter O. Runcie, Lima, Peru

Application August 5, 1944, Serial No. 548,195

5 Claims. (Cl. 66—1.5)

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This invention relates to a relooping needle for picking up dropped stitches in stockings or the like and is an improvement over the needle assembly embodied in copending application Serial No. 469,462, filed December 16, 1942, for Darning attachment for sewing machines.

An object of this invention is to provide a pneumatic relooping needle which is formed with a spring operated latch slidingly carried by the needle for closing the hook on the return stroke of the needle and opening the hook on the out or down stroke of the needle.

Another object of this invention is to provide in a pneumatic operator for a needle of this type an improved valved regulator which will provide for the quick stopping of the reciprocation of the needle at the will of the user.

A further object of this invention is to provide an improved calibrated regulator by means of which the length of stroke of reciprocation of the needle can be finely and accurately regulated.

A further object of this invention is to provide a needle of this type which will provide a more gentle action so that the needle will not damage delicate threads.

A further object of this invention is to provide a needle construction which may be made sufficiently fine for use with delicate threads, and of such simple construction that it will not readily get out of order.

A further object of this invention is to provide in a needle of this type an improved means for protecting the latch spring so that the spring will not be damaged.

A further object of this invention is to provide a protecting shell about the rear portion of the needle so as to prevent accumulation of foreign matter which would affect the smooth and constant operation of the latch.

Another object of this invention is to provide a removable protecting casing about the needle assembly so that it will not be injured when not in use.

With the foregoing objects and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, modifications and variations may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a detail side elevation of a relooping needle assembly constructed according to an embodiment of this invention,

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Figure 2 is a plan view of the needle assembly,

Figure 3 is a longitudinal section taken on the line 3—3 of Figure 2, with the cover or guard above the needle,

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3,

Figure 5 is an enlarged longitudinal section of the needle embodied in this invention,

Figure 6 is a sectional view taken on the line 6—6 of Figure 5,

Figure 7 is a sectional view taken on the line 7—7 of Figure 3,

Figure 8 is a view similar to Figure 7 but with the valve in closed position,

Figure 9 is a sectional view taken on the line 9—9 of Figure 3,

Figure 10 is a detail end elevation of the rear end of the device,

Figure 11 is a fragmentary plan on an enlarged scale of the needle.

Referring to the drawings, the numeral 15 designates generally a cylinder having mounted on the rear end thereof a cap or head 16. The cap or head 16 has secured in the center thereof an elongated nipple 17 having an axial bore 18 extending therethrough. The nipple 17 is adapted to be pressed or otherwise firmly secured in the head or cap 16. The cap or head 16 includes a cylindrical flange 19 which is threaded as at 20 onto the rear end of the cylinder 15 and the latter is formed with an annular flange or rib 21 outwardly of its inner end and against which the cylindrical flange 19 is adapted to abut. The flange 19 is of such length as to provide an annular air space 22 between the rear end of the cylinder 15 and the inner side 23*a* of the rear wall 23 of the cap 16.

The cap 16 includes an annular knurled rib 24 and this rib is provided with opposed flat portions 25. The cap 16 is also formed with a pair of openings 26 through the flat portions 25 which communicate with the annular chamber 22 so as to provide for exhausting of air from the cylinder 15 in the event it is desired to stop the operation of the needle as will be hereinafter described.

A knurled cylindrical adjustable valve 27 is rotatably mounted on the nipple or stem 17 and is held against endwise movement by means of an annular rib or flange 28 carried by the stem or nipple 17. The inner end of the valve member 27 is formed with a frusto-conical skirt or flange 29 having the base thereof confronting the outer

side of the wall 23. The wall 23 of the cap 16 is formed with an arcuate channel or recess 30 within which a pin or integral projection 31 carried by the flange or skirt 29 is adapted to loosely engage. The length of this arcuate channel 30 determines the degree of rotation of the valve member 27.

The nipple or stem 17 is formed with an exhaust opening 32 and the valve member 27 is also formed with an exhaust opening 33. The outer surface of the stem or nipple 27 is provided with a spiral groove 34 which has its deepest portion communicating with the opening 32 and the groove 34 then gradually becomes more shallow and finally merges with the periphery of the stem or nipple 17, as shown in Figure 8.

This gradually reducing groove 34 provides a means whereby a selected amount of air may be exhausted from the bore 18 so as to thereby provide for regulating the pressure exerted on the piston which is slidable in the cylinder 15. The head or outer wall 23 is formed with an annular groove or channel 35 within which a spring 36 is adapted to engage, the spring 36 providing for the frictional holding of the valve member 27 in its adjusted position. The outer portion of the frusto-conical skirt or flange 29 is provided with a series of graduations 37 and a point or indication 38 is provided on the outer edge of the knurled rib 24 so that the valve member 27 may be rotatably adjusted to provide for the desired release or exhausting of air through the exhaust opening 33.

A piston 39 is slidable within the cylinder 15 and includes a cup-shaped flexible washer 40 secured to the piston 39 by means of a fastening member 41. The piston 39 includes an elongated hollow stem or shank 42 which slidably engages a cylindrical guide or bearing 43 extending from the forward end of the piston 15. The shank or stem 42 is provided with a longitudinally extending slot 44 within which a pin 45 carried by a set screw 46 is adapted to loosely engage so as to thereby hold the piston 39 against rotary movement while permitting free sliding movement thereof.

A spring 47 is disposed within the cylinder 15 bearing at its forward end against the cup-shaped washer or sealing member 40 and at its opposite or rear end bearing against the inner wall 23a of the cap 16. The spring 47 cushions the return of the piston 39, and assists the air pressure in starting a new cycle of operation. The cylinder 15 adjacent the forward end thereof is provided with a vent opening 48 so as to permit air to be exhausted from or drawn into the cylinder 15 at the forward side of the piston 39. A compression spring 49 is disposed in the cylinder 15 at the forward side of the piston 39.

The shank or stem 42 is provided rearwardly of the forward end thereof with a central opening 50 within which the rear end of a needle structure generally designated as 51 is adapted to tightly engage. The needle structure 51 includes an elongated bar 52 which is provided with an elongated longitudinally extending slot or passage 53 opening through one side thereof. The forward end of the bar or shank 52 is provided with a reverted hook 54 at its forward end and the opposite sides 55 of the bar or shank 52 are cut away is indicated at 56 on a gradual inclination extending rearwardly from the hook 54.

A latch member generally designated as 57 is slidable in the slot or guide opening 53 and includes an elongated shank 58 which has a forwardly and inwardly inclined upper edge 59. The forward end of the latch member 57 is formed on angle as indicated at 60, the angle being inclined upwardly and rearwardly and a knob or enlargement 61 is formed on the upper edge of the latch member 57 at the forward end thereof in a position confronting the free end or bill of the hook 54. The enlargement or knob 61 is provided with a slot 62 within which the bill of the hook 54 is adapted to engage so that on one movement of the needle assembly the hook will not catch on a thread, whereas on the opposite movement of the needle assembly the latch member 57 will be automatically moved to a released or opened position.

In order to provide for the automatic movement of the latch 57 to open position, I have provided an ear 63 which is carried by the shank 58 at a point spaced forwardly from the rear end thereof. The ear 63 projects above the needle bar or shank 52 and a second ear 64 is fixedly carried by the bar or shank 52 at a point spaced forwardly from the rear end thereof. In practice, the ear 64 is carried by a bar or pin member 65 which is secured between the sides of the slot 53, and the rear end of the shank 58 is adapted to abut against the forward end of the bar 65 when the shank 58 is pulled rearwardly under the tension of a return spring 66. The return spring 66 is secured at the opposite ends thereof to the ears 63 and 64.

The latch member 57 is slidingly retained in the slot 53 by means of a U-shaped clip or strap 67 which engages over the open side of the slot 53 and is secured to the opposite sides 55 of the shank 52. The shank 42 which is connected to the piston 39 is provided with an enlarged bore 68 extending from the bore 50 and opening through the forward end of the shank 42. The enlarged bore 68 is provided in order to permit the ears 63 and 64 and the spring 66 to freely operate during the operation of the device. A cap 69 having a reduced rear end 70 is adapted to frictionally engage in the outer end of the shank 42, the cap 69 being formed with a central opening 71 within which the shank 52 engages.

In order to provide for protecting the needle structure when the device is not in use, I have provided an elongated cap 72 which is formed with a cylindrical or slightly tapered side wall 73 engaging annular ribs 74 and 75 carried by the guide 43.

In the use and operation of this relooping needle, the cap 72 is removed to provide for engagement of the needle structure in the knitted article. The nipple 17 is connected to a source of air supply, preferably an air supply embodying impulses generated by a reciprocating compressor, as embodied in my copending application Serial Number 469,462, filed December 18, 1942, now Patent No. 2,390,329.

The valve member 27 is set by rotating this member on the nipple or stem 17. The cylinder 15 is grasped in one hand with the thumb, and fore or index finger engaging the opposed release openings 26 in the cap 16. As the pulsations of air enter the cylinder 15, piston 39 will be reciprocated, the degree of reciprocation depending on the adjustment of valve member 27. When hook 54 moves downwardly the loop within the hook will slide out and engage enlargement 61, spring 66 assisting the loop in moving latch 57 to open position. As hook nears the lower end of its downward stroke the loop will slide over enlargement 61 so that latch 57 may be

closed over the next thread. Continued upward movement of the needle will cause the loop engaged with the enlargement or knob 61 to ride downwardly thereover, the inertia of the latch 57 and shank 58 moving latch 57 to closed position, and thereafter sliding downnwardly over closed hook 54. The thread now engaged with hook 54 will repeat the above operation. As the piston 39 moves forwardly any air in the forward end of the cylinder 15 will be exhausted through the vent 48 and on the return or rearward stroke of the piston 39 air will be drawn inwardly into the cylinder 15 through the vent opening 48.

In the event it is desired to instantly stop the operation of the piston 39 and the needle structure 51, this can be accomplished by removing the thumb and finger from the opposed openings 26. These openings 26 are of such size that the pulsating air entering the rear end of the cylinder 15 and exhausting from these openings will not be of sufficient pressure when the openings 26 are uncovered to provide for reciprocation of the piston 39.

The needle structure will thereupon promptly stop whereas the source of pulsating pressure may continue in its operation. In this manner, it is not necessary to cut off the source of pulsating pressure every time it is desired to stop the operation of the needle structure.

What I claim is:

1. A relooping needle assembly comprising a cylinder, a piston slidable in said cylinder, a needle connected to and operated by said piston, a spring in said cylinder constantly urging said piston in one direction, a head carried by said cylinder, a coupling member carried by said head for connection with a source of pulsating air supply, said coupling member having an exhaust opening adjacent said head, and a sleeve valve about said coupling member having an opening adapted to register with said exhaust opening.

2. A relooping needle assembly comprising a cylinder, a piston slidable in said cylinder, a needle connected to and operated by said piston, a spring in said cylinder constantly urging said piston in one direction, a head carried by said cyinder, a coupling member carried by said head for connection with a source of pulsating air supply, said coupling member having an exhaust opening adjacent said head, and a cylindrical valve member about said coupling member having an opening adapted to register with said exhaust opening, one of said members having a non-circular surface confronting the adjacent circular surface of the other member whereby rotation of said sleeve valve will effect finely regulated exhaust of air.

3. A relooping needle assembly as set forth in claim 2 including frictional means holding said sleeve valve against rotation.

4. A relooping needle assembly as set forth in claim 2 wherein said non-circular surface is formed on said coupling member.

5. A relooping needle assembly as set forth in claim 2 wherein said non-circular surface is of substantially spiral configuration in cross section.

WALTER O. RUNCIE.

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